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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
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TABLE OF ACRONYMS

Acronym	Meaning
AEL	Associated Emission Level
BAT	Best Available Technique
BAT-AEL	BAT-Associated Emission Level
BAT-AEPL	BAT-Associated Environmental Performance Level
BATC	Best Available Techniques conclusions
BAU	Business As Usual
BREF	Best Available Techniques Reference document
CAPEX	Capital expenditure
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilisation
Cd	Cadmium
CE	Circular economy
CEMS	Continuos emissions monitoring systems
CMS	Chemical Management System
CMR	Carcinogenic, mutagenic and reprotoxic
EIA	Environmental Impact Assessment
EEA	European Environment Agency
EGD	European Green Deal
EIPPCB	European Integrated Pollution Prevention and Control (IPPC) Bureau
ELV	Emission Limit Value
EMS	Environmental Management System
EMAS	Eco-Management and Audit Scheme
E-PRTR	European Pollutant Release and Transfer Register
EPER	European Pollutant Emission Register
ETS	Emissions Trading System
FF55	Fit for 55
GHG	Greenhouse gas
HFC	Hydrofluorocarbons
Hg	Mercury
IA	Impact assessment
INCITE	INnovation Centre for Industrial Transformation & Emissions
IED	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions
INSPIRE	Infrastructure for Spatial Information in Europe
JRC	EU Joint Research Centre
LCP	Large Combustion Plant
LSU	Livestock Unit
MCA	Multi-criteria analysis
MCP(D)	Medium Combustion Plant (Directive)
MS	Member State
MWEI	Management of Waste from Extractive Industries (directive)
NGO	Non-Governmental Organisation
NMVOC	Non-methane volatile organic compounds
NO_x	Generic term for the nitrogen oxides that are most relevant for air pollution
ODS	Ozone depleting substances

Acronym	Meaning
OECD	Organisation for Economic Co-operation and Development
OPC	Open Public Consultation
OPEX	Operational expenditure
PBT	Persistent, bioaccumulative and toxic
PFAS	Perfluoroalkyl chemicals
PM ($_{2.5}$ and $_{10}$)	Particulate Matter of size < 2.5 µm or < 10 µm
PO	Policy option
PRTR	Pollutant Release and Transfer Register
RE	Resource Efficiency
REACH	Regulation (EC)1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals
SO_2	Sulphur dioxide
REFIT	Regulatory Fitness and Performance Programme
SVHC	Substance of very high concern
TRL	Technology Readiness Level
TWG	Technical Working Group
UNECE	United Nations Economic Commission for Europe
UWWTP(D)	Urban Waste Water Treatment Plant (Directive)
vPvB	Very persistent and very bioaccumulative
WFD	Water Framework Directive
WHO	World Health Organisation
ZPAP	Zero Pollution Action Plan

1. INTRODUCTION: POLICY AND LEGAL CONTEXT

1.1. Context of the initiative

The European Green Deal (EGD)[1] is Europe's growth strategy to ensure by 2050 a climate-neutral, clean and circular economy, optimising resource management, minimising pollution while recognising the need for deeply transformative policies. The EU Chemicals Strategy for Sustainability[2] of October 2020 and the Zero Pollution Action Plan[3] adopted in May 2021 specifically address pollution aspects of the EGD. In parallel, the New Industrial Strategy for Europe[4] highlights the need for new technologies, innovation and investment to strengthen Europe's industrial competitiveness and facilitate industry's shift to a truly sustainable, greener and more digital economy. The updated May 2021 version of this strategy[5] further emphasises the potential role of transformative technologies.

Other particularly relevant policies comprise the "Fit for 55" package[6], the Methane Strategy[7] and the Glasgow methane pledge, the Climate Adaptation Strategy[8], the Biodiversity Strategy[9], the Soil Strategy[10], the Farm to Fork initiative[11] and the upcoming Sustainable Products Initiative[12].

In the EGD, the Commission commits to revise EU measures to address pollution from large industrial installations, notably by looking at the scope of the legislation and at how to make it fully consistent with the European Green Deal, the zero pollution ambition, and climate, energy and circular economy policies, bearing in mind the benefits for both public health and biodiversity. The **Industrial Emissions Directive 2010/75/EU (IED)**[13] and the **Regulation (EC) No 166/2006 on the European Pollutant Release and Transfer Register (E-PRTR)**[14] are complementary instruments controlling the environmental impact of industry. The IED establishes a system of 'command and control' to secure a progressive reduction of pollution from the EU's largest industrial and rearing of livestock installations (hereafter agro-industrial installations)[15], whilst preserving a competitive level playing field. The E-PRTR facilitates monitoring of pollution-reduction efforts by enhancing publicly available information on the actual performance of installations.

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[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640
[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0667&from=EN
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102
[5] https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf
[6] https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal_en
[7] https://ec.europa.eu/energy/sites/ener/files/eu_methane_strategy.pdf
[8] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN
[9] https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en
[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0699
[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0381
[12] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_en
[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075&qid=1624007748130
[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006R0166&qid=1624007792921
[15] The expression agro-industrial installations is used to capture all types of activities that may be regulated by the IED mechanisms, including in particular energy-intensive industries and rearing of livestock

This legislation has links with many other policies since it seeks to address the environmental pressures of agro-industrial installations in a holistic manner. However, the effectiveness of its contribution varies by policy area. This is discussed in the section on problem definition and drivers.

Table 1: Mapping of IED and E-PRTR links to EGD policies

Policy area	IED and E-PRTR contribution and relevance
Zero pollution	• IED prevents and reduces emission of pollutants to air, water and soil • IED seeks to ensure that emissions do not lead to exceedances of environmental quality standards defined in air and water legislation • IED regulates transfers of industrial pollutants to urban waste water plants • E-PRTR provides public access to data on the amount of pollutants emitted and transferred, thereby empowering civil society
Sustainable Chemicals	• IED reduces the presence of harmful chemicals in the environment • IED encourages the use of safer chemicals in production processes • E-PRTR data is used when assessing risks of harmful chemicals
Circular economy	• IED promotes efficient use of materials, water and energy • IED encourages the use of secondary raw materials
Waste	• IED reduces emission of pollutants from polluting waste treatment installations • IED promotes waste prevention and recycling • E-PRTR provides data on industrial waste transfers to treatment facilities
Sustainable Products	• IED levels the playing field for the production of intermediate products (e.g. metals, paper, cement, and polymers), addressing part of products' lifecycle
Nature and biodiversity	• Pollution is one of the drivers of biodiversity loss. By curbing pollutant emissions, the IED contributes to protecting biodiversity
Climate	• IED takes GHG emissions of pollutant reduction techniques into account • IED regulates emission of GHG not covered by the ETS, e.g. methane • E-PRTR provides data on a range of GHG emissions
Energy	• IED identifies energy efficiency techniques and establishes energy performance levels for specific processes
Innovation	• IED seeks to promote emerging techniques
Sustainable finance	• IED information is used in defining criteria for the Taxonomy • E-PRTR provides data to gauge the environmental performance of installations
Digitalisation	• E-PRTR promotes the use of advanced IT instruments to make environmental information publicly available
Industrial strategy	• IED contributes to levelling the EU playing field for production processes • IED is increasingly recognised internationally as a model for developing industrial emission policies[16] • E-PRTR data can be compared internationally with other countries

The Council[17] and the European Parliament[18,19,20] welcomed the revision of the IED and expressed their expectations that this revision will address pollutant emissions to air from

[16] https://www.oecd.org/chemicalsafety/risk-management/best-available-techniques.htm?utm_source=Adestra&utm_medium=email&utm_content=More%20on%20the%20BAT%20project&utm_campaign=November%202017%20Chemical%20Safety%20News&utm_term=demo
[17] https://data.consilium.europa.eu/doc/document/ST-6650-2020-INIT/en/pdf
[18] https://www.europarl.europa.eu/doceo/document/TA-9-2021-0107_EN.html
[19] https://www.europarl.europa.eu/doceo/document/TA-9-2020-0005_EN.pdf
[20] https://www.europarl.europa.eu/doceo/document/TA-9-2020-0321_EN.pdf

industrial and agricultural activities and contribute to the circular economy, including by promoting water reuse in industry[21,22].

The multi-stakeholder High Level Group on Energy-Intensive Industries, advising the Commission on policies relevant to energy-intensive industries since 2015, developed a masterplan[23] with recommendations to build the policy framework needed to manage this transition while keeping industry competitive. It recommends that '*The Industrial Emissions Directive permitting process should be adapted to support GHG* [greenhouse gas] *abatement measures in energy-intensive installations throughout the transition.*'

This impact assessment focuses on the processes set out in the IED and the E-PRTR to minimise pollution from agro-industrial installations in the context of the recently adopted Climate Law and the Fit for 55 package[24] of climate, energy and transport proposals. It does not discuss the wider problems of environmental pollution, biodiversity loss, climate change and resource depletion, which are subject to other specific policies.

The key aims of this impact assessment are to:

1. Identify and assess the impacts of policy measures to address the shortcomings identified in evaluations of the IED and the E-PRTR thereby contributing to the zero pollution ambition of the European Green Deal in general, and the objectives of the Zero Pollution Action Plan in particular.

2. Assess how this legislation may contribute to wider EGD policy goals and respond to relevant stakeholder concerns and Council conclusions and resolutions from the European Parliament. This requires exploring a range of options of varying ambition, covering the promotion of innovation, resource efficiency, circularity and decarbonisation, thus enhancing the EU's resilience whilst reducing harmful impacts on both public health and biodiversity.

3. Address the current and future interactions between reducing emissions of pollutants (depollution) and GHGs (decarbonisation) including policy coherence to maximise industrial installations' contribution to the EU's twin targets of Zero Pollution and Net Zero Carbon emissions.

1.2. The IED (Industrial Emissions Directive)

Processes established by the IED

The IED controls the environmental impacts of around 52 000 of Europe's large-scale, high pollution risk agro-industrial installations in an integrated manner, on a sector-by-sector basis. It covers all relevant pollutants potentially emitted by industrial installations that affect human health and the environment[25]. IED installations account for about 20% of the EU's overall pollutant emissions by mass to air, around 20% of pollutant emissions to water and

[21] https://data.consilium.europa.eu/doc/document/ST-9419-2021-INIT/en/pdf
[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
[23] https://op.europa.eu/en/publication-detail/-/publication/be308ba7-14da-11ea-8c1f-01aa75ed71a1/language-en
[24] https://ec.europa.eu/info/sites/default/files/chapeau_communication.pdf
[25] Annex II to the IED provides a non-exhaustive list of relevant pollutants

approximately 40% of GHG emissions[26]. Activities regulated by the IED include e.g. power plants, refineries, waste treatment and incineration, production of metals, cement, glass, chemicals, pulp and paper, food, and drink, as well as the rearing of pigs and poultry. An IED installation may undertake several IED activities, e.g. cement production and waste co-incineration.

National authorities are obliged to issue permits covering each installation's activities based on the use of Best Available Techniques (BAT)[27]. To ensure a consistent approach across the EU, BAT reference documents (BREFs), addressing specific agricultural or industrial activities, are produced via a EU-wide assessment, the 'Sevilla process', by Technical Working Groups (TWGs) whose members include non-governmental organisations (NGOs) promoting environmental protection, industry associations, EU Member States and the European Commission. BREFs are large documents (up to more than 1 000 pages) describing the concerned sector(s), the techniques used and evidence gathered for establishing BAT and, where possible, quantifying their environmental performance.

The conclusive chapters of BREFs are adopted as Commission Implementing Decisions (the 'BAT conclusions') and are legally binding. Member States' permitting authorities must use BAT conclusions as the reference when setting, in the relevant permit, the conditions which regulate the modalities of operating specific installations. Each site-specific permit must include Emission Limit Values (ELVs) for relevant pollutants from within the range of the BAT-Associated Emission Levels (BAT-AELs) set in the sectoral BAT conclusions.

Experience has shown that by defining in some degree of detail the tasks of the competent authorities, Member States have ensured that the appropriate level of resources were made available to fulfil the related obligations and comply with the Directive. However, the revision of the large number of permits of pigs and poultry farms has been a challenge for these competent authorities.

Interaction between the IED and other EU environmental law

The IED permits must respect limits placed on releases of pollutants and other resource, waste, and environmental controls, including ensuring a high level of protection of media (air, water etc) and ecological habitats. These levels of controls may refer to the prevention or high degree of control of pollution entering river basins, groundwater or air, which by their nature may span the territories of more than one Member State. Alternatively, a nature protection site may be close to the IED installation in question, and thus require a high level of localised protection.

By regulating certain activities at source, the IED:

[26] SWD(2020) 181

[27] Defined in Article 3 (10) of Directive 2010/75/EU as a combination of "best", "techniques" and "available techniques". Using this trio of conditions, the emphasis of the end result is (*sensu lato*) on achieving the most effective way of protecting the environment as a whole, under economically and technically viable conditions, and referring to the way in which the installation is designed, built, maintained, operated and decommissioned.

- In parallel with other EU law regulating emissions at source[28]:
    - Supports Member States in meeting their obligations under EU legislation setting environmental quality standards, e.g. the Ambient Air Quality Directive[29], and the Surface Water Directive[30].
    - Also supports the Member States in meeting the objectives they have under EU legislation setting national targets, such as the National Emission reduction Commitments (NEC) Directive[31] (e.g. by reducing emissions of SO_2), the Effort Sharing Regulation[32] (e.g. by reducing emissions of methane) and the Energy Efficiency Directive[33].
- The IED does not regulate emissions of greenhouse gasses that fall within the scope of the EU Emissions Trading System (ETS)[34]. It however complements the EU ETS by regulating emissions of greenhouse gases from industrial activities that do not fall under the EU ETS (e.g. methane or fluorinated gases).
- Secures general environmental performance improvement contributing to other EU sectoral legislation including REACH[35], waste[36], and nature protection[37].
- Urban Waste Water Treatment[38]- The current UWWTD regulates pollutants typical for such wastewater (e.g. organic matter), whereas it only includes general principles for pollutants that may be released to the sewer by IED installations (e.g. heavy metals). The current IED contains an ambiguous provision allowing higher emissions from IED installations if there is a downstream wastewater treatment plant.
- In line with the Aarhus Convention, horizontal and vertical EU law ensures access to environmental information. Directive 2003/4/EC on public access to environmental information defines the principles on access, disclosure and withholding of such information. The IED requires access to information on permitting processes and permits.

Progress achieved under the IED

The 2020 evaluation[39] provides a detailed overview of the functioning of the processes set up by the IED. Annex 14 reproduces relevant excerpts thereof.

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[28] For example, for cars, Euro 5 and 6 Regulation 715/2007/EC sets the emission limits for NO_X and Regulation (EU) 2019/631 sets emission performance standards for CO_2

[29] Directive 2008/50/EC, *OJ L 152, 11.6.2008, p. 1–44* http://data.europa.eu/eli/dir/2008/50/oj

[30] Directive 2008/105/EC, OJ L 348, 24.12.2008, p. 8 . https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0105

[31] Directive (EU) 2016/2284, *OJ L 344, 17.12.2016, p. 1–31* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.344.01.0001.01.ENG&toc=OJ:L:2016:344:TOC

[32] Regulation (EU) 2018/842 , *OJ L 156, 19.6.2018, p. 26–42* http://data.europa.eu/eli/reg/2018/842/oj

[33] Directive (EU) 2018/2002 as amended, *OJ L 328, 21.12.2018, p. 210-230* http://data.europa.eu/eli/dir/2018/2002/oj

[34] Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading

[35] Regulation (EC) No 1907/2006 , as amended (current consolidated version: http://data.europa.eu/eli/reg/2006/1907/2021-10-01)

[36] E.g. Waste Framework Directive 2008/98/EC, as amended (current consolidated version: http://data.europa.eu/eli/dir/2008/98/2018-07-05

[37] Inter alia, the Habitats Directive 92/43/EEC, as amended (current consolidated version: http://data.europa.eu/eli/dir/1992/43/2013-07-01)

[38] Council Directive 91/271/EEC concerning urban waste water treatment

[39] See section 2 of SWD(2020)181 https://europa.eu/!HP74fW, pages 7 to 13

The IED evaluation concluded that the directive is generally effective in preventing and controlling pollution to air, water and soil from industrial activities, as well as in pushing forward the incorporation of BAT. The process for producing BREFs and identifying BAT has worked well, and is recognised as a model of collaborative governance and co-creation of legislation.

The IED has substantially reduced emissions of pollutants to air and, to a lesser degree, water emissions. It has also contributed to minimising emissions to soil from IED installations. Although its impacts on resource efficiency, the circular economy and innovation are harder to assess, it appears to have made a positive contribution, even though this to date may be of limited magnitude. It has also made a limited contribution to decarbonisation, within the constraints currently placed on the IED (see Section 2.4). Other aspects, such as public access to information and access to justice, have improved compared to the earlier legislation that the IED replaced.

The IED design ensures proportionality of outcomes by (i) defining BAT as the most environmentally effective as well as economically viable range of proven techniques used in a sector, and (ii) allowing derogations in individual cases if application of the EU-wide BAT requirements would lead to costs disproportionately higher than the expected environmental/health benefits. The evaluation concluded that the IED has mixed impacts on EU competitiveness: on one hand driving the export of EU sustainability expertise, on the other imposing additional compliance costs in the EU compared to elsewhere. Nevertheless, Eurostat data shows that, overall, the industry environment compliance costs remain relatively constant and are generally a small factor in global competitiveness, with other costs, such as labour, raw materials and energy, being much more influential. The IED design also allows for evidence-based input to the taxonomy process. Furthermore, the IED's provisions on access to information and public participation help operators to diffuse societal disagreements and tensions when establishing or expanding industrial activities. The co-creation of BAT requirements by Member States, industry and environmental NGOs ensures a high, albeit not necessarily absolute, level of support by Member States, industry and environmental NGOs.

The evaluation, however, also identified areas for improvement that are discussed in the problem definition section.

1.3. The E-PRTR Regulation

Processes established by the E-PRTR Regulation

Since 2007, the E-PRTR has provided accessible environmental data from the largest EU agro- industrial facilities[40]. It implements the EU's international obligations from the UNECE Kyiv Protocol[41], under the umbrella of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters[42].

[40] There is also data for Switzerland, Iceland, Liechtenstein, Norway and Serbia. The UK has exited from the E-PRTR as a consequence of Brexit

[41] https://unece.org/DAM/env/pp/prtr/Protocol%20texts/PRTR_Protocol_e.pdf

[42] https://unece.org/DAM/env/pp/documents/cep43e.pdf

Data on key pollutants are provided by operators of some 30 000 agro-industrial facilities. This data is held in the E-PRTR database hosted and maintained by the European Environment Agency, as part of a revamped Industrial Emissions Portal[43], where annual emission[44] data are combined with data reported under the IED. This covers 65 economic activities that are closely (but not exactly) aligned to the list of activities regulated under the IED.

For each facility, operators provide annual information on the quantity of pollutants emitted to air, water and soil (land), together with off-site transfers of hazardous and non-hazardous waste and pollutants in waste water. The reported data may come from measurements, calculations or estimations, and they cover all emission routes i.e. deliberate, accidental, routine or non-routine. The E-PRTR covers 91 key pollutants, including heavy metals, pesticides, GHGs and dioxins. To concentrate efforts on reporting solely the largest emission sources, the E-PRTR's scope is restricted to facilities that emit more than defined thresholds, set for each pollution type.

In addition to these core datasets, which cover the main point sources of pollution, the E-PRTR contains spatially disaggregated data on emissions from diffuse (i.e. non-point) sources such as transport or domestic heating, resulting from modelling.

Interaction between the E-PRTR Regulation and other EU environmental law

Compared to the IED, the E-PRTR covers additional activities that are derived from the UNECE Kyiv Protocol (e.g. waste water treatment plants, mining, aquaculture) but omits certain activities introduced by the IED in 2010 (e.g. waste recovery, carbon capture and storage).

An E-PRTR facility may comprise several IED installations e.g. a complex petrochemical facility may operate installations for oil refining, chemical production and power generation. As such, the E-PRTR Regulation covers the overwhelming majority of IED installations.

Annex 16 maps the scope of the IED, the E-PRTR Regulation and other relevant EU law. The main E-PRTR interfaces with other EU law are with the directives for:

- Aarhus Convention - horizontal and vertical EU law ensures access to environmental information. The E-PRTR ensures disclosure to the public of comprehensive information on emission of pollutants.
- EU ETS – compared to the ETS, E-PRTR provides a wider scope of GHG data (adding CFCs, HCFCs etc.), provides more nuance on carbon dioxide emissions (as it distinguishes biomass derived CO_2) and, through the Industrial Emissions Portal, provides enhanced data accessibility. In addition, ETS emissions are subject to Monitoring, Reporting and Verification (MRV)[45] requirements but, in view of the associated financial implications, these are typically more formal and onerous than quality assurance processes under the E-PRTR. ETS data are publicly available as a simple list via the EU

[43] https://industry.eea.europa.eu/

[44] The E-PRTR term 'releases' is equivalent to 'emissions'. Therefore, for clarity, the term 'emissions' is used instead of the term 'releases', wherever possible in this staff working document.

[45] https://ec.europa.eu/clima/sites-0/emission-trading-system-mrv-reporting_en

Registry[46]. In practice, the same emission data may be used by operators for both ETS and E-PRTR purposes although this can be complicated by different installation boundaries for the two regimes.

- Whilst the UWWTD sets regulatory controls on the operation of plants as small as 2 000 population equivalent (p.e.), the E-PRTR requires the very large plants (over 100 000 p.e.) to report their emissions. The E-PRTR also requires operators of industrial activities to report their transfers of waste water to UWWT plants. The Water Information System for Europe (WISE)[47] contains country-level overviews of UWWTD implementation but no data on emissions from individual plants.
- National Emission reduction Commitments (NECD)[48] – sets national (top-down) totals for the atmospheric emission of five key pollutants[49] and therefore complements the individual (bottom-up) source controls under IED permits and E-PRTR reporting obligations.

Progress achieved under the E-PRTR Regulation

The 2017 evaluation[50] provides a detailed overview of the functioning of the processes set up by the E-PRTR Regulation. Annex 15 reproduces the relevant excerpts of that evaluation.

The evaluation concluded that the Regulation is a pivotal component in the knowledge base on emissions from industrial activities in Europe. It was considered to be an important instrument in the EU environmental acquis and to be generally fit for purpose.

The readily-accessible data available on the new 'Industrial Emissions Portal' (previously the E-PRTR website) provide the public with information that greatly enhances their ability to engage with wider environmental decision-making. Moreover, for a variety of other users, including policy analysts, the E-PRTR remains the primary reference point for key environmental facts on large industrial activities.

The E-PRTR website and its associated search tools have been designed to make access as easy as possible. The E-PRTR evaluation showed an average of 242 consultations per day of the old E-PRTR website, by varied visitors (including public services, private enterprises, NGOs and the general public). In 2021, a different analytical method showed 160 website visits per day to the Industrial Emissions Portal.

The evaluation, however, also identified areas for improvement that are discussed below in the problem definition section.

2. PROBLEM DEFINITION

Annex 6 provides a detailed discussion of the problems and drivers, taking into account the outcome of the evaluations, stakeholders input and further analysis.

Based on this analysis there are five high-level problems to be addressed.

[46] https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/union-registry_en
[47] https://water.europa.eu/
[48] Directive (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants
[49] Sulphur dioxide, nitrogen oxides, volatile organic compounds, ammonia and fine particulate matter
[50] See section 2 of SWD(2017)710 available at https://europa.eu/!bC98wG, pages 3 to 9

2.1. Problem area 1: Insufficiently effective legislation

A major objective of the IED is to prevent or reduce emissions of pollutants to the environment, thereby helping to meet environmental and public health standards and objectives set in EU air quality[51] and water quality[52,53,54] laws.

Between 2010 and 2019, based on data reported to the E-PRTR, industrial emissions of sulphur oxides (SO_x) and particulate matter (PM_{10}) decreased by 50% in the EU. Other emissions decreased to a lesser extent: carbon dioxide (CO_2) by 8%, nitrogen oxides (NO_x) by 25% and heavy metals: cadmium (Cd), mercury (Hg) and lead (Pb) by 40%, whereas non-methane volatile organic compounds (NMVOC) increased by 1%[55]. From 2014 to 2017, ammonia emissions increased every year, and by about 2.5 % over the whole period[56].

At the same time, however, scientific evidence related to the negative impacts of air pollution has consolidated further, and the updated Air Quality Guidelines[57] as recently published by the World Health Organization (WHO) recommend lower guideline exposure levels than the previous 2005 edition for several air pollutants – including particulate matter, nitrogen dioxide and ozone. Accordingly, and in line with the European Green Deal, the European Commission will "propose to align EU air quality standards more closely with WHO recommendations"[58], which in turn may require further reductions of industrial emissions. Similarly, the gradual reduction of pollution is unlikely to allow the full cessation of priority hazardous substance[59] emissions to water bodies as stipulated in EU water legislation.

Large agro-industrial installations still significantly contribute to pollution across the EU, through both emissions (to air, water and soil) and the continued use of harmful substances in agro-industrial processes (including pesticides, insecticides and biocides). In 2017, these installations were responsible for over half of anthropogenic emissions to air of CO_2, SO_X, NMVOCs and the heavy metals (Cd, Hg and Pb), and were key sources of NO_X (32%) and PM_{10} (28%)[60]. This causes significant harm as evidenced by the damage costs (externalities) to public health and natural ecosystems due to emissions to air[61] reported to the E-PRTR, estimated for 2017 at 277 - 433 € billion. This represents only part of the health and environmental damages of polluting emissions by agro-industrial installations, as recognised monetisation methodologies only exist for some air pollutants and not for emissions to water or soil.

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[51] Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in air, and Directive 2008/50/EC on ambient air quality and cleaner air for Europe

[52] Directive 2000/60/EC establishing a framework for Community action in the field of water policy

[53] Directive 2008/105/EC on environmental quality standards in the field of water policy

[54] Directive 2006/118/EC on the protection of groundwater against pollution and deterioration

[55] https://www.eea.europa.eu/data-and-maps/indicators/industrial-pollution-in-europe-4/assessment

[56] https://www.eea.europa.eu/publications/nec-directive-reporting-status-2019/nec-directive-reporting-status-2019

[57] WHO guidelines available at 9789240034228-eng.pdf (who.int)

[58] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12677-Revision-of-EU-Ambient-Air-Quality-legislation

[59] The Water Framework Directive (2000/60/EC) and its daughter Directive 2013/39/EU

[60] Concerns EEA-33, i.e. the 33 member countries of the European Environment Agency including the EU-27 Member States, Iceland, Liechtenstein, Norway Switzerland, Turkey and UK - https://www.eea.europa.eu/data-and-maps/indicators/industrial-pollution-in-europe-3/assessment

[61] Based on value of a life year (VOLY) and value of statistical life (VSL); Schucht, et al., 2021 https://www.eionet.europa.eu/etcs/etc-atni/products/etc-atni-reports/etc-atni-report-04-2020-costs-of-air-pollution-from-european-industrial-facilities-200820132017

Member States mainly set Emission Limit Values (ELVs) in permits for individual agro-industrial installations towards the least stringent end (i.e. upper end) of the BAT-AEL ranges. Despite difficult access to permits and their complex and inhomogeneous drafting, the analysis of permits for several sectors shows[62] that between 75-85% of all emission limit values are either based on the upper end of the range or are above it. Furthermore, the IED offers flexibilities that are not always properly applied, e.g. allowing industrial waste waters to be discharged into the public collection systems even when the urban treatment water plants cannot, and do not, treat adequately such industrial pollutants. Many of these pollutants are priority hazardous substances under EU water legislation.

Member States implement IED requirements in a heterogeneous manner, including measures related to BAT conclusions. This leads to differences in granting derogations, compliance assessment and enforcement. In particular, when assessing permit compliance, Member States use diverging methods to account for measurement uncertainty thus creating discrepancies in EU-wide compliance. Even where permit ELVs are the same, diverging Member State approaches to measurement uncertainty lead to major differences in the actual emission levels. These discrepancies may reach 25% or more of the emissions of a given plant[63].

All of the above elements mean that the operation, permitting and monitoring of IED installations may be inconsistent with the objectives of the IED framework, and exhibit a lack of ambition with regard to the spirit of the law as outlined in, for example, Articles 11, 14, 15 and 18 of the existing IED. However, even where inconsistencies exist, both Member States' and operators' implementation methods can still be compliant with the present IED letter of specific articles within the law. It is for this reason that greater convergence between IED aims and the flexibilities given to all parties is required, whilst maintaining genuine reasons for taking into account technological and contextual specificities of individual installations.

The level of public access to information, participation in decision-making and access to justice with regard to permitting decisions and revisions remains an issue. Environmental NGOs complain that permit information is very difficult to access on the Internet and, even when available, it is so complex that the public cannot understand and use it. Information on emissions does not cover all relevant substances, which also makes it difficult to identify which sectors may be significant sources, e.g., of emissions of priority hazardous substances under EU water legislation, and thereby limits the capacity of the IED processes to define BATs for preventing their emission. Furthermore, the Meeting of the Parties to the Convention (Aarhus Convention MoP7) in October 2021[64] endorsed the conclusions of the Aarhus Convention Compliance Committee ha that the fact that the IED does not entitle the public to participate in reviews of permits triggered by the publication of new BAT conclusions is in breach of the EU obligations under the Convention[65]. As found out in the evaluation of the IED and recently underlined again in the 2020 Communication on improving access to justice[66], limitations also remain in access to justice including in the

[62] Assessment of BAT Conclusion Implementation in IED permits, Eunomia (2021) Draft Final Report

[63] https://circabc.europa.eu/sd/a/589a486c-1732-4e9d-abbc-a515ddf0aca0/IED-evaluation-support-study-published.pdf

[64] https://unece.org/environmental-policy/events/Aarhus_Convention_MoP7

[65] https://unece.org/fileadmin/DAM/env/pp/compliance/CC-68/ece.mp.pp.c.1.2020.8.e.pdf

[66] COM(2020) 643 final

ability of the public or environmental NGOs to challenge revisions of existing permits or to seek legal redress in case of damages.

With regard to the E-PRTR Regulation, information collected and made public is outdated and does not fully support the IED and its coherence with other policy areas, e.g. by not taking sufficiently into account priority substances under EU water legislation. The list of substances, and the reporting thresholds, for which reporting is required date from before 2006 and ignores development of emerging pollutants, e.g. PFAS[67].

These combined problems undermine the capacity of the IED and the E-PRTR Regulation to reduce environmental pressures exerted by agro-industrial installations, as well as the IED's ability to establish a level playing field at a high level of protection of health and the environment. These problems also relate to the failure to correctly apply the polluter pays principle, as identified by the European Court of Auditors[68].

Conclusions on problem and drivers

The IED and E-PRTR are less effective than they could be in terms of: ensuring prevention and reduction of pollution from agro-industrial installations, providing public access to information and participation in the permit procedure and coherence in implementation and enforcement.

Driver 1: Regulatory failure at the EU level: in particular, excessive flexibilities allowed by the IED for national authorities to set ELVs, grant derogations from BAT-AELs, and set other permit conditions, result in polluters not being required to sufficiently reduce or prevent harmful effects stemming from their operations and not paying the true costs (externalities) of their pollution, thus insufficiently implementing the "Polluter Pays Principle".

Driver 2: Imperfect information on emissions from large industrial installations, including on their environmental and health impacts, and insufficient public involvement in the permit setting process.

Driver 3: Regulatory failure at the Member State level (coherence, clarity) mean that rules on permitting conditions are not uniformly applied and enforced.

2.2. Problem area 2: Ineffective promotion of innovation

There are deficiencies in how the IED promotes new production processes, technologies and innovation. The reason for this is that BAT are inherently 'backwards looking', i.e. based on current, already established practices that are proven 'on the ground'. Emerging techniques are not taken into account when defining BAT and their performance levels. This results in BREFs that may hamper innovation deployment and slow technological progress or even "lock in" existing technologies and techniques as the norm for a decade or so, until the BREF is revised e.g. perpetuating the use of coke, rather than hydrogen, as a reducing agent to make steel.

Conclusions on problem area and drivers

The IED is not dynamic enough and does not sufficiently support the deployment of innovative processes and technologies.

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[67] Perfluoroalkyl substances; see https://echa.europa.eu/hot-topics/perfluoroalkyl-chemicals-pfas

[68] https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=58811#:~:text=Special%20Report%2012%2F2021%3A%20The%20Polluter%20Pays%20Principle%3A%20Inconsistent,and%20is%20a%20key%20concern%20for%20EU%20citizens.

Driver 4: Regulatory failure at the EU level in terms of backwards looking, rigid and slow processes to establish BAT[69], hindering the development and deployment of more effective innovative techniques.

2.3. Problem area 3: Insufficient contribution to resource efficiency and less toxic production

The IED has not been effective in addressing resource efficiency, circular economy and non-toxic production[70]. This is mainly because the IED only gives a clear legal status to the parts of BAT conclusions that contain ranges for setting emission limit values in permits for pollutant emissions to air and water. Other parts, such as techniques to reduce resource use and prevent waste generation, to reuse water within installations (or the use of reclaimed water for inflows)[71] or to use safer chemicals, are solely characterised as a 'reference' for setting permit conditions. Furthermore, Article 9(2) of the IED allows Member States to opt out from requirements on energy efficiency. This results in diverging interpretation by Member States of the legal status of those parts, leading to further discrepancy in implementation.

Furthermore, E-PRTR reporting is limited to emissions and does not cover, e.g., resource efficiency aspects, which are essential in contemporary EU policies.

Conclusions on problem area drivers

The IED and E-PRTR do not sufficiently promote the following: use of safer chemicals or chemical alternatives[72]; resource efficiency and Circular Economy solutions (with reference to materials, energy, waste prevention and reduction, and water use, and re-use).

Driver 5: Market/regulatory failure: the combination of (i) market prices not reflecting the environmental and health impacts of resources and hazardous substances, and (ii) the lack of clarity of the relevant IED provisions, in particular the weak status (mere reference) of the relevant parts of BAT conclusions, result in ongoing overuse of resources and hazardous substances by IED installations.

2.4. Problem area 4: Limited contribution to decarbonisation

Whilst IED installations are responsible for about 40% of total EU GHG emissions (36% out of these 40% are covered by the EU Emissions Trading System (ETS) Directive[73]), the interactions between GHG emission reduction possibilities and overall pollution emissions minimisation in the IED have, to date, not been sufficiently taken into account. This is partly because Article 9(1) of the IED prevents the setting of ELVs in IED permits for those GHG emissions that are covered by the EU ETS[74].

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[69] BAT conclusions are published after 5-6 years of data gathering and are implement in permits within 4 years. The revision of BAT conclusions may occur up to 10 years later.

[70] IED evaluation and Ricardo (2019) "IED Contribution to the circular economy"

[71] The Regulation on minimum requirements for water reuse ((EU) 2020/741) foresees the use of reclaimed water for agricultural irrigation; an evaluation of its scope is to take place in 2028 and assess in particular also reuse for industrial purposes. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R0741

[72] Building on the work under the Chemicals Strategy for Sustainability (COM(2020) 667) on chemicals that are safe and sustainable by design

[73] Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading

[74] Carbon dioxide (CO2), nitrous oxide (N2O) and perfluorocarbons (PFCs)

It is important to note, however, that there is no absolute exclusion of GHGs from the IED, except the limitation on setting ELVs in permits for GHG emissions and installations falling under the scope of the ETS. Information gathering to define BAT has generally not covered GHG emissions and only a few BAT-AELs have been set for GHG emissions that are not covered by the ETS (e.g., refrigerants, methane). For example, the IED currently regulates about 5% of the total methane emissions in the EU-27.

The rationale behind this separation of tasks has, to date, mainly been the avoidance of double regulation and a risk that 'command and control' under the IED may interfere with, and damage, the working of the ETS carbon trading mechanism. However, since these frameworks are de facto operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, it has the disadvantageous effect that any decarbonisation and depollution interactions are not coherently taken into account, and, as a result, synergistic optimising possibilities and investments are to date not being identified.

However, it is increasingly clear that, in the EGD context and the wider, EU and indeed global efforts towards tackling the climate and environmental degradation, deployment of emerging techniques by energy-intensive industry sectors, e.g. using hydrogen rather than coal to produce steel, will create an unprecedented interaction between decarbonisation and depollution[75], which may result in new policy coherence challenges in the near to mid-term future. Whilst climate-related interventions will remain the main driver of transforming industrial techniques, principally via the ETS mechanism, the IED has to accompany and optimise this process by taking fully into account the co-benefits and trade-offs of decarbonisation and depollution. The interaction between depollution and decarbonisation may have mutually-supporting or dissonant effects. This has two aspects:

1. Where decarbonisation techniques have strong co-benefits in terms in reducing emission of pollutants, it may become impossible to avoid the IED impacting more the carbon market in the future. When such techniques will become economically viable and practicable, they will qualify as BAT within the meaning of the IED and become the reference for establishing mandatory environmental performance levels for all relevant IED plants. Consequently, command and control under IED would drive investment in the techniques and affect the carbon market, whilst also contributing to the decarbonisation efforts. This is likely to increasingly occur in the run-up to the 2030 decarbonisation milestone, as emerging cleaner techniques become available in a number of sectors;

2. There is a need to avoid that investment cycles triggered separately by the IED and the ETS may increase costs for society in respect of pollution and climate objectives:
    a. Obligations to implement existing (backward-looking) BAT may hinder deployment of emerging decarbonisation techniques;
    b. The deployment of decarbonisation techniques may entail a need for a later and costly retrofitting to abate pollutant emissions if maximum synergies between decarbonisation and depollution are not stimulated at innovation technologies level, and through BREFs.

[75] Wood, Deloitte, IEEP (2021). Wider environmental impacts of industry decarbonisation. https://circabc.europa.eu/w/browse/39928fd6-dcea-4fbc-b798-70e816bdecb0

Furthermore, in the longer term between 2030 and 2050, and as a result of both legislative and policy action at EU and national level, it is likely that a large proportion of EU-based industrial operators will have already converted to low-carbon or carbon-neutral techniques. This will require increasing attention on the question of whether and how a level playing field should be established through the IED, so that the use of such cleaner techniques is generalised across the EU.

With regard to the E-PRTR, reporting on GHG emissions is incomplete and lacks detail. In addition, whilst the E-PRTR provides data on GHGs outside the scope of the ETS (e.g. CFCs), these emissions data are aggregated and do not distinguish the constituent compounds – each of which has a very different Global Warming Potential.

Conclusions on problem area and drivers

Currently, the IED's contribution to EU climate policy lacks coherence and is limited.

Driver 6: Sub-optimal regulation and implementation: IED design and implementation have not prioritised GHG emissions, resulting in lack of coherence and GHG emissions not being taken into account in IED and its implementation.

2.5. Problem area 5: Sectoral scope coverage is too limited

Commitments to reduce pollution in the Green Deal, as enshrined in particular in the Zero Pollution Action Plan, new Circular Economy Action Plan and in the Farm to Fork Strategy will increase the need to reduce pollutant emissions at source including those sectors not currently captured by the IED and/or the E-PRTR Regulation. Certain polluting agro-industrial activities may merit future inclusion, in the following instances: (1) where they have controlled their pollution emissions relatively less than comparable IED sectors (e.g. rearing of livestock); (2) where significant growth is expected in the sector, leading to commensurate risks of increased pollutant emissions (e.g. extraction of metals and production of batteries); or (3) where they are only regulated when associated to other activities (e.g. textile finishing and downstream ferrous metal processing activities).

These problems limit the capacity of the IED and the E-PRTR Regulation to reduce environmental pressures exerted by agro-industrial installations and establish a level playing field.

Conclusions on problem area and drivers

The IED and E-PRTR do not regulate some medium to highly polluting agro-industrial sectors, especially when taking into account future growth projections for some sectors.

Driver 7: Regulatory failure: current provisions fail to capture a significant stream of emissions leading to a market failure: polluters do not pay the true costs of the pollution they cause.

2.6. Stakeholder views

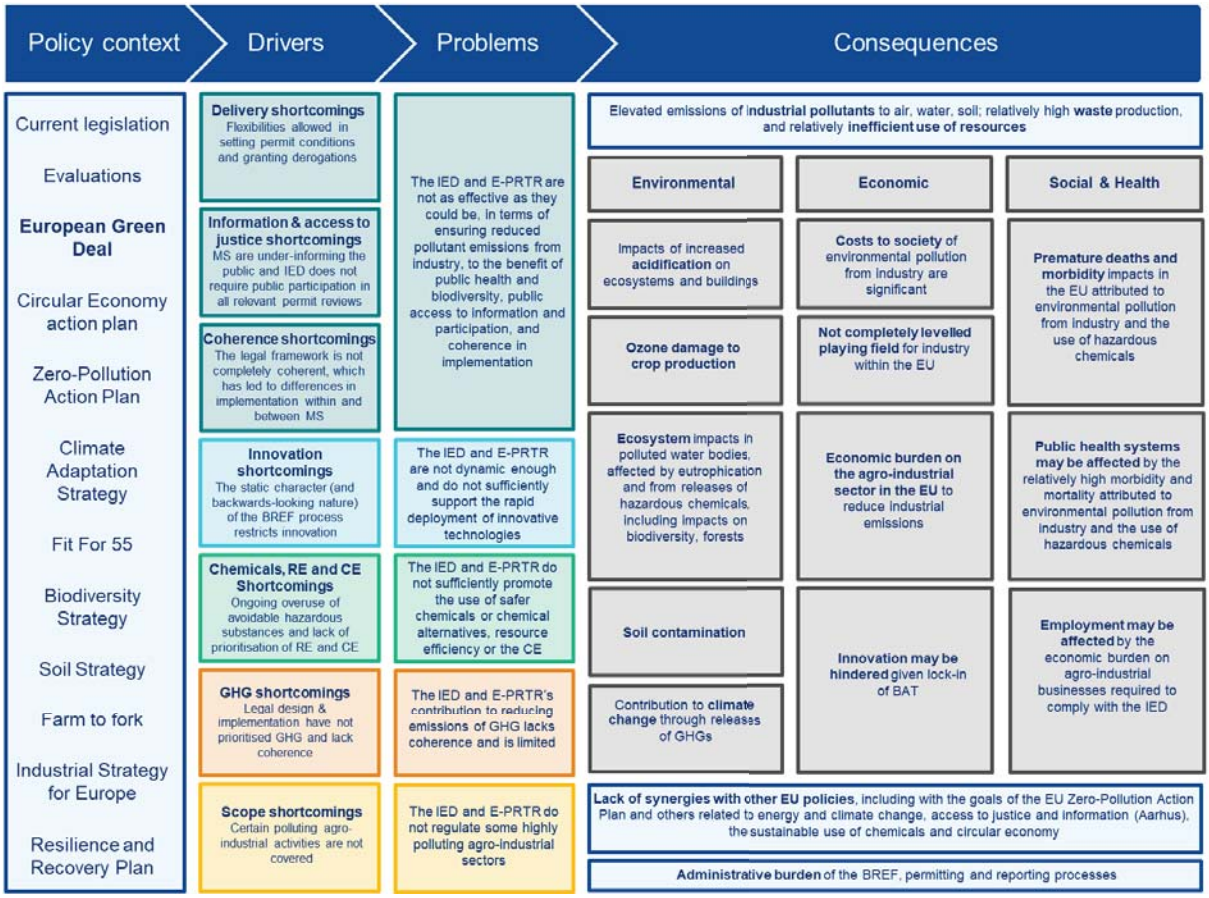
There is a similar pattern of responses from stakeholders to consultations regarding the evaluation of the current contribution of IED installations to three main policy concerns: achieving a climate-neutral economy, promoting green growth, and achieving a circular economy in the EU. Responses from environmental and civil society NGOs, backed up by EU citizens and public authorities, mostly ranked the contributions of IED installations to date as being limited whilst business associations and individual companies considered IED facilities were currently playing an important role.

Civil society and environmental NGOs consider all above-listed problems to be of high relevance, in particular regarding environmental impacts being insufficiently addressed by the IED, the need to have the E-PRTR pollutant list updated more quickly to take account of new threats[76] and limited access to information on installations' performance levels. Interestingly, the latter is perceived by all groups as an important element to promote. Industry and business associations were rather neutral (but not negative) in recognising problem areas 3 (resource efficient and less toxic production), 4 (decarbonisation) and 5 (scope), pointing to potential additional reporting costs and risks of overlaps with the ETS. All stakeholders agree that the IED is limited in promoting innovation.

2.7. Overview of problems and drivers

Figure 1 presents the problem tree for the revision of the IED and the E-PRTR

Figure 1: The problem tree



3. WHY SHOULD THE EU ACT?

3.1. Legal basis

Articles 191, 192 and 193 of the Treaty on the Functioning of the European Union (TFEU)[77] empower the EU to act to: preserve, protect, and improve the quality of the environment;

[76] E-PRTR evaluation - SWD (2017)710

[77] Treaty on the Functioning of the European Union, OJ C 326, 26/10/2012, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT

protect human health; contribute to the prudent and rational utilisation of natural resources; and promote measures at the international level to deal with regional or worldwide environmental problems, in particular combating climate change.

3.2. Subsidiarity: Necessity of EU action

Pollution from agro-industrial installations travels across national borders, both between Member States and across the frontiers of the Union, and pollution control cannot be sufficiently achieved by the Member States alone. Furthermore, the operation of industrial plants is intrinsically linked to the functioning of the internal market. In the absence of a common EU approach for setting environmental performance standards, the same industries would face different pollution control regulation in each Member State with the resultant risk of creating an uneven playing field, fragmenting the single market and impeding the Union's efforts in pursuing the Treaty objective of achieving a high level of environmental and health protection.

The IED's and E-PRTR's combination of centralised elements (definition of standards, publication of EU-wide data) with decentralised components (permitting of activities and validation of operators' data by national competent authorities) is consistent with carrying out at EU level only what is necessary.

3.3. Subsidiarity: Added value of EU action

The IED BAT-based system and the E-PRTR provide information used by all Member States, through a single EU level information exchange process, replacing the need for each Member State to establish national processes. Operators of plants in all Member States achieve economic efficiencies by only having to adhere to one EU-wide uniform regulatory approach. The EU system is increasingly being used by third countries, thereby promoting an international level playing field.

4. OBJECTIVES: WHAT IS TO BE ACHIEVED?

4.1. General objectives

The general objective of this initiative is to contribute in the most effective and efficient way to protect natural ecosystems and public health from the adverse effects of pollution from large agro-industrial installations; this will also enhance EU industry's resilience against the impacts of climate change. It aims to stimulate a deep agro-industrial transformation towards zero pollution through the deployment of breakthrough technologies, and thereby contribute to the achievement of the EGD objectives of reaching carbon neutrality, a non-toxic environment and a circular economy. It aims to further contribute to establishing a competitive level playing field at a high level of protection of health and the environment, including by ensuring consistency of implementation by the Member States.

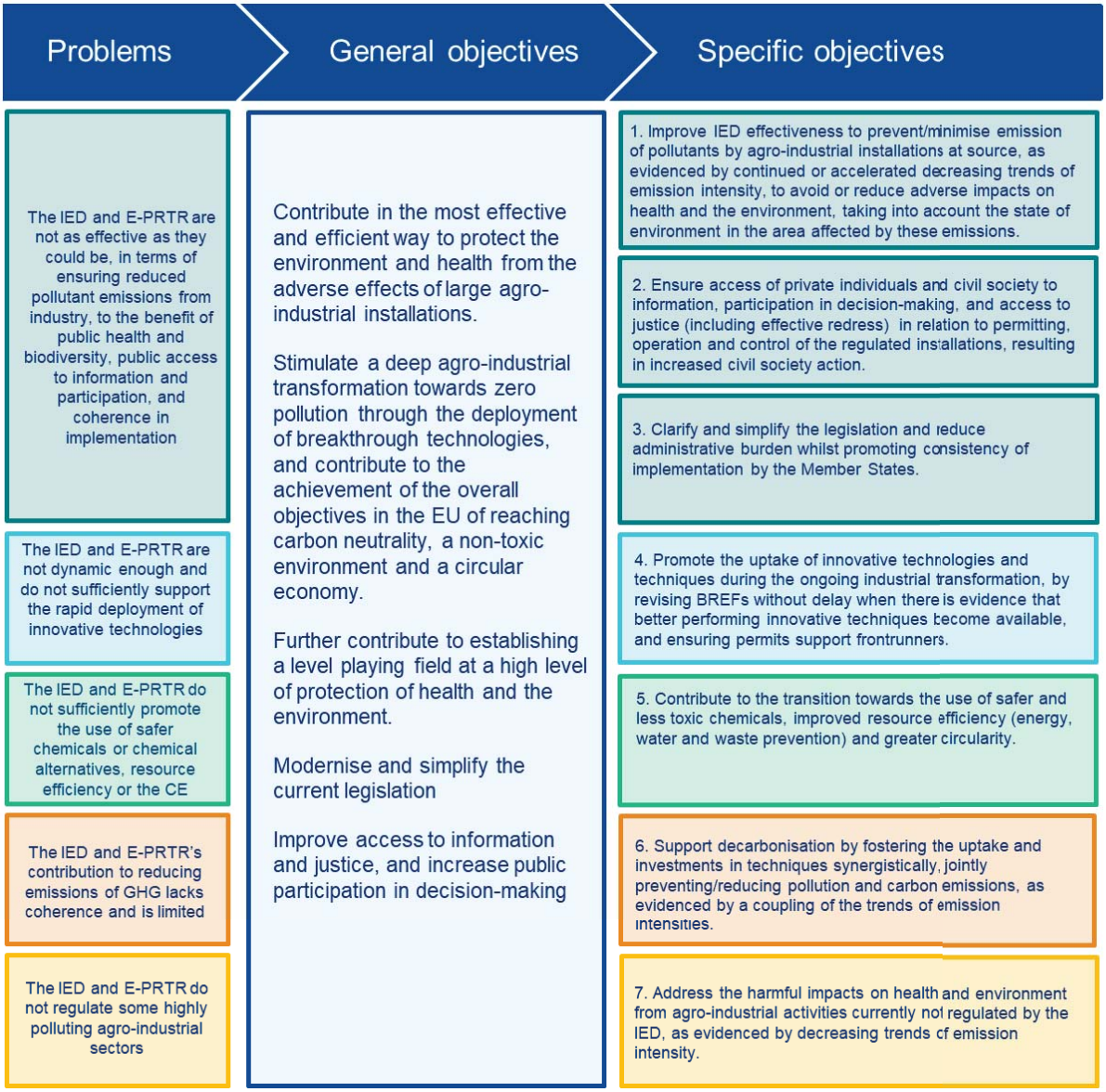
The aim is also to modernise and simplify the current legislation - where this is feasible, e.g. through digitalisation and without impairing the overall objectives whilst improving knowledge on sources of pollution. Moreover, the initiative will aim to improve access to information and justice, including effective redress, and increase public participation in decision-making.

4.2. Specific objectives

As shown in Figure 2, there are 7 specific objectives logically linked to the 5 problems and their respective drivers:

1. Improve IED effectiveness to prevent or, when impractical, minimise the emission of pollutants by agro-industrial installations at source, as evidenced by continued or accelerated decreasing trends of emission intensity, to avoid or reduce adverse impacts on health and the environment, taking into account the state of environment in the area affected by these emissions.
2. Ensure access of private individuals and civil society to information, participation in decision-making, and access to justice (including effective redress) in relation to permitting, operation and control of the regulated installations, resulting in increased civil society action.
3. Clarify and simplify the legislation and reduce administrative burden whilst promoting consistency of implementation by the Member States.
4. Promote the uptake of innovative technologies and techniques during the ongoing industrial transformation, by revising BREFs without delay when there is evidence that better performing innovative techniques become available, and ensuring permits support frontrunners.
5. Contribute to the transition towards the use of safer and less toxic chemicals, improved resource efficiency (energy, water and waste prevention) and greater circularity.
6. Support decarbonisation by fostering the uptake and investments in techniques synergistically preventing/reducing pollution and carbon emissions, as evidenced by a coupling of the trends of emission intensities.
7. Address the harmful impacts on health and environment from agro-industrial activities currently not regulated by the IED, as evidenced by decreasing trends of emission intensity.

Figure 2: Relationship between the problems and the objectives



5. WHAT ARE THE AVAILABLE POLICY OPTIONS?

5.1. What is the baseline from which options are assessed?

This section summarises the detailed description and discussion of the baseline provided in Annex 5.

The baseline implies the continuation of the existing legal framework and scope, coupled with further developments of BREFs and BAT conclusions under the information exchange mentioned in Article 13 of the IED and continued reporting of emissions under the E-PRTR Regulation.

The problems that have been identified with the implementation of the IED and the E-PRTR Regulation are assumed to remain, although their evolution would be subject to market developments and continuous efforts of the Commission to promote effective

implementation. Such measures would include: issuing guidance documents on implementation, providing platforms for discussions and exchange of best practices and encouraging voluntary improvements of the current processes. Whilst this could lead to some improvement, the impact is expected to remain marginal, given the voluntary and non-binding nature of these measures for Member States and individual business stakeholders.

The key parameters of the baseline are depicted in the following sub-sections.

Number of installations

Around 52 000 installations currently fall under the scope of the IED and, very largely (almost all), also under that of the E-PRTR Regulation (since an E-PRTR facility may comprise several IED installations). The number of IED installations remains largely static at the EU level. However, estimations based on the PRIMES model suggest that the number of IED installations could gradually increase to 65 000 by 2040. Other factors may affect the number of installations such as their consolidation due to the green transition.

Substances for which emissions are reported

Emissions are reported to the E-PRTR based on a list of 91 pollutants that has not been updated for 15 years, i.e. since 2006. Likewise, the reporting thresholds are outdated, as technological developments have enabled significant emission reductions since the thresholds were initially set to capture 90% of industrial emissions i.e. for some pollutants the current reporting is incomplete. This has significantly reduced the added value of the E-PRTR data for monitoring/evaluating various EU environmental policies, including air, soil, water, waste and chemicals.

In addition, the E-PRTR substances are not fully compatible with substance lists under other EU legislation e.g. REACH or priority hazardous substances under the Water Framework Directive.

IED influence on emission of pollutants and its cost

Continued implementation of the IED, with ELVs in permits based on BAT-AELs, is expected to lead to a further decline of emissions from IED installations over time. Past experience with some industry sectors[78] suggests that the decrease in emission intensity[79] during one BREF cycle, i.e. over an average period of 9-12 years, ranges between 35 and 70%. These reductions tend to be concentrated in the period starting a few years before the publication of the BREF until the date of entry into force of the BAT conclusions, with an average annual reduction of emissions of between 7-14%. These high overall reduction levels were observed for the first BREF cycle, and were driven by the IED's impact on levelling the playing field for installations across the EU. However, the prognosis is that reductions in emission intensity will be lower for future BREF cycles, as the installations' emission profiles will be relatively similar in the second BREF cycle (and subsequent cycles), unless transformational techniques (or processes) are identified and become eligible to qualify as BAT under the current conditions (backwards looking), causing significant differences in

[78] Estimate based on trend of emissions of the pulp and paper, cement, and glass production sectors. Evidence is not yet available for a number of other activities

[79] Emissions per unit of production

pollutant abatement performance. The potential for emission reductions remains high for rearing of pigs and poultry, as the first BAT Conclusions for this sector, adopted in 2017, introduced few BAT-AELs whilst setting clear emission monitoring requirements (representing a key source of data for the future BREF revision).

The total estimated damage costs of associated pollution will follow those trends and remain high.

Furthermore, the contribution of activities currently not covered by the IED, but nevertheless responsible for significant pollutant emissions, would remain unregulated at the EU level. Member States would be expected to gradually take measures to address this problem, but the lack of a common approach would lead to an uneven level of protection of the environment and distorted competition. The environmental pressures from activities currently not covered by the IED, like those it already currently covers, are to some extent covered by other EU more horizontal environmental legislation that does not control pollution directly at the source. The relevant existing EU legislation (e.g. Water Framework Directive, Effort Sharing Regulation, National Emission reduction Commitments (NEC) Directive) only addresses one or a limited number of impacts, for society as a whole including IED activities, and does not address the pollution in an integrated way. The candidate activities for inclusion within the IED scope are regulated to a varying extent by Member States, which does not contribute to a level playing field at EU level.

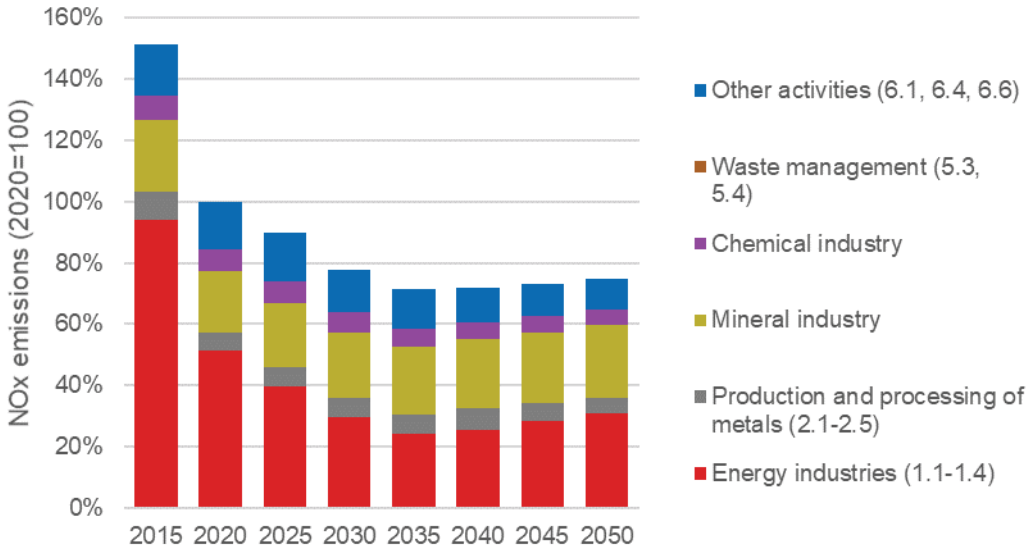
The baseline evolution of emissions of pollutants will depend strongly on the dynamics of industrial transformation.

Dynamics of industrial transformation

The New Industrial Strategy for Europe outlines the elements of the industrial transformation and, amongst them, climate policy is expected to have the main impact on emissions of pollutants. The expected evolution of the market context for the relevant agro-industrial sectors follows the projections modelled in the 'Fit for 55' (FF55) climate package as presented by the European Commission on 14 July 2021. The FF55 "MIX" model describes potential trends in decarbonisation for the various sectors, and provides a picture of how decarbonisation techniques would be developed and deployed. It is increasingly clear that emerging decarbonisation techniques will, in many cases, also deliver reductions of pollutant emissions to air, benefitting water and soil quality too.

However, as illustrated in Figure 3, whilst NO_X emission projections for the majority of the larger polluting industries covered by IED show substantial declines from 2020 through to 2035, after 2035 NO_X emissions increase again, driven primarily by the energy industries (high temperature combustion of hydrogen produces higher amounts of NO_X), suggesting the need for further longer-term policy action to have effect from the 2030s.

Figure 3: MIX scenario NOx emissions projected by the GAINS model to 2050



Source: GAINS

The FF55 package represents the assemblage of policies for achieving the decarbonisation objectives up to 2030. The post-2030 forecasts are based on general 2050 decarbonisation policy objectives; implementing policies still remain to be agreed to meet the 2050 objective.

Three case studies in Annex 11 (cement, iron and steel and oil and gas refining sectors) illustrate how the expected industrial transformation could impact pollutant emissions, GHG emissions, the use of resources, and the future relevance of the IED and E-PRTR legal framework as well as overall other relevant EU legislation. This highlights that a number of challenges will arise:

1. A number of novel decarbonisation techniques will allow the reduction of both GHG and pollutant emissions, typically from 2030 onwards. In the absence of adequate mechanisms, BAT would likely continue to be defined in a manner that does not help driving synergistic and economically sound decarbonisation and depollution techniques, which would hence contribute to suboptimal (and possibly shorter-term) investment decisions.
2. In other cases, novel decarbonisation techniques having negative impacts on pollutant emissions may come onto the EU market. This would require BAT to be (rapidly) defined, in order to avoid adverse additional emissions of (possibly new) pollutants.
3. CCS/CCU[80] is likely to become relevant for several IED sectors, and would thus require the definition of BAT, amongst others to address potential environmental issues such as potential GHG leakage and impact on the quality of underground water. Developing a BREF for CCS/ CCU would be consistent with the current IED scope.
4. Certain sectors (e.g. oil and gas refining) are predicted to undergo profound modifications vis-à-vis their role in the value chain; they will likely redevelop new production processes adapted to these new roles. Hence, BAT will need to be defined for these novel production processes.

[80] Carbon Capture and Storage / Carbon Capture and Use

5. Most importantly, should an agro-industrial sector develop novel production processes which allow it to undergo a full/ step-change transformation, the question will arise as to whether BAT conclusions should define BAT at the level of the production processes as such. BAT conclusions may, for example, stipulate that the use of fossil fuel in certain production processes and IED sectors is no longer BAT. The implementation of such BAT conclusions would require the "deep transformation" of all installations included in that sector, and, as such, would directly drive investments in decarbonisation (and concomitant depollution) techniques. This would be similar to what was triggered by the BAT conclusions on chlor-alkali production[81] which, by stating that the mercury-cell process was not a BAT, stimulated the conversion of the whole sector to cleaner processes.

These issues will also generate new policy coherence challenges that need to be resolved regarding the ETS and the IED, and particularly to increase synergies and co-benefits of the investment cycles associated with requirements under the IED for pollution prevention and the ETS for decarbonisation.

5.2. Description of the policy options

The policy options have been constructed by selecting from a comprehensive list of more than 200 potential policy measures based on the evaluations of the existing legislation, and input from Member States and stakeholders. These measures were screened[82] to identify those that should be retained for further analysis. Annexes 12 and 13 provide the lists of measures that have been discarded, and the rationale behind their screening out from further consideration. Measures which could be taken into account without the need for changing policies or amending legislation, e.g. to improve implementation via issuing guidance and stepping up enforcement efforts, have been integrated into the baseline as they are likely to be applied in any event. Furthermore, a number of measures screened out concern the desirable update of the legal text to, e.g. as a number of recitals and articles have become obsolescent over time; these will be addressed in a codification to take place after completion of the legislative procedure on the revision.

The screening process resulted in a **list of 73 measures retained for impact assessment**: 43 concern IED, and 30 concern E-PRTR[83]. The measures are diverse, seeking to address a complex set of issues. Whilst most are relatively independent, some of them contribute to several specific objectives to at least a limited degree. Others are mainly relevant for a single objective.

Five **policy options** have been defined, which group together the individual **policy measures** retained.

The broad definition of the policy options aligned with each of the relevant problem areas, the measures they comprise and, where applicable, the alternatives, is provided below. The detailed overview of all the measures and to which policy option and sub-option they belong

[81] https://eippcb.jrc.ec.europa.eu/reference/production-chlor-alkali-0

[82] Screening (see Annex 4) was developed in accordance with Tool #17 of the Better Regulation Toolbox. The longlist of measures were assessed (or rated) against eight criteria, namely: legal feasibility, technical feasibility, stakeholder acceptability, effectiveness, efficiency, proportionality, EU value added and coherence.

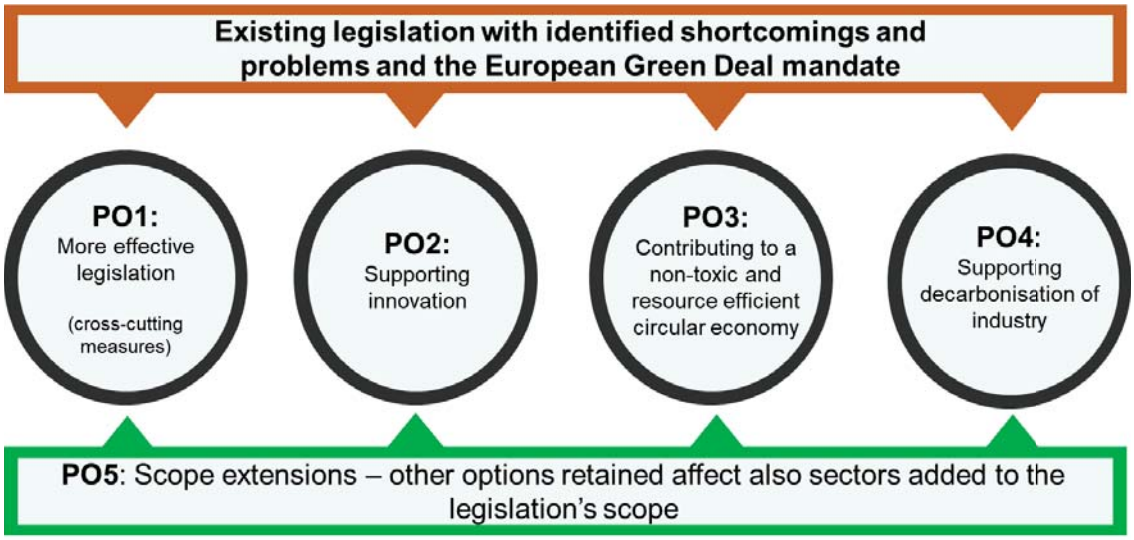
[83] Measures IED#7 and E-PRTR#7 were discarded at a late stage, with no renumbering of measures

is provided in Annex 7. Annex 2 provides further details on the stakeholder views summarised below for each option. In several cases there are contrasting views between NOGs and industrial stakeholders and Member States have intermediate views. In such cases options have been maintained for in-depth assessment.

General presentation of the policy options

Figure 4 presents how the options have been aligned to each of the five problem areas.

Figure 4: General presentation of options



PO1 brings together measures considered necessary to address the shortcomings related to problem area 1, as identified in the evaluations of the IED and the E-PRTR Regulation, as well as in the finding and recommendations of the Aarhus Compliance Committee. It presents sub-options addressing the different relevant aspects: PO1-a tackles the achievement of BAT-AELs, PO1-b seeks to homogenise implementation and enhance enforcement, PO1-c expands public access to information and access to justice, and PO1-d clarifies and simplifies existing legal requirements. Thereby, PO1 also contributes partly to resolving other problem areas. Supplementary actions, e.g., via other options and sub-options described below, will determine the actual, potentially higher, level of ambition of the initiative in each of those areas.

Policy Options **PO2** to **PO4** present options and sub-options of varying ambition that respond to the mandate given by the EGD to review EU measures to address pollution from large industrial installations, thus contributing to the zero pollution ambition whilst making such actions consistent with climate, energy and circular economy policies. This responds to each relevant problem areas:

- Problem Area 2 (ineffective promotion of innovation) is tackled by PO2-a (*frontrunners*), PO2-b (*stimulate innovation*) and PO2-c (*supporting transformation*). Whilst he main drivers of a deep transformation of industry are the carbon neutrality policies, the IED would accompany such transformation.
- Problem Area 3 (insufficient contribution to resource efficiency and less toxic production) is addressed by PO3-a *(performance levels),* PO3-b (*Environmental Management System - EMS*), PO3-c (*symbiosis plans*), PO3-d (*pollutants list*), PO3-e

(*report resource use*), PO3-f (*tracking waste transfers*) and PO3-g (*report on products*).

- Problem Area 4 (insufficient contribution to decarbonisation) is tackled by PO4-a (*energy efficiency)*, PO4-b (*IED/ETS interface*), PO4-c (*disaggregated reporting*) and PO4-d (CO_2 *equivalent reporting*).

PO5 (sub-options a to i) aims to tackle the problem area 5. It identifies new agro-industrial activities that could be newly incorporated into the IED, based on their pollution risk profile, and insufficient coverage under other EU legislation. It also identifies where the limits of coverage of some current activities could be expanded. As shown by Figure 4, PO5 interacts with all other four policy options, since all new measures under PO1 to PO4 would have to apply to a larger number of installations and processes.

The preferred policy package described in Section 8 brings together the selected options.

5.2.1. Policy option 1 – More effective legislation

Twenty-four measures have been retained after screening as relevant for addressing the general effectiveness of the current legal acts.

PO1 groups the **24 individual measures** (IED#1-16 and E-PRTR#1-6 and #8-#9[84]), into the following **4 policy sub-options** addressing the action needed to resolve a variety of issues across the two pieces of legislation.

Box 1 - PO1- More effective legislation
PO1-a-achieving BAT-AELs (IED#1-#5): Alternative 1 ***clarify flexibilities: (IED#1#-#4).*** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water quality Alternative 2 ***full BAT potential: (IED#1-#4 AND IED#5).*** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water *quality* ***AND*** require consideration of the full BAT-AEL range when setting ELVs in permits**.** **PO1-b-implementation and enforcement (IED#6-#9):** Empower competent authorities to suspend the operation of non-compliant plants, harmonise the rules to assess plants' compliance with their permits, make the provisions on penalties more stringent and improve transboundary cooperation in permitting. **PO1-c-rights of the public (IED#10-#13 and E-PRTR#1-#4):** Alternative 1 ***public rights: (IED#10-#13 and E-PRTR#1, 3 & 4).*** Improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available and requiring systematic public participation in permit reviews. *Alternative* 2 ***enhanced public rights: (IED#10-#13, E-PRTR#1, 3 & 4 AND E-PRTR#2)*** improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available, requiring systematic public participation in permit reviews ***AND*** more granular reporting of emissions to E-PRTR in an INSPIRE-compliant manner**.** **PO1-d- simplification (IED #14-#16 and E-PRTR #5-#6 and #8-#9):** clarify certain definitions and activity descriptions, delete the indicative list of pollutants in Annex II, compliance assessment rules under Chapter II of IED to take precedence over rules in other chapters and top-down reporting for livestock farms and aquaculture.

For sub-options PO1-a-achieving BAT-AELs and PO1-c-rights of the public, alternatives of varying ambition have been defined, to take account of the particular importance of, respectively, measure IED#5 (requiring the consideration of the full BAT-AEL range when

[84] Measure E-PRTR#7 was discarded at a late stage, with no renumbering of measures

setting ELVs in permits) and measure E-PRTR#2 (more granular reporting to E-PRTR in an at the more disaggregated level of the installation, rather that of the facility).

Annex 7 provides detailed information on the measures included in each sub-option; Box 2 provides a short description of each measure.

Box 2: Short description of measures included in PO1
IED #1 Introduce a time limit for derogations granted under Article 15(4)
IED#2 Standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits under Article 15(4) on derogations
IED#3 Require that indirect releases of polluting substances to water shall not lead to an increased load of pollutants in receiving waters compared to the application of BAT at installation level (Article 15(3))
IED#4 Amend Article 18 to specify the type of additional measures to be included in the permit, with a view to reducing the specific contribution of the installation to pollution, where environmental quality standards cannot be met by implementing existing BAT conclusions
IED#5 Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the starting point is the most stringent limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT conclusions only allows meeting a less stringent ELV within the BAT-AEL range
IED#6 Allow Member State Competent Authorities to temporarily suspend the operation of non-compliant installations in cases where non-compliance causes significant environmental degradation
IED#7 Common rules for assessing compliance with emission limit values under Chapter II of the IED
IED#8 Define penalties with due regard to the nature, gravity, extent and duration of the infringement (Article 79)
IED#9 Strengthen cooperation in cases of transboundary pollution between Member States (Article 26)
IED#10 Make Member States monitoring of the impact of Article 15(4) derogations publicly available
IED#11 Widen public participation in permitting as requested by the Aarhus Convention Committee and facilitate access to justice and redress in case of damages related to non-compliance
IED#12 Introduce a uniform, user-friendly permit summary and make them publicly available
IED#13 Information made available to the public to go on Internet and be free of charge
E-PRTR#1 Reduce the reporting thresholds for some pollutants to better meet the aim of 90% capture
E-PRTR#2 Introduce reporting at installation level
E-PRTR#3 Require operators to explicitly confirm that releases are below the reporting threshold
E-PRTR#4 Mandate the monitoring/calculation/estimation (M/C/E) hierarchy
IED#14 Clarify IED scope regarding gasification, liquefaction, pyrolysis and biogas plants
IED#15 Delete Annex II of the IED "List of polluting substances"
IED#16 Chapter II compliance assessment rules (IED#7) to take precedent over rules in other chapters
E-PRTR#5 Establish a 'sunset list' to remove pollutants that are no longer of concern
E-PRTR#6 Clarify that E-PRTR covers upstream oil and gas facilities (activity 3(a))
E-PRTR#8 Reword 5(d) landfills activity description to include flaring of vent gas
E-PRTR#9 Top-down reporting for livestock production and aquaculture

5.2.1.1. Stakeholder views on PO1

Stakeholder views are summarised across the four PO1 themes:

- **Ensuring that BAT-AELs are achieved:** NGOs are most supportive of measures tightening the implementation of BAT-AELs, with some support from public authorities, but an absence of support from industry. Competent authorities consider that any time limit to derogations should be determined at the local level. There are particularly contrasted views regarding measure IED#5 that requires Member States to use the whole BAT-AEL range rather than defaulting ELVs at the most lax end of those ranges. NGOs and Member States considered this measure would bring significant improvements with

regard to emissions to air and water, whilst Industry has indicated strong opposition to this measure and raised potential negative impacts on competitiveness. SMEs[85] called for a realistic adaption of ELVs with a range of flexibility. Industry also opposes tightening rules at source on indirect emissions to water, claiming that centralised (typically urban) waste water treatment plants can adequately treat the industrial pollutants at lower cost.

- **Homogenising and enhancing implementation and enforcement:** Member State authorities and NGOs support these measures that they consider would anticipate at least moderate improvement. Industry is not convinced that such improvements would occur. Only NGOs support strengthening transboundary cooperation through the IED. Other stakeholders consider that one of the most important obstacles in cross-border cooperation is the diversity between EU and international rules, all applicable in different situations.

- **Improving and expanding the public's access to information, participation and access to justice:** Regarding public information, a large majority of environmental and civil society NGOs consider these provisions to be relatively or very important. This is consistent with NGO views in the environmental reporting fitness check where public access to the actual reporting of emissions was seen as having contributed to reducing them. Industry is less supportive and emphasised that there is a need to protect sensitive information. Furthermore, regarding E-PRTR, all stakeholder groups observed that automated Quality Assurance systems could help improve the quality of the reported data. However, most respondents - other than NGOs - considered that shorter reporting deadlines would not be feasible and would decrease data quality and increase reporting costs/ administrative burden in general. Regarding access to justice, business associations and company/business organisations have overall felt that the public access to justice functions very well for industrial activities. The opposite view is held by all NGOs, who typically state that public access to justice does not function well. Mixed views have been provided by public authorities.

- **Clarifying and simplifying existing legal requirements:** The main measures attracting positive interest from stakeholders, in particular SMEs, were those aimed at clarifying certain definitions (gasification, liquefaction and pyrolysis) and solving discrepancies in averaging periods used in the IED and BAT conclusions when setting ELVs and subsequently assessing BAT-AELs compliance.

- **The Fit for Future Platform (FFFP) Opinion on the IED:** The FFFP Opinion was submitted to the European Commission on 6.12.2021, subsequent to and separate from the Impact Assessment-related consultations that took place earlier. Many of the FFFP suggestions cover PO-1 type options, related to better implementation and effectiveness of the industrial emissions framework, e.g., improving the permit process and optimising the BREF procedure. Annex 2 contains the FFFP Opinion and information on related action taken, as tabulated in its Table A2-8 and Table A2-9.

[85] https://www.smeunited.eu/admin/storage/smeunited/20210604-final-position-ech-smeunited-zeropollution.pdf

5.2.2. Policy option 2 – Accelerating innovation

PO2 only concerns the IED. It comprises **6 individual measures** (IED#17-#22), which constitute the following **3 sub-options** aimed to improve the IED dynamism in supporting the uptake of innovative technologies/techniques:

Box 3 - PO2- Accelerating innovation
PO2-a-frontrunners (IED#17, #18): Facilitate the development and testing of emerging techniques *AND* allow more time for implementing these more innovative technologies and techniques
PO2-b-stimulate innovation (IED#19, #20):
Alternative 1 ***shorter BREFs cycle*:** Establish shorter BREF revision cycles
Alternative 2 ***INCITE***: Establish an INnovation Centre for Industrial Transformation & Emissions (INCITE) documenting innovation and recommending BREF revisions
PO2-c-supporting transformation (IED#21, 22):
Alternative 1 ***time***: allow more time to implement BATC if deep industrial transformation is required
Alternative 2 ***plans/review:*** establish a permit review obligation and require transformation plans
Alternative 3 ***plans/EMS:*** require transformation plans and integrate them in the EMS (see IED#25)

5.2.2.1. Stakeholder views on PO2

Whilst all stakeholder groups are generally in favour of measures supporting innovation, their views vary per measure and sub-option.

Stakeholders were rather neutral concerning options providing more time for innovative operators to test and deploy emerging techniques. IED operators and their trade associations, however, support such measures that provide flexibility. It is interesting to note that technology suppliers doubted this would have major impacts.

The multi-stakeholder High Level Group on Energy-Intensive Industries recommended that '*low carbon emission technologies under development should be assessed as potential emerging techniques during the BREF drawing and reviewing process'*. The alternative - 'short BREF cycles' - is not supported. Industry expressed concerns this could negatively impact investment cycles if existing installations were obliged to review their plans frequently. Member States have stressed the scarcity of human and financial resources that would be need for more frequent BREF reviews. The alternative 'INCITE' attracted support, especially from Member States, who considered this would allow the documenting and validating of evidence on innovative techniques; some suggested that the current pilot scale project (innovation observatory) should be formalised.

Industry supported the provision of more time for deep transformation, triggered by BAT conclusions, whilst pointing out that the IED is not the best tool to regulate the transition. Some Member States strongly supported the transformation plan alternative arguing this should be applied earlier than 2035.

The question was also raised as to whether the end of the 4-year period for an installation to operate in compliance with the revised BAT conclusions impedes innovation and should therefore be shortened. Input from stakeholders and experience point to the fact that this period is not excessively long for the correct performance of successive activities that require time: the reconsideration of the permit; the organisation of public participation by the competent authorities; the funding, planning and implementation of the necessary investments by the operator. Also, data gathered so far suggest that emissions start to decrease already before the end of the 4-year period.

5.2.3. Policy option 3 – A non-toxic and resource efficient circular economy

Policy option 3 comprises **12 individual measures** (4 IED#23-#26- + 8 E-PRTR#10-#17), regrouped into **7 sub-options** seeking to contribute to the use of safer and less toxic chemicals, improved resource efficiency and the circular economy, with attention also to water re-use in line with Climate Adaptation goals.

Box 4 - PO3- Contributing to a non-toxic and resource efficient circular economy
PO3-a-performance levels (IED#23, 24): Alternative 1 ***binding:*** introduce option for BREF Technical Working Groups (TWGs) to set binding environmental performance levels (so-called BAT-AEPLs) including for resource efficiency, water use efficiency and reuse, and waste generation) Alternative 2 ***binding and benchmarks:*** introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System (EMS) **PO3-b-EMS (IED#25):** Require operators to address Resource Efficiency, Circular Economy and Chemicals Management in their EMS **PO3-c-symbiosis plans (IED#26):** Require Member States to produce national plans to promote industrial symbiosis **PO3-d-pollutants list (E-PRTR#10):** Dynamically updating the list of pollutants to be reported **PO3-e-report resource use (E-PRTR#11, 12, 13):** Require information to track progress in resource efficiency (including energy, materials and water) **PO3-f-tracking waste transfers (E-PRTR#14, 15, 16):** Require information to better track the nature and destination of waste transfers between installations (mainly concerns transfers between installations located within a Member State) **PO3-g-report on products (E-PRTR#17):** Require reporting releases from products

5.2.3.1. Stakeholder views on PO3

Overall, environmental NGOs were in favour of the PO3 measures proposed, especially binding BAT-AEPLs. However, industry was generally not in favour, indicating that the expected environmental benefits are small, while associated administrative and compliance costs would be significant; the water industry however supported these measures. Member States generally supported reporting mechanisms and benchmarks, giving a general preference for a resource efficiency and circular economy plan, which could be linked to reporting requirements and BREF benchmarks, rather than necessarily making BAT-AEPLs binding in the same manner as BAT-AELs (as in PO3-a). However, some Member States were also in favour of binding BAT-AEPLs wherever appropriate (PO3-a), whilst some also recognised that derogation conditions, such as those of BAT-AELs, could result disproportionately burdensome if these had to be applied to the case of binding BAT-AEPLs. Hence, a general overall preference for the second PO-3a alternative, ***binding and benchmarks***, is perceived.

Inclusion of a Chemical Management System in the EMS was seen by industry as overlapping with REACH, but environmental NGOs considered this would ensure better coherence between IED and REACH. Member States noted that some BREFs already include such systems and that this allows adaptation, according to the needs of each sector.

With regard to E-PRTR measures to collect better data on waste transfers and resource consumption (e.g., energy, water, and raw materials), public authorities, researchers, NGOs and the public were generally in favour. Industry stakeholders were less enthusiastic, citing additional burden and concerns with data confidentiality; the water industry supports more reporting regarding water use.

5.2.5. Policy option 4 – Supporting decarbonisation

Policy option 4 comprises **6 individual measures** (IED#27-#30 + E-PRTR#18 and #19), grouped into the following **4 policy sub-options,** which could contribute towards the decarbonisation of the agro-industrial activities:

Box 5 - PO4- Supporting decarbonisation of industry
PO4-a-energy efficiency (IED#27): Delete Article 9(2) with exemptions from setting energy efficiency requirements in IED permits **PO4-b-IED/ETS interface (IED#28, 29, 30):** Alternative 1 ***review***: Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation Alternative 2 ***sunset***: introduce a sunset date on Article 9(1) Alternative 3 ***delete***: immediately delete Article 9(1) **PO4-c-disaggregated reporting (E-PRTR#18):** Require more granular reporting for some GHG, in particular refrigerants **PO4-d- CO_2 eq. reporting (E-PRTR#19):** Require GHG releases to be also reported as CO_2 equivalent

5.2.5.1. Stakeholder views on PO4

From a general perspective, the multi-stakeholder High Level Group on Energy-Intensive Industries recommended in its masterplan[86] that '*The Industrial Emissions Directive permitting process should be adapted to support GHG abatement measures in energy-intensive installations throughout the transition.*'

More specifically, Member States generally consider that the IED should support decarbonisation. Environmental NGOs, including climate-specialised NGOs, vocally supported the introduction of ELVs for GHG and mandatory energy efficiency requirements in IED permits, considering these as complementary to the ETS. Industry, including SMEs[87], and a majority of Member States, considered that such an approach would create double regulation and cross-compliance problems, and risked adversely impacting the carbon market and hence effectiveness and efficiency of the ETS.

For the E-PRTR, most NGOs, and public authorities considered the disaggregated reporting of GHGs to provide considerable additional value, whereas industry representatives viewed the current reporting as sufficient.

5.2.6. Policy option 5 – Scope extensions

Policy option 5 comprises **25 individual measures** (13 IED: #31- #34[88], IED#36-IED#44 and 12 E-PRTR: #20-#31), regrouped into the following **9 sub-options** which could contribute towards addressing, as efficiently as possible, the environmental impacts of agro-industry installations currently not regulated:

[86] https://ec.europa.eu/docsroom/documents/38403

[87] https://www.smeunited.eu/admin/storage/smeunited/20210604-final-position-ech-smeunited-zeropollution.pdf

[88] Measure IED#35 was discarded at a late stage, with no renumbering of measures

Box 6 - PO-5- Industrial scope
PO5-a-cattle and tailored permitting (IED#31, 32, 33; E-PRTR#20, 21): Broaden current sectoral coverage of the IED and E-PRTR Regulation in rearing of animals (include cattle farms above a threshold within the range of 50-150 LSU, expand coverage to pigs and poultry farms above a threshold within the range of 50-150 LSU *AND* a tailored permitting process for the rearing of animals).
PO5-b-expand existing IED activities (IED#34, 36, 37, 38; E-PRTR# 22, 24, 25, 26): Extension of IED and E-PRTR current sectoral scope by closing loopholes for smaller smitheries, regulating the associated activities of textiles finishing, forging presses, cold rolling and wiredrawing; and better coverage of the battery value chain by including the rapidly growing batteries gigafactories
PO5-c-landfills (IED#39, 40; E-PRTR# 27): Landfills: Adoption of BAT conclusions for landfills *OR* adoption of BAT conclusions for activity 5.4 landfills *AND* revise the capacity threshold
PO5-d-mining (IED#41): Include non-energy minerals extraction industry in the IED scope
PO5-e-aquaculture (IED#42): Include acquaculture in the IED scope
PO5-f-oil and gas (IED#43): Include upstream oil and gas extraction in the IED scope
PO5-g-align E-PRTR to IED (E-PRTR#28): Align E-PRTR activity descriptions to IED activity descriptions
PO5-h- align E-PRTR to other EU laws (E-PRTR#29,#30):
Alternative ***fully:*** Revise E-PRTR activity descriptions by aligning to the Medium Combustion Plants Directive (MCPD) *AND* the Urban Waste Water Treatment Directive (UWWTD)
Alternative ***partially:*** expand the E-PRTR scope to cover (MCPs between 20 and 50 MW *AND* UWWTPs between 20 000 and 100 000 person equivalents
PO5-i-watch mechanism (IED#44; E-PRTR#31): Establish a dynamic system to identify and include emerging activities/sectors of concern, according to significance of production and attendant (already occurring, or risk of) pollutant emissions, and the IED's potential to address these issues

For PO5-a (*cattle and tailored permitting*), Annex 8 analyses the impacts of setting the threshold in PO5-a at 50, 100, 125, 150, 300, 450 and 600 LSU (*livestock unit*). Three criteria have been used to select the threshold to be used in the option retained for assessment: the cost benefit ratio, the degree of coverage of emissions from the sector[89], and the number of farms regulated. The cost-benefit analysis is favourable in all cases, but lower as the LSU threshold value decreases; it is higher for cattle at all LSU threshold values than for pigs and poultry[90]. In terms of number of animals and the proportion of emissions covered by the legislation, setting a threshold between 50-150 LSU would result in around 80-95% of pigs and poultry covered but only about 40-80% of cattle. Under 100 LSU, the number of farms included increases considerably, especially for cattle. Setting the threshold between 50-150 LSU for cattle, pigs and poultry farms would result in the following proportion of non-subsistence farms[91] being covered by the legislation: 18-37% of pigs farms (80-94% of animals), 15-32% of poultry farms (87-98% of animals), and 10-39% of cattle farms (40-80% of animals), with a benefits to costs ratio around 4-9 for pigs and poultry and 7-14 for cattle.

Furthermore, as such scope extension would bring a number of smaller, less complex installations under the IED, it is appropriate to design a tailored permitting system to limit compliance and administrative costs. The tailored permit that is integrated into PO5-a will build on national permitting systems, include only basic requirements, will not entail the revision of each individual permit, and will focus on a limited number of key environmental

[89] The emissions covered by the option are directly in proportion of the number of animals covered.

[90] Pigs and poultry mainly emit ammonia whilst cattle also emit considerable amounts of methane, resulting in more favorable cost benefit ratios for regulating cattle.

[91] Farms below 10 LSU are considered to be subsistence farms; they represent by far the largest number of farms and are not considered in this assessment. All numbers in this assessment concern non-subsistence farms.

issues such as the emission of methane, ammonia and nitrates. It will not include components of IED permits that have a significant administrative burden for operators, e.g. the baseline report or the EMS.

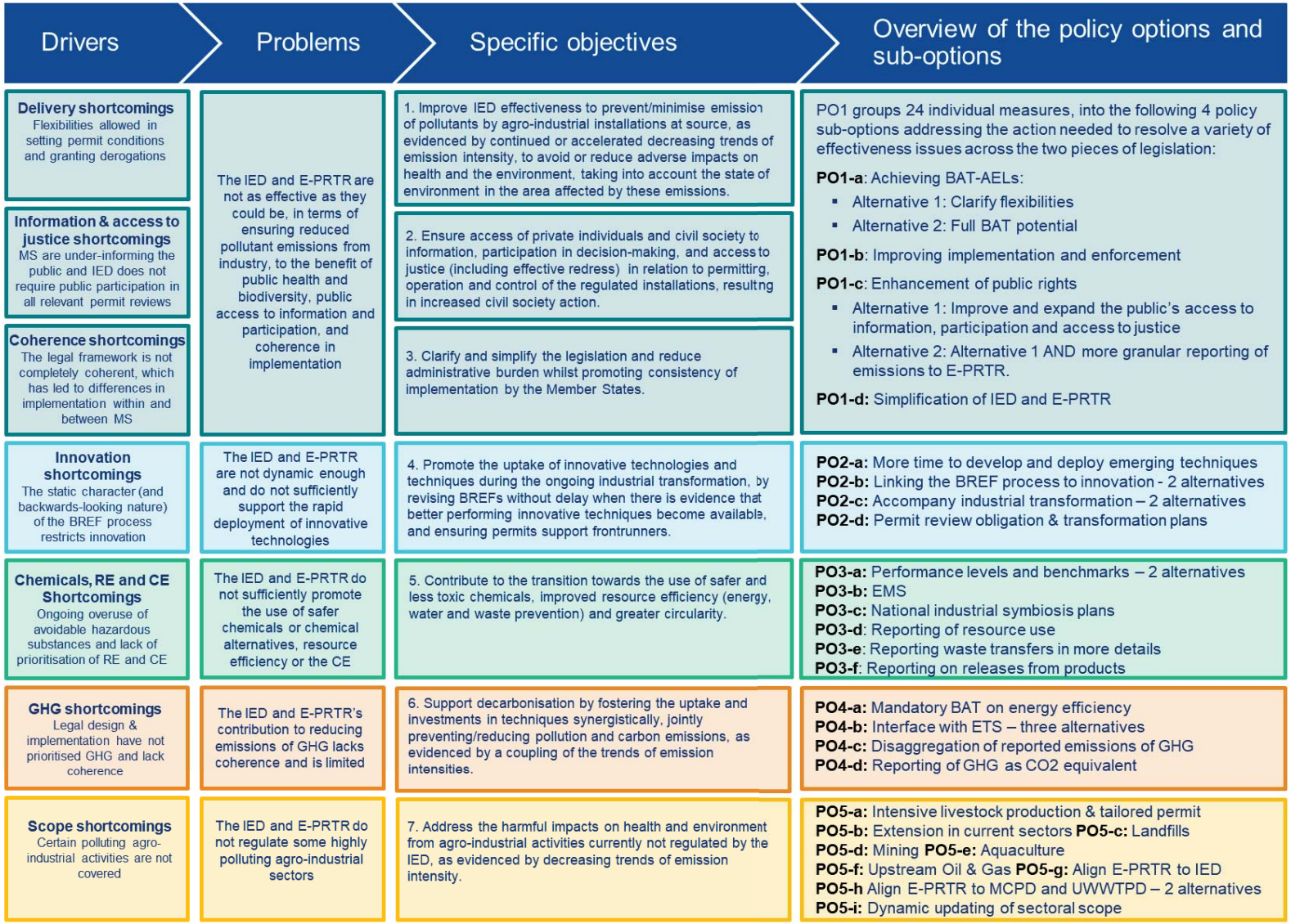
5.2.6.1. Stakeholder views on PO5

Stakeholder views are diverse: NGOs strongly support scope expansion across the board, Member States support certain scope expansions, whilst the individual sectors concerned oppose extension of IED scope to their activities, pointing to the monitoring and reporting burdens imposed on smaller installations; at the same time, opinions from the open public consultation gave information that the environmental impact of small and medium sized plants is limited compared to large plants. Moreover, industry generally considers that the agricultural sector should contribute its fair part to preventing pollutant emission.

With regard to specific sub-options:

- Concerning livestock: expansion to include part of cattle rearing seems most supported, including by a portion of the sector. Tailored permitting attracted interest across all stakeholder groups. However, NGOs and Member States consider that the approach of using thresholds may lead to avoidance of regulation, via livestock operators deciding to adjust farm sizes just below the threshold. Industry identified manure management as a problematic issue. Drinking water companies and water authorities also regularly express concerns about the increase of water treatment costs, notably related to emissions to water from rearing of livestock.
- Regarding landfills, only NGOs support the lowering of the scope threshold; Member States consider smaller landfills as not viable. However, over half of Member State respondents thought IED should define BAT for landfills falling within its scope.
- Concerning mining and quarrying: Member States' authority stakeholders note that the application of the IED to mining and quarrying activities would have the largest environmental impact of all potential new activities. Industry representatives consider that mining and quarrying activities are sufficiently covered by other EU and national law.
- Concerning aquaculture: There is significant support from Member States, as well as NGOs. Whilst recognising the environmental impacts of aquaculture, industry stakeholders consider that the inclusion of aquaculture in the scope of IED would result in economic costs unlikely to lead to significant, additional environmental improvements.
- Concerning upstream oil and gas: Stakeholders' input confirmed that upstream oil and gas operations could also be linked to environmental pressures other than methane emissions, such as water and soil pollution, indicating that impacts from upstream oil and gas industries are significant for greenhouse gases, and emissions to air, water, and soil.

Figure 5 maps these policy options with the core problem drivers, problem areas and specific objectives for the revision of the IED



6. WHAT ARE THE IMPACTS OF THE POLICY OPTIONS?

6.1. Introduction

This section presents an assessment of the impacts of all options against the baseline. This is complemented by Annex 10 that provides a series of boxes and tables summarising key information.

The vast majority of the individual measures considered in this impact assessment relate to improving existing processes, such as the drafting of BREFs and BAT conclusions and the issuing of permits to installations. The remaining measures *introduce new processes*, such as INCITE to monitor emerging innovative techniques to address decarbonisation and depollution, as well as measures addressing resource efficiency. Hence, the ultimate impacts of the measures and related sub-options will depend on a sequence of successive processes and events that may vary significantly.

Of particular importance are firstly, the levels of ambition of BAT requirements and secondly, the degree to which they are implemented effectively by the relevant industry sectors and the competent authorities who must set permit conditions taking the local and specific circumstances of the installations into account.

Therefore, the majority of the measures considered do not lend themselves to quantitative assessment of economic, environmental and social impacts. The impact assessment is in those cases qualitative, and seeks to both identify the type of potential impacts and to rate their potential magnitude.

The administrative burden for full implementation of the requirements associated with the overall proposed revisions to the IED are split between operators and Member States. A summary of the administrative burdens is provided in Annex 10, which gives details of the resources that Member States will need to dedicate in order to fully implement the IED revisions. Successful implementation of the revised IED will require Member States to fully allocate the required resources. The IED is essentially a process directive, reliant on full implementation by all parties concerned; the full impacts of any of the revision options presented may not be realised if Member States' implementation resources are jeopardised.

The vast majority of industrial installations covered by the IED do not meet the SME definition criteria[1], the exception being the scope extension under PO5-a livestock sector, where to ease the economic burden on smaller (SME) installations, a tailored permitting approach is proposed.

However, as most measures improve existing processes or establish new ones, it has been possible to monetise the administrative burden of implementing them. Detailed tables providing the administrative costs are provided in Annex 10.

Policy sub-options PO5-a to PO5-i (sectoral scope expansion) are a notable exception and their assessment could, to a degree, include quantitative elements where data was available, such as the number of installations concerned and the related environmental impacts of the

[1] SME definition: https://ec.europa.eu/growth/smes/sme-definition_en; also SWD (2021)279

activities concerned[2]. Furthermore, where assumptions could be made on what could likely be defined as BAT, potential environmental and economic impacts could be quantified. However, this has been limited by the availability of data and information and by the uncertainty of which techniques would eventually qualify as BAT. An important feature to be taken into account in the assessment of PO5 is that, by design, the IED and the BREF process ensure that the definition of EU BAT requirements and their implementation in permits remain proportionate. Annex 10 includes a table summarising the key information on these options.

As options and sub-options are packages of measures, the impact assessment builds on the assessment of the impacts of the individual measures, which is available in Annexes 8 (IED measures) and 9 (E-PRTR measures). Where some individual measures dominate in the impact assessment, the summary of the impacts of those individual measures is provided in Annex 10.

Colour coding is used to summarise the assessment of impacts referring to the direction (positive or negative) and magnitude (small or large) of any expected impacts (see Table 3).

Table 2: Coding used to present expected impacts

××××× ×××××	×××××	×	0	✓	✓✓✓✓✓	✓✓✓✓✓ ✓✓✓✓✓	U
Extremely negative	Strongly Negative	Weakly negative	"Zero": i.e. no or limited impact	Weakly positive	Strongly Positive	Extremely positive	"U": Unclear

An iterative process (see Annex 4) was used to obtain these point ratings, on a scale of "-10 to +10", with 10 crosses representing the maximum negative impacts, and 10 ticks representing the maximum positive impacts. This scale has more divisions than the more usual scale of from "-5 to +5", and was used owing to the wide disparities in the impacts, and the need to represent impacts progressively from individual measures, to amalgamating them into packaged options/sub-options. Each policy area was addressed by a dedicated independent expert team, within the consultant team supporting this impact assessment, and then the iterative process explained in Annex 4 was used to ensure coherence and consistency between the scores given by individual teams for individual measures. This allowed comparisons within and across policy areas. E-PRTR measures were rated in a similar manner, enabling IED and E-PRTR scores also to be combined; note that the majority of E-PRTR measures represent smaller, incremental positive or negative impacts, and thus often score one, occasionally two ticks or crosses, compared to larger IED measures.

This impact assessment is one of the pilot cases for the one-in-one-out principle announced by the European Commission on 1 December 2019[3]. Therefore, particular attention has been

[2] Given this exception for PO5 options, a separate summary of the key impacts and of the (quantitative) assessment results for PO5 options are provided in Annex 10.

[3] Commission working methods P(2019)2; https://ec.europa.eu/info/sites/default/files/working-methods.pdf

paid to providing comprehensive information on administrative burden. Those costs are systematically presented under each option (with totals in the tables in Section 7), whereas a more in-depth discussion can be found in Annexes 8 and 10. For ease of presentation, costs provided in this report combine one-off and recurrent costs foreseen for 20 years, which then are presented per annum. The former are linked mainly to BREF revisions, issuing, reconsidering and updating a permit, application for a derogation or exemption, drafting reports or plans. The latter involves monitoring, reporting and inspections that are an important component of a number of measures. In addition, for the preferred policy package, a detailed table on the calculation of administrative costs, broken into one-off and recurrent costs, is included in Annex 3. Underlying assumptions behind the calculations are provided in Annex 4.

6.2. Effectiveness: Analysis of Policy Option 1

See section 5.2.2 for short description of the measures; Annex 7 provides more detail.

6.2.1. Economic impacts

Administrative burden on businesses and public authorities: **PO1-effectiveness** would lead to increased administrative activity by IED operators and public authorities. This would include under **PO1-a-achieving BAT-AELs** employing more resources due to increased frequency and/or depth and breadth required in producing, collecting and reporting large and/or new amounts of data and evidence; permit reconsiderations; derogations; and enforcement activities under **PO1-b-implementation and enforcement**. **PO1-a-achieving BAT-AELs** and **PO1-c-rights of the public** would require that operators and public authorities spend marginally more resources bringing together and sharing data and information online or otherwise. However, this additional administrative burden from the IED elements would be limited. This corresponds per option to:

- **PO1-a-achieving BAT-AELs** €1.4 million per year for operators and €0.89 million per year for public administration in the Alternative 1 and €9.4 million and €7.89 million per year in the Alternative 2;
- **PO1-b-implementation and enforcement** €4.6 million/year for operators and €5.65 million/year for public administration;
- **PO1-c-rights of the public** offers two Alternatives: with or without the E-PRTR#2 introducing reporting on installation's level. This translates into €0.5 or €0.56 million of admin costs per year for operators and doesn't change for public administration: €2.9 million per year in both alternatives;
- **PO1-d- simplification** offers savings for both for operators: €11.8 million and for public administration: €0.670 million.

Once the initial time and resources investment has been made in modernising private and public administrations and maximising the use of the latest digital technologies for data management, this should reduce significantly over time. The E-PRTR elements of PO1 are estimated to bring an administrative saving of some €10.2 million per year for operators and costs of about €0.9 million per year for public authorities.

Operating costs and the conduct of businesses: **PO1-effectiveness** may also lead to an increase in and/or bring forward costs of doing business for IED operators, primarily by introducing more stringent requirements and limiting the duration and/or reducing the

likelihood of approval of derogations from implementing BAT conclusions. Here it should be recalled, that as safeguard for future competitiveness concerns, the IED definition of BAT in Article 3 requires that it is cost-effective and during the drawing up and reviews of BREFs , economic viability is evaluated at the sector level. Usually, the economic viability of a technique is established by noting that it is used in various installations across various countries, under competitive market conditions.

PO1-a-achieving BAT-AELs – alternative *full BAT* potential includes measure IED#5, encouraging the most stringent end of the BAT-AEL range for setting ELVs, which could entail significant capital (CAPEX) and operational expenditures (OPEX) for installations across the EU. Whilst the specific investments and operating costs of IED#5 could not be reliably quantified, as a partial illustration for one pollutant (NO_X) and only five IED activities[4], it was assumed that about 10% of installations would be affected by this measure, and each of these installations might be required to invest at least €0.5 million additional or earlier than in the baseline. This would bring the potential EU-wide CAPEX at €210 million per year. However, the scale of these substantive compliance costs remains uncertain, especially in this example where the measure would not mandate but encourage, where possible, a more ambitious approach (by default) - to setting ELVs.

Competitiveness: Whilst uncertain, PO1 costs are expected to remain limited compared to the overall costs and the turnover of installations in the concerned sectors. Again, as an illustration of the relative impact on costs of doing business: the Iron and Steel BAT conclusions ex-post assessment estimated total annualised compliance costs of the sector at around €134 million per year, the annual turnover at around €123 billion and its annual investment costs to be €3.9 billion. This sector includes about 300 installations and the illustrative additional investment for NOx abatement of €15 million, representing 0.1% of annual turnover. Hence, it is unlikely that IED#5 would have a significant impact on sector's global competitiveness. Furthermore, a growing number of non-EU countries around the world are implementing legislation based on the BAT concept or using EU BREFs to provide information for setting emission limit values, further mitigating any impact on international competitiveness. The OECD is organising an exchange of information between international experts on BAT-like legislation, which help to reduce differences in environmental requirements at international level.

Furthermore, the overall improved environmental performance is also expected to have operational and competitiveness benefits in the medium to longer term, for example, through increased energy efficiency. Improved air quality would improve productivity through reduced number of lost working days due to health impacts of air pollution. Finally, the IED measure IED#6 may lead to the (temporary) closure of installations, which might also affect the costs of doing business in the EU; but suspension of activities is not expected to be a common occurrence.

Level playing field: PO1-effectiveness would have a positive impact on the level playing field in the EU, primarily by homogenising and clarifying the requirements that businesses must comply with and expected enforcement practices and more effective access to justice and redress.

[4] Glass; cement, lime and magnesium; large combustion plants, pulp and paper; refining of mineral oil

6.2.2. Environmental impacts

PO1-effectiveness is expected to have positive impacts especially on air, water and soil quality with co-benefits for biodiversity and enhanced climate-resilience. These impacts would result from **PO1-a-achieving BAT-AELs** introducing shorter and/or fewer derogation (IED#1, #2) and encouraging or setting stricter environmental performance requirements (IED#3, #4, #5), and from **PO1-b-implementation and enforcement** ensuring stepped up enforcement of, and compliance with, the IED regulatory framework (IED#6, #7, #8, #9). The most significant environmental impacts are likely to result from **PO1-a-achieving BAT-AELs – *alternative full BAT potential*** specifying that the starting point for setting emission limit values should be closer or at the most stringent limit of the BAT-AEL range (IED#5). This alone is expected to generate significant health and environmental benefits from reduced emissions. Whilst these could not be reliably quantified, as a partial illustration for one pollutant, monetised health and environmental benefits accruing from estimated potential reductions of NO_X emissions from the implementation of IED#5 across five sectors range from €860 million to €2 800 million per year. Setting stricter ELVs in permits will also result in lowered pollutants emission to water and may encourage phasing out the use of substances of concern.

Indirectly, we would also expect that **PO1-c-rights of the public – alternative *public rights*** would improve the public's access to information, participation and justice (including effective redress) (IED#11, #12, #13, E-PRTR #1, #3, #4) and increase the public's leverage and ability to influence the environmental performance ambitions, which may result in marginal reductions in emissions over time, when compared to the baseline. These impacts would be slightly stronger for **PO1-c-rights of the public – alternative *public rights*** that introduces more disaggregate reporting (E-PRTR#2); this would provide policy relevant very information for allowing to better track improvements in environmental performance.

Similarly, by clarifying and simplifying legal requirements **PO1-d- simplification** would likely have indirect positive impacts on compliance with the legislation, which would result in indirect positive impacts on the natural systems and public health. There is limited available evidence, thus limiting the quantification and monetisation of these benefits.

6.2.3. Social impacts

All sub-options under **PO1-effectiveness** are unlikely to have any significant impacts on employment in the EU. On the one hand, some measures will require additional staff to carry out additional, or more intensive, administrative activities and enforcement/compliance-related, when compared to the baseline. On the other hand, overall increases in the costs of doing business and any additional, albeit limited, temporary closures of installations may put pressure on businesses to increase their operating efficiency, including by reducing the numbers of staff employed in the EU-27. There is limited evidence available to conclude on the overall net effect. There are however other social impacts that **PO1-a-achieving BAT-AELs (IED#4) and PO1-c-rights of the public** bring in, namely improving transparency on permitting and emissions monitoring, and contributing to empower the public. For example, this would allow researchers and concerned organisations and citizens to make informed criticisms and requests relating to the state of industrial emissions.

Moreover, the environmental impacts outlined earlier, especially the reduction in pollutants emission to the environment resulting from **PO1-a-achieving BAT-AELs – *alternative full***

BAT potential (IED#5), are likely to have positive impacts on public health in the EU by reducing the exposure to pollutants and the subsequent risk of disease, especially respiratory and cardiovascular diseases, and by leading to reductions in health and social care costs affecting EU citizens, residents and public authorities primarily. Health damage costs are provided in the environmental impacts section.

When costs towards business cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. However, the illustrative calculation of costs potentially incurred under the most onerous measures retained (IED#5) suggest that additional costs would be of the order of magnitude of less than 0.1% of annual turnover. Hence, it is unlikely that this would perceivable impacts on consumer prices.

6.3. Accelerating innovation: Analysis of Policy Option 2 (PO2)

See section 5.2.3 for short description of the measures; Annex 7 provides more detail.

6.3.1. Economic impacts

Administrative burden on businesses and public authorities: All three PO2 options would increase administrative burden for IED operators and public authorities overall, when compared to the baseline. **PO2-a-frontrunners** would primarily include a number of installations seeking flexibility to develop and/or test innovative emerging techniques that are additional to the baseline. This is expected to entail additional administrative cost for business of around €1 million a year for business as well as of around €0.5 million a year for the competent authorities. **PO2-b-stimulate innovation** would require managing and engaging with more frequent BREF processes that may not completely substitute, but rather complement, the baseline. Both alternatives would trigger additional or more demanding permit reconsiderations and updates. Systematic short BREF cycles (IED#19) would likely cause more frequent permit reviews than BREF reviews triggered by INCITE (IED#20). This option would also yield further costs for public authorities, via the set up and operation of INCITE. Finally, **PO2-c-supporting transformation** would require that operators demonstrate to competent authorities that they need more time, as part of a derogation (IED#21), for deep transformation or that they develop Transformation Plans (IED#22) as either a part of a permit review or they will integrate Transformation Plans in the EMS. The administrative burden will depend on the number of derogation or permit review procedures they will drive; derogations would concern a limited number of operators, whilst transformation plans would be required from all operators. The central estimate is €0.6 million a year for businesses and €0.3 million for competent authorities in IED #21. Making Transformation Plans (IED#22) part of a permit review will cost €50 million for both operators and competent authorities, and integrating them in EMS (PO3-b) would limit the admin burden for operators to €20 million p.a and would relieve competent authorities from having to review the permit (there will be no permit review).

Innovation and research: **PO2-a-frontrunners, PO2-b-stimulate innovation** and **PO2-c-supporting transformation** are likely to encourage more investment in the development and testing of innovative techniques and technologies. This will bring a push for a higher uptake of low-emission techniques becoming then a benchmark for taxonomy criteria, documented in BREFs. There is limited quantified evidence, and substantial uncertainties regarding the positive impacts of these measures on innovation and research. However, as part of the

consultation activities, the majority of stakeholders also agreed that these policy sub-options may contribute, from moderately to significantly, to increasing the uptake of innovative technologies by IED operators. When these options were explored through focus groups and interviews, including of experts, it was highlighted that, for the IED to encourage operators to invest in innovative technologies, these options should be complemented by financial and policy incentives, as well as clear legal requirements. This would be, e.g. funding via Horizon Europe or the Innovation Fund, and potential avenues of incentives via pending policies currently being revised, e.g. EU Taxonomy decisions and state aid guidelines. It is also intended that the revised IED/ E-PRTR framework should serve to improve the provision of information on sustainable industry practices, mainly technologies, to then be useful in the development of future initiatives under EU funding instruments and sustainable finance policy.

Operating costs and the conduct of businesses: **PO2-c-supporting transformation** may lead to an increase in and/or bring forward costs for IED operators, especially CAPEX, by encouraging industrial transformation and favouring innovative and emerging technologies. The scale of impact will depend on the speed of technological advancement and technology cost curves. For example, CAPEX and OPEX from operators would depend upon the Transformation Plans and/or novel techniques selected to contribute to their "deep transformation". Cost that could be brought forward are linked to earlier retrofits to existing heavy industry installations; this would concern one-off investments ranging from €0.5 to €200 million per IED site, based on expert opinion. The plan would ensure alignment of investments required for pollution reduction and decarbonisation. **PO2-a-frontrunners** and **PO2-b-stimulate innovation** could have similar effects, although evidence available and expert opinion suggest that these are likely to be less significant than the impacts from PO2-c.

Competitiveness: The available evidence is unclear as to what extent **PO2-b-stimulate innovation** and **PO2-c-supporting transformation** may affect the competitiveness of businesses in a global context. The main drivers of a deep transformation of industry are the carbon neutrality policies, the IED would accompany such transformation rather than trigger it. On the one hand, these options may increase the cost of doing business relative to competitors in the global context and thus reduce the competitiveness of EU industry. On the other hand, these options could put the EU's industry in the vanguard of transformation, potentially gaining first-mover advantage and even exporting any acquired know-how or innovative techniques. In addition, a low environmental footprint and resulting compliance with criteria under the EU taxonomy for sustainable activities[5] will facilitate access to green finance putting the industry in an advantageous position on the financial market. Finally, through introducing a price on carbon in imports of specific products the carbon border adjustment mechanism[6] may mitigate some of the impacts of these options on competitiveness, where they are related with higher CO_2 emission abatement.

6.3.2. Environmental impacts

PO2-a-frontrunners, PO2-b-stimulate innovation and **PO2-c-supporting transformation** would be likely to have positive environmental impacts by encouraging innovative

[5] https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

[6] COM(2021) 564 final

technologies with improved environmental performance. **PO2-b-stimulate innovation** and **PO2-c-supporting transformation** are likely to have more significant positive impacts on air, water and soil quality and resources, especially if INCITE (IED#20) triggering BREF reviews to take account of the availability of high maturity emerging techniques and the permit review obligation (IED#22) are taken forward. **PO2-c-supporting transformation** would also have positive impacts on the climate by encouraging GHG emission reductions from industrial sectors covered by the IED.

The scale of environmental impacts across the selected categories would depend on technological progress and the outcomes of INCITE, together with any more frequent BREF reviews and resulting actions triggered.

6.3.3. Social impacts

PO2-a-frontrunners, PO2-b-stimulate innovation and **PO2-c-supporting transformation** are unlikely to have any significant impacts on employment in the EU. On the one hand, some measures entailing additional Research and Innovation and other, possibly including administrative, activities, may require additional staff.

Moreover, environmental impacts, especially the reduction in emissions to air, are likely to have positive impacts on public health in the EU by reducing the risk of disease, especially respiratory and cardiovascular diseases, and by leading to reductions in health and social care costs across the EU.

6.4. Resource efficiency and chemicals: Analysis of Policy Option 3 (PO3)

See Section 5.2.4 for short description of the measures; Annex 7 provides more detail.

6.4.1. Economic impacts

Administrative burden on businesses and public authorities: All seven sub-options envisaged by PO3 (see Table 2) would increase administrative activity by operators and public authorities, when compared to the baseline.

PO3-a-performance levels would essentially require operators to provide measurable information as regards resource efficiency, waste prevention and circular economy performance levels (BAT-AEPLs) when seeking a new permit/updating an existing one, as well to carry out related reporting and compliance activity. BAT conclusions already include specific plans to monitor and manage resource efficiency of water, energy, and certain materials, and operators subject to these requirements will face a limited increase in admin burden compared to the baseline. Evidence collated suggests that 20-40% of IED operators may not be currently subject to any permit conditions based on BAT-AEPLs and could, therefore, be affected by an increase in their administrative costs associated with permit reconsideration and compliance/reporting activities. The measure privileging binding BAT-AEPLs (IED #23) will result in €7 million/year (around 540 EUR/year per installation) for business above the baseline and €6 million/year for administration; for the alternative allowing use of either binding BAT-AEPLs or benchmarks used in the operator's EMS (IED#24), the estimate is €16 and €12 million accordingly.

PO3-b-EMS would require operators to produce, implement and/or monitor a Resource Efficiency and Circular Economy Plan and a Chemical Management System (CMS) as part of the Environmental Management System (EMS). Both may require additional

administrative efforts by operators, to assemble the information and/or plans as well as to maintain the EMS periodically. The scale of these costs would depend on the complexity of the plans and systems, and thus their maintenance and audit requirements; this is estimated to be €46 million a year for business and €23 million for the administration.

Both **PO3-a-performance levels and PO3-b-EMS** will require additional enforcement-related activity from public authorities, including managing confidential business information issues, monitoring and enforcing binding BAT-AEPLs, and the evaluation and control of the EMS of each installation, including of how benchmarks contained in BAT conclusions are addressed in the EMS.

PO3-c-symbiosis plans would require public authorities to develop and implement a plan of action related to industrial symbiosis. The scale of this impact is unknown, although this is likely to be limited in the shorter term, and it would likely have both highlight new opportunities whilst required supplementary administrative activity from businesses.

PO3-d-pollutants list entailing the dynamic updating of the list of pollutants to be reported, would make the E-PRTR more responsive to emerging environmental issues. It would lead to a greater number of facilities having to report data for air, water and soil emissions, but this could be offset, to some extent, by the corollary 'sunset' list for removing the need to report on other pollutants. The estimated burden for operators should not exceed €3.9 million a year.

PO3-e-report resource use would require additional administrative efforts by operators (€35 million/year) to gather data on progress made in achieving enhanced resource efficiency. There are also likely to be issues regarding confidential business information, which could restrict data usefulness.

Similarly, the additional reporting requirements on waste transfers under **PO3-f-tracking waste transfers** would require significant additional administrative efforts by operators and a cautious estimations due to the numerous and complex waste flows indicate that they should not exceed €0.7 million/year. The **PO3-g-report on products** would create significant administrative impact for competent authorities required to gather information on environmental releases via products and also significantly diverge from the E-PRTR's core role. It also has the potential to overlap with other initiatives, notably the product passport under the Sustainable Products Initiative that would, contain inter alia similar information. Because of the complexity of implementing PO3-g, these costs could not be quantified.

Operating costs and the conduct of businesses: **PO3-a-performance levels** and **PO3-b-EMS** will likely require upfront CAPEX from operators (although PO3-b should already be partly established by operators in all IED sectors). These may include energy and resource efficiency measures, including water reuse, which may reduce OPEX in the longer term. Other operational measures may introduce additional costs into production processes, such as the use of less-toxic chemical alternatives as an input to production. The scale of these economic impacts would vary across Member States; however, it is expected that the net economic impact would be somewhat negative in the shorter term, and the long-term trend is hard to anticipate. It will depend in large part on how the investment costs decline due to technological advances, and the evolution of resource costs. **PO3-c-symbiosis plans** could also have impacts on operating costs and the conduct of business in the EU, although these

will depend on the nature and approach taken by national authorities to produce and implement industrial symbiosis plans.

Competitiveness: The available evidence is unclear as to what extent this option will impact competitiveness. Whilst increased operating costs may affect it negatively, increased transparency on overall performance generates confidence, facilitates cross-sectoral and cross-value chain collaboration; and would lead to efficiency-based cost reductions. Transparency will not involve sharing confidential and sensitive, which would negatively affect business.

Innovation and research: **PO3-a-performance levels, PO3-b-EMS** and **PO3-c-symbiosis plans** are likely to encourage innovation and research. An explicit binding status of BAT-AEPLs could further encourage businesses to identify innovative processes and techniques that would enable them to meet BAT-AEPLs at the lowest possible cost. This impact may be limited, however, since BAT-AEPLs are already implemented in this way in some Member States. Any increase in focus on research and innovation is likely to indirectly benefit the implementation of strategies and plans focussed on improving energy and resource efficiency, resource circularity and a transition to less toxic chemicals as these will necessarily require new or adjusted process technologies, eco-design, and cross-sectoral collaboration (e.g. industrial symbiosis). These conclusions are also supported by findings from the IED evaluation (Ricardo et al, 2020), which showed that a majority of stakeholders (>75%) somewhat or strongly agreed that the IED, BREFs and BAT conclusions stimulated innovation, with BAT conclusions being indicated as the most important driver.

Although administrative and compliance costs will marginally increase for all businesses, those costs will be more significant for SMEs. Energy and resource efficiency strategies, as well as the use of less toxic chemicals or alternatives are likely to increase operating costs at the installation level, which might pose challenges, particularly for smaller businesses with more restricted access to the technological and financial resources needed to innovate and optimise processes. However, resource efficiency is one of the main drivers of companies' competitiveness as they spend, on average, 40% of their costs on raw materials, with energy and water pushing this to 50%[7]. Therefore, improving the resource efficiency of SMEs offers enormous potential for reducing production cost and increasing productivity while, at the same time, making a significant contribution to addressing environmental and climate challenges. Furthermore, 25% of EU SMEs work on green products or services[8], and might particularly benefit from increased focus on energy, resource efficiency and safer chemicals. Improved water use and reuse practices contribute to enhanced resilience to climate change, as recognised and called for in the EU Climate Adaptation Strategy[9]. There is limited evidence available to conclude on the overall net effect.

[7] https://www.fitreach.eu/sites/default/files/editor/publications%20ENG/FFR_Finl%20report_cover%20version%202%20full.pdf

[8] Eurobarometer survey: SMEs are important for a smooth transition to a greener economy https://ec.europa.eu/commission/presscorner/detail/en/MEMO_12_218

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN

6.4.2. Environmental impacts

Efficient use of resources: **PO3-a-performance levels, PO3-b-EMS** and **PO3-c-symbiosis plans** would likely result in an improved and more efficient use of energy, water and materials by industry. This could in particular contribute to combating increasing water scarcity. Efficiency measures encouraged by the proposed policy options, especially **PO3-a-performance levels** and **PO3-b-EMS**, would aim to decrease consumption of resources per unit of production, both in-house and upstream or downstream in the production chain. It would also ensure that chemicals risk management is appropriately addressed in the operator's EMS[10] resulting in use of safer substances, the use of which is not prohibited under REACH, and reduced toxic emissions. The use of materials can be (i) minimised, by producing less waste per unit of production output; (ii) eliminated, referring particularly to the use of toxic and hazardous substances, which should thus reduce the hazardousness and increase the recyclability of the installation's production residues; (iii) substituted, e.g. by recycled, waste-based, or less resource intensive materials; or (iv) better managed, by implementing measures that reduce material losses over the production process. These strategies will particularly affect industrial installations of the most material-intensive production chains. The scale of these impacts would depend upon the extent to which:

- Binding BAT-AEPLs or benchmark are taken forward by IED operators, although evidence suggests that the introduction of the sub-option to introduce the possibility of both binding BAT-AEPLs and benchmark levels (IED#24) could be more effective in encouraging a more efficient use of resources when compared to the baseline.
- Resource Efficiency and Circular Economy Plans, and Chemical Management Systems (PO3-b) set by operators are ambitious, effectively implemented by operators, and monitored and enforced by competent authorities.

Waste production, generation and recycling: Energy, water and materials efficiency improvements (**PO3-a-performance levels** and **PO3-b-EMS**) will indirectly have significant positive effects, by reducing waste production and generation and/or increasing material re-use and recycling. National plans (**PO3-c-symbiosis plans**) may increase the uptake and implementation of industrial symbiosis, avoiding waste generation when compared to the baseline. There is, however, very limited evidence regarding the potential uptake of industrial symbiosis based on national plans; industrial symbiosis is rather dependent on local conditions, such as proximity of symbiosis partners and by-products that instead of becoming waste are used as a "circular" input to other processes.

Climate: Energy, water and materials efficiency measures and improvements should result in reductions in industrial GHG emissions, and support adaptation to climate change. **PO3-a-performance levels** will encourage or require BAT-AEPLs on energy use/efficiency, and/or materials consumption, with consequent reductions in environmental footprints. **PO3-b-EMS** would require Resource Efficiency and Circular Economy Plans, decreasing consumption of resources per unit of production, including fossil energy carriers, and consequent indirect

[10] The Fit for REACH project financed under Life concluded that '*Chemicals risk management is not sufficiently considered in the environmental management systems (EMAS, ISO 14000, corporate sustainability reporting, etc.)*
https://www.fitreach.eu/sites/default/files/editor/publications%20ENG/FFR_Finl%20report_cover%20version%202%20full.pdf

GHG emissions. Adopting measures oriented towards resource efficiency will likely have knock-on, positive impacts on GHG emissions, particularly on installations within the most energy-intensive production chains. **PO3-c-symbiosis plans** may also lead to direct and indirect reductions of emissions of GHGs, although with greater uncertainty, depending on national plans and local conditions.

6.4.3. Social impacts

The PO3 group of policy options are unlikely to have any significant impacts on employment in the EU. The reduction and/or recovery of waste and the use of safer chemicals could have positive social and public health impacts across the EU. These impacts have not been quantified due to limited availability of evidence.

6.5. Decarbonisation: Analysis of Policy Option 4 (PO4)

See Section 5.2.5 for short description of the measures; Annex 7 provides more detail.

6.5.1. Economic impacts

Administrative burden on businesses and public authorities: The four sub-options under PO4 would lead to increased administrative activity by IED operators and public authorities overall, when compared to the baseline, although this would be very limited for the alternative of **PO4-b-IED/ETS interface review** (IED#28). **PO4-a-energy efficiency**, as well as the more ambitious alternatives within **PO4-b-IED/ETS interface** sub-options to introduce a *sunset date* for Article 9(1) IED (IED#29) and *immediately delete* Article 9(1) (IED#30), will require adjustments to the BREF and permitting processes, which are likely to increase the frequency and duration of administrative activities for businesses and public authorities. The sub-option of *a future review* of Article 9(1) **PO4-b-IED/ETS interface (IED#28)** would have a very limited administrative burden primarily on public authorities, although operators may be consulted. The IED elements would entail an administrative burden of €100 million per year for operators and €72 million per year for public authorities, over the next 20 years. The E-PRTR elements would have an administrative burden of around €0.004 million per year for operators and about €0.006 million per year for public authorities.

Innovation and research: PO4-a-energy efficiency and alternatives within **PO4-b-IED/ETS interface (IED#29, IED#30)** will likely encourage more investment in developing and testing innovative techniques and technologies, to help operators comply in a cost-efficient manner with potentially more stringent energy efficiency and GHG requirements.

Operating costs, and the conduct of businesses: **PO4-a-energy efficiency** and alternatives within **PO4-b-IED/ETS interface** that delete Article 9(1) later (IED#29) or immediately (IED#30**)** will also lead to an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts. The alternative requiring a review (IED#28) would not have impacts until action has been implemented subsequently to the review

6.5.2. Environmental Impacts

PO4-a-energy efficiency would likely have positive environmental impacts, by requiring that industrial operators improve their energy efficiency. The scale of this impact will likely vary by sector, with those operating bespoke energy systems, such as iron and steel installations, likely to see less savings than those sectors using a more standard energy boiler/generator system, although the evidence is limited. This option should also have positive knock-on effects on air quality and other environmental categories via reduced fuel use and combustion.

PO4-b-IED/ETS interface could have a wide range of impacts, depending on the selected alternative: review clause (IED#28), sunset date for deletion (IED#29) or immediate deletion of Article 9(1) (IED#30). Immediate deletion would likely result in GHG emission reductions at the specific installations, depending on the stringency of GHG emission limits derived under IED. This may also have other positive environmental impacts, such as on air quality and resource use, as decarbonisation techniques may have also positive impacts on overall depollution, and hence environmental protection. Introducing a review (IED#28) or sunset (IED#29) clause into Article 9(1) may delay potential positive impacts.

Reporting hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) as individual pollutants (**PO4-c-disaggregated reporting**) would provide a better understanding of GHG contributions, since HFCs and PFCs are currently reported as total masses, even though component species have different global warming potentials. The costs of doing so should be limited, since the required data should be already available to operators. Reporting individual HFCs and PFCs via their mass of CO_2 equivalent (**PO4-d- CO2 eq. reporting**) would also give a better understanding of GHG contributions compared to the current aggregated data. This measure is likely to have limited economic impact as it involves a relatively simple additional step before reporting data to the E-PRTR.

6.5.3. Social impacts

PO4-a-energy efficiency and **PO4-b-IED/ETS interface** are unlikely to have any significant impacts on employment in the EU. Moreover, environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory disease, and leading to reductions in health and social care costs across the EU. Any reductions in GHG emissions would contribute to climate change mitigation.

6.6. Sectoral scope: Analysis of Policy Option 5 (PO5)

A short description of the measures is provided in Section 5.2.5 whilst Annex 7 provides more detail. Annex 10 includes a table summarising the key information underpinning the assessment of Policy Option 5.

6.6.1. Economic impacts

Administrative burden on businesses: All nine sub-options entailed by PO5 would lead to additional administrative activity by operators, when compared to the baseline. IED permit review and compliance with permit conditions (i.e. implementation of BAT) occur within four years of publication BAT conclusions. **PO5-a-cattle and tailored permitting** would affect the highest number of installations which could amount to an additional 84 000-330 000 cattle farms and 77 000-187 000 extra pig and poultry farms; resulting in IED covering

the largest and most polluting cattle, pigs and poultry farms existing in the EU representing 10-40% of all non-subsistence farms. These additional operators would then need to apply for permits, and implement BAT as defined in BAT conclusions, as well as address permit (re)considerations and reporting under E-PRTR. Implementation by Member States of the tailored permitting included in this sub-option results in lower administrative costs. The full IED permitting process would amount to €2182-595 million per year (depending on the specific threshold within the range of 50-150 LSU). The tailored approach reduces this by €63-232 million for farms newly brought under the IED scope; there would be additional reductions should Member States opt for also applying the tailored permit to the farms already covered by IED. The new CAP promotes more sustainable, including less polluting, farming. Hence, until the new IED introduces binding EU standards, Member States may include, in their CAP strategic plans, measures to support emissions reductions also at relevant farms. Once they will become binding EU standards, compliance with them will however be seen as compliance cost, in principle no longer eligible for EU co-funding. Given the number of potential installations per sector and despite significant uncertainties, **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** could yield a total administrative burden on businesses of around €43million per year, primarily from engaging with the relevant permitting processes following the publication of BAT conclusions (assuming publication of two BAT conclusions and thus two permit reviews within 20 years), as well as related monitoring and reporting requirements, and inspections. The E-PRTR elements of **PO5 (g-align to IED and h-align to other law)** are expected not to exceed €37 million per year for businesses.

Administrative burden on public authorities: All **PO5** sub-options would lead to additional administrative activity by public authorities, when compared to the baseline. These costs would be driven primarily by the BREF and permitting processes, although other related activities such as enforcement and inspections would also be relevant. **PO5-a-cattle and tailored permitting** would have the relatively highest burden on public authorities, reaching €182-595 million per year (range of 50-150 LSU) for full IED permitting of farms over a period of 20 years, including the cost of engaging with the BREF and permitting processes for hundreds of thousands of farms, and related compliance and enforcement activities. A tailored regulatory process may require significantly less input from public authorities, reducing this burden significantly by €63-232 million per year (range of 50-150 LSU). **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** could yield an administrative burden on public authorities of €30 million per year over a 20-year period, primarily from the relevant BREF and permitting processes, as well as carrying out inspections. PO5-h, depending on the measure will cost €5.5 million (E-PRTR#29) or €3.5 million (E-PRTR#30) for operators and €0.3 or €0.2 million for the authorities. The E-PRTR elements of **PO5** would have an administrative burden in the range of €2.8 to €3 million per year for public authorities.

Industrial installations newly brought into the scope will differ in size and activity significantly, also covering a wide range of industrial sectors, which will impact their administrative costs. These will be significantly lower for the tailored permitting system applied to farms than to other industrial installations newly brought into the scope. Furthermore, administrative cost were estimated in Annex 8 taking a fictitious baseline of zero IED-like controls being currently applied by Member States. As at least part of such

controls will in fact already be applied at national level on part of all of these installations, the estimated administrative costs are over-estimated.

Operating costs and the conduct of businesses: All options would lead to substantial compliance costs, both one-off and recurring, for operators, when compared to the baseline. **PO5-a-cattle and tailored permitting** would likely have significant compliance costs on businesses. Ricardo (2021) identified two key environmental issues for the sector of rearing of animals, that is, the reduction of emissions to air of ammonia and methane. The total EU-27 compliance costs are estimated to be around €265-812 million per year for applying abatement techniques tackling ammonia and methane emissions. Overall compliance costs are likely to be higher in practice after all BAT are defined and implemented, not just on techniques tackling ammonia and methane emissions. **PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture** and **PO5-f-oil and gas** would also yield substantial compliance costs. Although fewer installations would be affected by these, PO5-b through to PO5-f sub-options, these installations could have more complex and costly BAT requirements. The scale of impact on operating costs and the conduct of businesses across the sectors covered by these sub-options is highly dependent upon the stringency of the adopted BAT requirements.

While the IED typically covers large, complex and capital intensive activities, PO5-a may affect SMEs as the livestock farms tend to be more often smaller installations. A clear breakdown of farms by employment level and turnover is not available to determine the SMEs population within the sector. There is extremely limited information available on whether farms meet the SME defining criteria. It is however likely that the scope increase will capture a number of the bigger SMEs of the sector (much bigger than subsistence farms). Therefore, PO1-a implements the *tailored* permit[11] to mitigate any impacts on the SMEs, with less complex regulatory means and focussing on a smaller number of key issues**.** Furthermore, as livestock installations are not complex, typical compliance costs are significantly lower than for other IED activities.

Innovation and research: **PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture,** and **PO5-f-oil and gas** are likely to encourage some innovation and research. The IED evaluation concluded that the IED, BREFs and BAT conclusions had stimulated innovation, albeit that more could be done. Hence, inclusion of these sectors may have a similar limited positive impacts on innovation and research. However, any sub-options addressing problem area 2 on innovation retained in the preferred policy package would contribute to amplifying this promotion of innovation.

Competitiveness: PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture, and **PO5-f-oil and gas** will lead to an increase in the cost of the doing business in the EU and, as a result, these policy options may negatively affect competitiveness. Nevertheless, little information is available on the potential impact on competitiveness in the international meat or dairy products markets.

[11] The tailored permit will build on national permitting systems, including only basic requirements and will not entail the revision of each individual permit. It will not include components of IED permits that have a significant administrative burden for operators, e.g. the baseline report, the EMS nor the transformation plan.

Whilst production costs of newly covered farms are expected to increase to meet the requirements, available estimations suggest that compliance and administrative costs are very small compared to turnover[12], representing indicatively about €2300 for an average farm. It is therefore clear that there are significantly stronger factors affect the competitive position of the EU producers, such as disease outbreaks, costs of feed, changing consumption habits (e.g. growing sales of meat substitutes) or growing meat/diary production capacities in other parts of the world. The 2014 study[13] which looked into farmers' costs of compliance with the EU legislation concludes that any effect on competitiveness under PO1-a is likely to be overshadowed by more significant forces than environmental legislation such as movements in exchange rates, shifts in consumer demand, differences in labour costs, health and safety standards or trade policies. Moreover, the IED evaluation concluded that there was no evidence that the IED so far materially impacted the EU's competitiveness in the global context. This should hold in particular also for the expanded scope under PO1-a to f, and any potential negative impact on business competitiveness is, therefore, likely to be limited.

Level playing field: **PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture,** and **PO5-f-oil and gas** will improve the level playing field EU-wide, especially in the case of PO5-a and PO5-d; experience shows that that bigger pig or poultry farms were being artificially split into smaller farms, to escape the IED regime. In addition, available evidence suggests that cattle farming has been regulated differently across the EU; as such, the introduction of cattle farming under the scope of the IED should address these differences and level the EU regulatory playing field.

6.6.2. Environmental Impacts

PO5-a-cattle and tailored permitting. In the EU, overall, the rearing of cattle, pigs and poultry emits each year 2138kt of ammonia to air. The IED already covers a number of pigs and poultry farms representing 18% of those emissions. The scope extension raises that coverage to 60-88%, as the farms newly covered by the IED emit between 950-1 548kt ammonia per year, depending on the specific LSU threshold (50-150 LSU). Conservative estimations, based on a limited set of techniques very likely to be included in BAT requirements, suggest reducing ammonia emissions by the newly regulated farms by at least 115-185kt each year, i.e. a reduction by at least 12% of their emissions[14]. These 115-185kt of ammonia emissions would represent an annual saving of 3-5% of total EU-27 ammonia emissions.

In the EU, overall, the rearing of cattle, pigs and poultry emits each year 6100kt of methane, which represents the overwhelming majority of GHG emitted by those activities[15]. The IED already covers a number of pigs and poultry farms representing 3% of those emissions. The scope extension raises that coverage to 42-77%, as the farms newly covered by the IED emit

[12] This is also confirmed by the study referred to in a next footnote (environmental compliance costs are marginal in total costs of production of diary and meat production).

[13] CRPA Assessing farmers' costs of compliance with EU legislation in the fields of the environment, animal welfare and food safety; final report. Environmental legislation included among other things the IED predecessor, the IPPC Directive (2008/1/EC).

[14] Weighted average for all three types of livestock; it is 12% for cattle, 7% for pigs and 20% for poultry.

[15] Methane represents 84% of all GHG emissions from the rearing of cattle, pigs and poultry.

2 500-4 740kt methane per year. Conservative estimations, based on a limited set of techniques very likely to be included in BAT requirements, suggest reducing methane emissions by the newly regulated farms by at least 260-460kt each year, i.e. a reduction by at least 10% of their emissions[16]. These 260-460kt of methane emissions would represent an annual saving of around 1.6-2.8% of all EU-27 agricultural sector GHG emissions. This has particular relevance for the 2030 and 2050 EU climate objectives, as methane is a GHG having a higher global warming potential (GWP)[17] in the 20-year timescale (84) than in the 100-year timescale (28 – used in the above calculations).

Using EEA damage costs, the reductions of ammonia and methane are valued at between €5 450 and €9 240 million per year. Around half these reductions estimated to accrue in France, Germany and Spain.

This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources; however, available evidence is limited, and the scale of impacts is uncertain. Water pollution from these activities is mainly related to manure land runoff and/or seepage of pollutants to surface water or groundwater (organic matter, nutrients, pesticides).

PO5-b-expand existing IED activities. The activities regulated under this sub-option may contribute to improving air quality, albeit this is expected to be significantly lower than PO5-a. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources. Some activities under this sub-option consume large quantities of water (e.g. cold rolling of steel), and others such as textile finishing in particular, can lead to polluted water being discharged. Battery gigafactories that will be constructed will comprise energy-intensive processes and entail a number of complex manufacturing procedures using hazardous substances, potentially leading to impacts to air, water (use and quality) and waste generation. In addition to these impacts, it is expected that the BAT conclusions for these activities could be effective in addressing the use of resources, chemicals and in accident prevention (e.g. through an EMS). This sub-option may also contribute to reducing GHG emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG emissions of activities has been somewhat limited and, therefore, it has not been possible to further quantify these impacts.

PO5-c-landfills. Landfill installations contribute to 1.3% of total NMVOC from all IED industry sectors, 1.9% of ammonia totals, and 1.4% of SO_X totals, part of which can be abated as a result of the BREF and permitting processes. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources. In particular this sub-option could further improve the prevention or reduction of water pollution from leachate ending up in groundwater and/or surface water. However, available evidence is limited, and the scale of impacts is uncertain. This sub-option may also contribute to reducing GHG

[16] Weighted average for cattle and pigs; it is 8% for cattle and 37% for pigs. This is a conservative assessment as significantly higher methane emission reduction potential is reported in some publications. Detailed assessment of specific feeding techniques is required to validate such potential. This would take place as part of the preparation of the BAT requirements for these activities.

[17] GWP indicates the effectiveness of a substance to absorb thermal infrared radiation relative to CO_2. On a 100-year timescale, methane has 28 times greater GWP than CO_2 and is 84 times more potent on a 20-year timescale. F-gases, other powerful GHGs, have a GWP that can be thousands of times higher than that of CO_2

emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG emissions of activities has been somewhat limited and therefore, could not be quantified.

PO5-d-mining. Minerals extraction activities may lead to substantial emissions of PM_{10}, equivalent to around 4.4% of total industrial emissions covered by the IED (E-PRTR data). Therefore, this sub-option is likely to have a positive impact on air quality, though further work is needed to ascertain the extent to which dust suppression techniques are already deployed in the non-energy minerals extractive industry and associated potentials for further reductions. PO5-d will likely lead to weakly positive or positive impacts on water pollution, depending on the subsector, as different extracted materials can lead to different impacts on the water quality and the quantity used. Land is also affected by extractive activities, with land use change practices potentially contributing to a loss of soil functions and of biodiversity. This sub-option may also contribute to reducing GHG emissions, albeit significantly less than PO5-a. Evidence on the potential reduction of GHG has been limited and, therefore, could not be quantified.

PO5-e-aquaculture is unlikely to have any significant impact on air quality. PO5-e is likely to have weakly positive impact on water quality and resources. The main environmental issue caused by aquaculture which falls within the scope of the IED is nutrient loading, caused by excessive release of nitrogen and phosphorus into the natural environment. Nutrient releases could lead to changes in water chemistry, leading to eutrophication within water bodies. Including aquaculture under the scope of the IED could be equivalent to regulating an additional 3% of total industry releases of nitrogen and approximately 5% of total industry releases of phosphorus for the industry sectors reporting under the E-PRTR (data from 2018). Aquaculture however also contributes to other environmental issues that are not typically regulated by the IED, including pharmaceuticals contributing to antibiotic resistance, damaging wild fish populations by reducing genetic diversity, introduction of invasive species, and, finally, diseases with potential impacts on biodiversity. This sub-option is unlikely to have significant climate impacts.

PO5-f-upstream oil and gas installations contribute to methane emissions, with fugitive emissions from these installations accounting for 54% of the emissions in the energy sector. Upstream oil and gas installations appear to contribute around 0.75% of NOx emissions and 1.75% of NMVOC covered by the IED. This sub-option is likely to have limited to weakly positive impacts on water and soil quality and resources; however, available evidence is limited, and the scale of impacts is uncertain.

Sub-options PO5-g (align E-PRTR to IED) and PO5-h (align E-PRTR to other law) ensure that the coherence between the E-PRTR Regulation and the IED, as well as other instruments, is enhanced. These sub-options can have an indirect impact on the environment through for example enabling a better comparison of performance of activities across the EU as well as a greater engagement of citizens in environmental decision-making.

PO5-i-watch mechanism. By monitoring emerging concerns related to emissions from agro-industrial installations and including relevant activities within the scope of the IED and/or the E-PRTR, this sub-option has the potential to enable an increased scope coverage over time and hence further emission reductions.

6.6.3. Social impacts

PO5-a-cattle and tailored permitting, PO5-b-expand existing IED activities, PO5-c-landfills, PO5-d-mining, PO5-e-aquaculture, PO5-f-oil and gas and PO5-i are likely to have mixed effects on employment in the EU. Net impacts on employment are unclear. When costs towards business cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. However, the costs incurred by farms newly brought into the scope of the IED are very limited, estimated at €2300 for an average farm, which would be unlikely to affect consumer prices.

Importantly, environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory and cardiovascular, and leading to reductions in health and social care costs across the EU. Significant benefits have been monetised for **PO5-a-cattle and tailored permitting**, as a result of air quality improvements from implementing a tailored permitting system for livestock farms.

7. HOW DO THE OPTIONS COMPARE?

This section compares the options per problem area. It seeks to highlight the key aspects of the impact assessment relevant for supporting decision-making on the choice of options and sub-options to include in the preferred package. In particular, it identifies which sub-options have a favourable cost-benefit profile. Furthermore, where sub-options include alternatives, their impacts are compared. The sub-options retained for inclusion in the preferred policy package are presented at the end of the section concerning each problem area.

7.1. Effectiveness

7.1.1. Comparison of sub-options

PO1 comprises four sub-options that can all be combined. PO1-a and PO1-c each include two alternatives. Table 3 compares the impacts of these sub-options.

Table 3: Summary of impacts for PO1-a to PO1-d

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
PO1-a achieving BAT-AELs Alternative ***clarify flexibilities***	×	✓✓	O	Business 1.4 Public authorities 0.89	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States and contributes to levelling the playing field at a high level of protection.
PO1-a achieving BAT-AELs Alternative ***full BAT potential***	××	✓✓✓✓	O	Business 9.4 Public authorities 7.89	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States. Implements better the polluter pays principle, in line with the recommendations of the European Court of Auditors Contributes to levelling the playing field at a high level of protection.
PO1-b implementation and enforcement	×	✓✓	×	Business 4.6 Public	Promotes better implementation and enforcement, also through better functioning, penalty and damage redress systems.

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
				administration 5.65	
PO1-c rights of the public Alternative ***public rights***	×	✓	O	Business 0.5 Public administration 2.9	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol.
PO1-c rights of the public Alternative ***enhanced public rights***	×	✓	O	Business 0.56 Public administration 2.9	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol. Ensures better coherence between the closely-related IED and E-PRTR Regulation, and related data.
PO1-d simplification	✓	O/✓	O	Business -11.8 Public administration -0.670	Clarifies provisions that stakeholders have flagged as problematic. Reduces administrative burden, in particular of farms.

Overall, benefits are likely to outweigh costs for all sub-options, in particular:

PO1-a-achieving BAT-AELs-*full BAT potential* is the most significant sub-option as it contains measure IED#5 (requiring setting stricter ELVs within the BAT-AEL range). It is expected to generate significant health benefits. Whilst these could not be reliably quantified, as a partial illustration, potential reductions of NO_X emissions from the implementation of IED#5 across five sectors were monetised to range from €860 million and €2 800 million per year while the corresponding CAPEX was estimated at €210 million per year.

PO1-b implementation and enforcement will promote more consistent and proportionate Member States approaches and thereby promote a more level playing field and reduce any territorial divergence of environmental performance of industry across Member States.

PO1-c rights of the public will significantly empower the public through eased access to information and access to justice, and enhanced participation in permitting processes. The harmonised digital permit summary will solve serious problems in accessing information on permit provisions, such as emission limit values, which will also facilitate monitoring of compliance at all levels of government.

PO1-d simplification introduces simplifications identified as needed by Member States and stakeholders. A codification after adoption of the revised act will allow eliminating provisions that have become obsolete.

7.1.2. Retained sub-options

Table 4 lists the sub-options addressing the effectiveness of the legislation retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 4: Sub-options included in and discarded from the preferred policy package

2- Supporting innovation	
PO1-a achieving BAT-AELs *Sub-option clarify flexibilities (discarded)* ***Alternative full BAT potential***	Clarifies the limits of flexibilities to ensure more consistent implementation by Member States. Sub-option *full BAT potential* implements better the polluter pays principle than sub-option *clarify flexibilities*, resulting in significantly higher environmental and health benefits, in line with the recommendations of the European Court of Auditors. Contributes to levelling the playing field at a high level of protection.
PO1-b implementation and enforcement	Promotes better implementation and enforcement, also through better functioning, penalty and damage redress systems.
PO1-c-supporting transformation *Alternative public rights (discarded)* ***Alternative enhanced public rights***	Ensures compliance with, and better implementation of, the EU's international obligations under the Aarhus Convention and Kyiv Protocol. Ensures better coherence between the closely-related IED and E-PRTR Regulation than sub-option *public rights*.
PO1-d simplification	Clarifies provisions that stakeholders have flagged as problematic. Reduces administrative burden, in particular for farms.

7.2. Innovation

7.2.1. Comparison of sub-options

PO2 comprises three options that can all be combined. PO2-b and PO2-c include two alternatives. Table 5 compares the impacts of the sub-options.

Table 5: Summary of impacts for PO2-a, PO2-b, and PO2-c

Policy option	**Main impacts**			**Admin. costs €million/y**	**Other key aspects**
	Econ.	**Env.**	**Social**		
PO2-a-frontrunners More time to develop and deploy emerging techniques	×	✓✓	O/ U	Business 1 Public authorities 0.5	Supports front-runners. Accelerates innovation by creating better conditions for deploying emerging techniques. Avoids investments in traditionally determined BAT when Emerging Techniques are expected to be available in short to mid-term.
PO2-b stimulate innovation Alternative 1: shorter BREF cycles (***shorter BREF cycles***)	×	✓	O/ U	Business 3 Public authorities 5	Short BREF cycles would require substantial increase of resources dedicated to BREF reviews by Member States, stakeholders and the Commission. Frequent updates would create too short or even overlapping investment cycles, negatively affecting economic costs and efficiency of policy as emphasised by Member States and industrial stakeholders.
PO2-b-accelerate innovation Alternative 2:	×	✓✓✓	O/✓	Business 3	Enables continuous monitoring of IED-relevant innovative techniques at EU and international level.

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
INnovation Centre for Industrial Transformation & Emissions (***INCITE***)				Public authorities 4	Informs the European Commission on the best timing/prioritisation of BREFs reviews to harness innovation and accelerate transition to clean and decarbonised production.
PO2-c-transformation Alternative 1: more time to implement deep transformation BAT (***plans***)	×	✓	O/✓	Business 0.6 Public authorities 0.3	The moment of technological readiness for deep transformation is unknown and will vary across sectors and installations and requires case by case planning. Concerns only the sectors where a significant process change has been qualified as BAT.
PO2-c-transformation Alternative 2: Permit review & Transformation Plans ***(review)***	××	✓✓✓	O/✓	Business 50 Public authorities 50	Makes the perspective of transformation (depollution and decarbonisation, in line with 2050 targets) concrete for all operators and competent authorities via an organised case-by-case approach. Promotes predictability for all operators and competent authorities regarding upcoming required transformations.
PO2-c-transformation Alternative 3: **integrating** Transformation Plans in EMS	×	✓✓✓	O/✓	Business 20 Public authorities 0	Similar to the Alternative 2 but achieved at lower costs.

Overall, benefits are likely to outweigh costs. In particular:

- **PO2-a-frontrunners:** The overall scale of benefits is likely to be relatively small, albeit nevertheless beneficial and having particularly importance for the frontrunners concerned, to encourage the testing and uptake of emerging technologies, especially when coupled with other existing R&I incentives and available funding.
- **PO2-b-stimulate innovation:** The benefits of the alternative measures, **shorter BREF cycles (Alt 1 - IED#21)** or establishing **INCITE (Alt.2 – IED#22)**, are likely to outweigh costs. However, INCITE is expected to result in a more effective and efficient intervention, especially as it would be designed to monitor sectors and update BAT Conclusions and/or trigger BREF reviews, rather than following a shorter yet periodic cycle that substitutes or complements the existing BREF process. The magnitude of costs and benefits associated with INCITE is uncertain and depends on the output of INCITE's work, as well as its future-oriented ability to efficiently encourage and/or trigger stricter environmental requirements in as many installations as possible.

- **PO2-c-supporting transformation:** Similarly, the benefits of the alternatives, allowing more time to implement BAT conclusions where deep transformation is required **(IED#21)** or Transformation Plans **(IED#22)**, are likely to outweigh costs. The IED#22 is likely to gain more traction with IED operators, as it should improve the collective understanding of all IED industry sectors' transformation needs and overall preparedness for industry to accelerate implementation and increase transparency and provide confidence that specific actions will be taken forward by industry. Within the IED#22, the alternative to integrate Transformation Plans in EMS allows for achieving those objectives at lower costs than the permit review alternative.

7.2.2. Retained sub-options

Table 6 lists the sub-options supporting innovation retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 6: Sub-options included in and discarded from the preferred policy package

2- Supporting innovation	
PO2-a-frontrunners	Lifts obstacles for testing and deploying more environmentally effective emerging techniques.
PO2-b-accelerate innovation *Alternative shorter BREF cycles (discarded)* ***Alternative INCITE***	Creates a permanent mechanism, *the INnovation Centre for Industrial Transformation & Emissions (INCITE)*, to monitor innovation and trigger the review of BREFs when emerging techniques reach a high level of maturity. By contrast, shorter BREF cycles would be costly and cumbersome to implement and would not be sufficiently flexible to adapt to the dynamics of innovation.
PO2-c-supporting transformation *Alternative time (discarded)* *Alternative plans/review (discarded)* ***Alternative plans/EMS***	The vast majority of IED operators will need to fundamentally transform their installations in response to the challenge of global warming. *Transformation plans* develop by 2030 meet this need and allow better predictability for operators and competent authorities. On the other hand, introducing *more time* for transformation required by BAT conclusions would only concern a limited number of operators acting upon their publication. Under two alternatives for developing Transformation Plans, the less costly was chosen.

7.3. Efficient use of resources and use of less toxic chemicals

7.3.1. Comparison of sub-options

PO3 comprises seven sub-options that can all be combined. PO3-a includes two alternatives. Table 7 compares the impacts of the sub-options.

Table 7: Summary of impacts for PO3-a to PO3-g

Policy Option	Main impacts			Admin. Costs €million/y	Other key aspects
	Econ.	Env.	Social		
PO3-a Alternative 1: Only binding performance levels (***binding***)	×	✓	O/U	Business 7 Public authorities 6	Setting at EU level meaningful binding BAT associated environmental performance levels (BAT-AEPLs) is only possible for activities that are highly homogenous across the EU. Industrial stakeholders emphasised that this could be economically inefficient.
PO3-a Alternative 2: Binding	×	✓✓	O/ U	Business 16	Enables BREF TWGs to address both activities that are homogeneous across the EU (binding levels) and activities that vary

Policy Option	Main impacts			Admin. Costs €million/y	Other key aspects
	Econ.	Env.	Social		
performance levels and benchmarks (***binding and benchmarks***)				Public authorities 12	depending on local conditions or installation specificities (benchmarks). Although the benchmarks are not binding, operators will have the obligation to monitor, analyse and report the concerned parameters.
PO3-b Environmental management system (EMS)	×	✓✓	O/U	Business 46 Public authorities 23	Provides a transparent instrument to secure implementation of parts of BAT conclusions that Member States struggle to incorporate in permit conditions. Builds on the already required EMS under IED, thereby limiting the additional administrative burden suggested by industrial stakeholders. Supports the proposed Energy Efficiency Directive by ensuring that relevant audits and plans required by the EED and integrated into the EMS are controlled by the IED competent authorities, and actions monitored. Supports chemicals policy in promoting use of less toxic substances. Flexibility of EMS allows adaptation of requirements to the needs of individual installations.
PO3-c National industrial symbiosis plans	U/×	U/✓	O/U	0	Industrial symbiosis requires action at the local level where supporting partnerships between businesses can take place. This limits the potential effectiveness of national plans. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action
PO3-d Dynamically updating the list of pollutants to be reported	×	✓	O	Business 3.9 Public authorities 0.3	Ensures continuous relevance of the E-PRTR, which can then be responsive to information needs regarding emerging (water) priority substances and other pollutants of concern.
PO3-e Reporting of resource use	×	✓	O	Business 35 Public authorities 0.03	Provides a more holistic picture of the environmental impacts of industrial activities and information supporting circular economy aspirations.
PO3-f Reporting waste transfers in more detail	××	✓	O	Business 0.6 Public authorities 0.03	The most important transboundary waste transfers are tracked under other EU law (waste shipment regulation). Tracking all intra-EU waste transfers between all operators would be even more complex.
PO3-g Reporting on releases from products	××	✓	O	Not assessed	Other EU initiatives may be more effective and efficient in making information on products available to the public, in particular product passports that are being considered under the Sustainable Products Initiative.

Overall, benefits are likely to outweigh costs for PO3-a and PO3-b, PO3-d and PO3-e. Doubts remain about the following measures: the introduction of national symbiosis plan requirements via the IED (PO3-c), more detailed reporting of waste transfers (PO3-f) and reporting on products (PO3-g). In more detail:

- **PO3-a-performance levels:** The benefits of the alternative measures, clarifying explicitly binding BAT-AEPLs **(IED#23)** or for explicitly binding BAT-AEPLs and setting benchmark levels for inclusion in EMS **(IED#24)**, are likely to outweigh costs. More flexibility for the TWG is provided by the latter option (**IED#24**) that would likely result in a more efficient and practical approach when compared to the "binding" option put forward by measure (**IED#23**). The scale of the benefits, however, would depend on the uptake of the binding BAT-AEPL and/or benchmark-setting options when compared to the baseline.
- **PO3-b-EMS:** The benefits that may be accrued from introducing Resource and Energy Efficiency Plans and Chemical Management Systems via the EMS could be significant, especially in improving energy and resource efficiency, and reducing waste and industrial sectors' overall carbon footprint. These options would entail economic costs for operators and public authorities, but these are expected to be comparatively much lower in magnitude and they can be mitigated to some extent by promoting digital solutions, and there will be reduced cost of resources thanks to reduced use of resources and energy. The scale of these costs and benefits would depend upon the ambition and effective implementation, monitoring and enforcement of the plans outlined as part of the EMS.
- **PO3-c-symbiosis plans:** The evidence remains uncertain regarding technical feasibility, and whether benefits would outweigh the costs of requiring Member States to develop and implement national symbiosis plans, especially via the IED. In particular, the effectiveness of this measure is very uncertain. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action.
- **PO3-d-pollutants list:** Introducing a mechanism, most likely a delegated act, for dynamically updating the E-PRTR pollutant list would have economic costs for operators, as it will lead to a greater number of facilities having to monitor/assess/report data for air and water emissions. This would partly be offset by synergies and avoided costs related to monitoring efforts for surface water pollutants under EU water legislation and reduced need for reporting the same data under various instruments, as well as promotion of digital solutions. Significant benefits would also accrue via better aligning the E-PRTR with up-to-date information needs, thus better supporting associated policies such as REACH and EU water legislation.
- **PO3-e-report resource use:** Adding requirements, for operators to report their use of energy, water and raw materials would have significant economic costs for operators since the reporting obligation could apply to every E-PRTR facility. This extra cost is particularly marked for the use of raw materials, since data gathering will depend on a number of factors, such as the types of products and processes. The environmental benefits are slightly positive, as it may enable benchmarking of the environmental performance of different industrial activities. However, this may be compromised by data sharing restrictions stemming from business confidentiality issues.
- **PO3-f-tracking waste transfers:** The more detailed reporting of waste transfers within between installations in a Member State would have significant economic costs for operators, since reporting obligation would apply to a large number of E-PRTR facilities.

Benefits: a better understanding of waste flows and improved corporate accountability on waste management.

- **PO3-g report on products:** Gathering information on products in the E-PRTR would not be technically feasible due to the diverse and complex nature of industrial products, and would mean a significant divergence from the E-PRTR's core role, which would likely be better delivered by the Commission's Sustainable Products Initiative and its concept of a product passport.

7.3.2. Retained sub-options

Table 8 lists the sub-options contributing to a non-toxic and resource efficient circular economy retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 8: Sub-options included in and discarded from the preferred policy package

3- Contributing to a non-toxic and resource efficient circular economy	
PO3-a-performance levels *Alternative binding (discarded)* ***Alternative binding and benchmarks***	It will be possible to set binding resource efficiency performance levels only in a few cases where industrial processes are highly homogeny across the EU and the performance is directly related to well-defined techniques. Non-binding benchmarks will give valuable information to all relevant operators and competent authorities on the potential for improving resource efficiency performance also in cases where the processes are not so homogenous across the EU or the performance depends highly on local circumstances and technical characteristics of the installations. Therefore, both binding levels and non-binding benchmarks should be available in BREFs, as appropriate. Benchmarks would be particularly efficient when combined with option PO3-b-EMS.
PO3-b-EMS	Strengthening the role of the already required EMS clarifies the legal status of BAT conclusions. It provides a means of implementation for those conclusions that require adaptation to the circumstances of individual installations, e.g. conclusions including resource efficiency benchmarks and a list of measures to be considered by operators to reach those benchmarks.
PO3-c-symbiosis plans (discarded)	National plans are not the right level of intervention for promoting industrial symbiosis, which rather requires local action tailored to the specificities of businesses and markets. However, action under the baseline to include in BREFs information on industrial symbiosis opportunities may support such local action.
PO3-d-pollutants list	Allows E-PRTR to better take into account substances of emerging concern. Thereby enhances coherence within relevant environmental polices (air, water, soil, chemicals).
PO3-e-report resource use	Enables the benchmarking of different industrial activities.
PO3-f-tracking waste transfers (discarded)	Reporting more detail on waste transfers between installations (both within and between Member States) is unlikely to provide reliable data and would have high administrative costs.
PO3-g-report on products (discarded)	Gathering information on products in the E-PRTR would not be technically feasible. The EU's Sustainable Products Initiative will better address public information on environmental characteristics of products.

7.4. Decarbonisation

7.4.1. Comparison of sub-options

PO4 comprises four sub-options that can all be combined. PO4-b includes three alternatives. Table 9 compares the impacts of these sub-options.

Table 9: Summary of impacts for PO4-a to PO4-d

Policy option	Main impacts			Admin. costs €million/y	Key aspects
	Econ.	Env.	Social		
PO4-a Inclusion of mandatory binding conditions on energy efficiency in the permits	×	✓✓	O/U	Business 29 Public authorities 21	Levels the EU playing field by ending the situation where installations were subject to binding permit conditions on energy efficiency in some Member States, but not in others. Supports the aim of the newly proposed revisions to Energy Efficiency Directive by ensuring that IED permitting authorities are mobilised to monitor implementation, and enforce obligations and actions.
PO4-b IED/ETS interface Alternative IED#28 IED and ETS review (***review***)	O	O	O	0	Mirrors the FF55 ETS revision proposal that includes a review of its interaction with the IED in light of industry decarbonisation evolution dynamics. Sets the date at which both reviews are to be undertaken, thus strengthening the legal signal for innovation to increasingly tackle both decarbonisation and depollution challenges.
PO4-b IED/ETS interface Alternative IED#29 Sunset date for Art. 9(1) (***sunset***)	U/×	U/✓	✓	Business 15 Public administration 11	There is a limited understanding of how innovation and industrial transformation dynamics will affect coherence between the ETS and the IED in the medium- to long-term, also limiting the possibility to assess impacts of this option.
PO4-b IED/ETS interface Alternative IED#30 Immediate deletion of Art. 9(1) (***delete***)	U/×	U/✓	✓	Business 56 Public administration 40	May negatively affect effectiveness and efficiency of the ETS market mechanism. It could lead to more carbon allowances becoming available for trading, ultimately reducing carbon market-based incentives for emissions reductions across ETS sectors.
PO4-c Disaggregation of reported GHG emissions	×	✓	O	Close to 0.02 to both	Improves understanding and emission control of the sources of various types of GHGs and their fuller environmental impacts, e.g., for types of refrigerants.
PO4-d Reporting of GHG as CO_2 equivalent	×	O	O	Close to 0.02 to both	The same objective could be met by including automated protocols in E-PRTR software to convert reported amounts of GHGs into CO_2 equivalents.

Overall, benefits are likely to outweigh costs. In more detail:

- **PO4-a-energy efficiency:** The scale of benefits is likely to be relevant but small, especially dependent on how energy efficiency and reductions in emissions of associated GHG and other pollutants - incentivised via the IED - may interact with the EU ETS framework. This would include potential air quality and other benefits, depending on the

measures taken by individual operators. The overall environmental benefits are expected to outweigh the associated costs.

- **PO4-b-IED/ETS interface:** The alternative measures 'sunset clause' (IED#29) and 'delete immediately' (IED#30) are expected to reduce GHG emissions, but the extent of these reductions is uncertain. It may interfere with the objective of the EU ETS to achieve GHG emission reductions in the most cost-effective manner. The alternative 'future review' (IED#28) secures consistency with the policy approach chosen by the European Commission in the recently tabled Fit for 55 package, strengthens the signal in terms of needed technological innovation tackling both decarbonisation and depollution, whilst granting sufficient time to identify concrete opportunities for strengthening the synergies between the IED and the ETS.
- **PO4-c-disaggregated GHG:** Knowledge benefits will accrue to all E-PRTR users from this refinement and the costs are minimal since the data readily exist.
- **PO4-d- CO2 equivalent:** Few benefits from this measure as CO_2 equivalent can be calculated from the already provided raw data.

7.4.2. Comparison of sub-options

Table 10 lists the sub-options addressing decarbonisation of industry retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 10: Sub-options included in and discarded from the preferred policy package

4- Addressing decarbonisation of industry	
PO4-a-energy efficiency	Ends the situation where installations were subject to binding permit conditions on energy efficiency in some Member States, but not in others. Supports the Energy Efficiency Directive by ensuring that IED permitting authorities are mobilised to monitor implementation and enforce obligations.
PO4-b-IED/ETS interface ***Alternative review*** *Alternative sunset (discarded)* *Alternative delete (discarded)*	The impacts of *deleting* or putting a *sunset date* on Art. 9(1) of the IED are unclear and may negatively affect the EU ETS carbon market. The *review* is consistent with the FF55 ETS revisions proposal and will allow revisiting, at a set date still within this decade, the coherence and potential for enhanced synergies between the IED and the ETS, in light of the dynamics of innovation.
PO4-c-disaggregated reporting	Provides better and low cost information on pollutants such as CFCs that are currently reported as combined totals.
PO4-d- CO_2 eq. reporting (discarded)	This information can be derived by calculations based on already reported data. PO4-c and PO4-d were considered as alternative measures. There were pros and cons to both and the preferred way only became apparent late in the impact assessment. The chosen measure, PO4-c, provides more useful information as emission data is obtained for each GHG, from which the CO_2 equivalent can be calculated, as needed.

7.5. Sectoral scope

7.5.1. Comparison of sub-options

PO5 comprises nine sub-options that can all be combined. Table 11 compares the impacts of the sub-options.

Table 11: Summary of impacts for PO5-a, to PO5-i

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
PO5-a Livestock production & tailored permit	×××	✓✓✓✓ ✓✓	×	Businesses: c. 148-392 Public authorities c. 122-366	These activities are a main contributor to ammonia and methane emissions and have historically not contributed as much as other sectors of industry and society to emission reductions. Brings under the scope additional 84 000-330 000 cattle farms and 77 000-187 000 pigs and poultry farms, resulting in the 10-40% largest EU non-subsistence farms to be covered by the legislation. The tailored permitting approach significantly reduces the administrative cost by 20 to 30%, depending on the specific activity. The increased scope enhances IED coverage from 18 to 60-88% of emissions of ammonia by rearing of cattle, pigs and poultry and from 3% to 42-77% for methane emissions. Minimum expected reductions in methane and ammonia emissions are valued at between €5 450 and €9 240 million/year and the related compliance costs would be between €265-812 million/year.
PO5-b Extension in current sectors	×	✓✓	O	Businesses: c. 17 Public authorities: c. 11	Covers smaller activities (lower thresholds or associated activities) related to existing Annex I activities and addresses the potential negative environmental impacts of rapidly growing batteries gigafactories. The environmental impacts of these smaller and associated activities are well known and can be addressed by the IED approach. Ensures that certain loopholes in the scope of the IED are closed (smaller smitheries, textiles finishing, forging presses, cold rolling and wiredrawing). Battery production is a growing sector surrounded by more uncertainty in terms of installations and their emissions profile. IED covers already many activities in the batteries value chain. The option would bring in additional 725 to 1 000 installations under the scope of the IED (full IED permitting). This includes c. 20-95 battery factories.
PO5-c Landfills	×	✓✓	O	No/Limited	Adoption of BATC would lead to improvement in existing standards and continuous improvement moving forward. The adoption of BATC can contribute to

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
					the EU Methane Strategy. This option does not change the number of landfills covered by the legislation.
PO5-d Mining	××	✓✓✓	O	Businesses: c. 12 Public authorities: c. 8	The demand for critical minerals and base metals will continue to place demands on specific mining installations in the EU and outside the EU. Could facilitate a level playing field across the EU, and ensure confidence in pollution control post-EIA. The option could support one of the Commission's priority actions in 2022, i.e. streamlining permitting procedures for battery raw material projects in Member States, in line with highest environmental standards. The option, which would include metallic and industrial minerals and exclude quarrying, would include between 800-900 minerals extraction installations to be regulated under the IED.
PO5-e Aquaculture	×/U	✓/U	O/×	Businesses c. 2 Public authorities c. 2	The demand for seafood is expected to increase and EU-based aquaculture can help to meet that demand. The sector includes about 12 000 installations mainly micro-enterprises or SMEs, 80% employ 5 or less workers. There are between 55 and 250 aquaculture installations which produce >1000t a year. Whilst IED could help addressing nutrient loading (nitrogen and phosphorus), some key environmental pressures (use of pharmaceuticals, invasive species, diseases, antibiotic resistance) from the sector are not typically regulated by the IED (pollution prevention and control).
PO5-f Upstream Oil & Gas	××	U/✓	O/×	Businesses c. 23 Public authorities c. 15	A Commission proposal is forthcoming under the Methane Strategy to address methane leaks (by far the main pollutant emitted from these activities). There are around 1 000-2 000 installations (offshore and onshore) in the EU.
PO5-g Align E-PRTR to IED (***full alignment***)	×	✓	O	Businesses c. 0.3 Public authorities close to 0.01	Re-establishes the E-PRTR as a primary implementation check on IED activities.
PO5-h - Align E-PRTR to MCPD and UWWTD Alternative E-PRTR#29 (***fulll alignment***)	×	✓	O	Business 5.5 Public authorities 0.3	Creates reporting obligations for a large number of small installations.
PO5-h - Align E-PRTR to	×	✓	O	Business 3.5	Creates better E-PRTR coherence with two closely-related EU instruments.

Policy option	Main impacts			Admin. costs €million/y	Other key aspects
	Econ.	Env.	Social		
MCPD and UWWTD Alternative E-PRTR#30 (***partial alignment***)				Public authorities 0.2	
PO5-i Dynamic updating of sectoral scope	U/××	U/✓✓✓	U/×		Enables "future-proofing" of the IED and E-PRTR regarding dynamic scope extension possibilities, without the need for primary legislation changes.

All new legislative measures introduced by PO1-PO4 will have to apply to a larger number of installations proposed in PO5. Therefore, costs associated with PO1-PO4 are calculated and presented in the total costs of PO5. Activities newly brought within the IED scope would fall under the existing proportionate framework, i.e. BAT being defined as the most environmentally effective and economically viable techniques, with derogations being allowed in cases where EU-defined BAT implementation in an individual installation would lead to disproportionate costs. However, these activities more or less lend themselves to regulation via the IED.

Overall, benefits are likely to outweigh costs for PO5-a, PO5-b, PO5-c, PO5-d, PO5-g, PO5-h and PO5-i. At this stage, it is, however, uncertain whether the benefits generated by PO5-e and PO5-f would outweigh the costs. In more detail:

- **PO5-a-cattle and tailored permitting:** Potential benefits are likely to be significant and outweigh costs. About 13-31% of pigs and poultry farms[18] and 10-40% of cattle farms would be newly brought under the IED's framework, representing an additional 161 000-517 000 farms added to the scope. This would result overall in about 10-40% of pigs, poultry and cattle non-subsistence farms being covered by the IED. Reductions in methane and ammonia emissions from widening the IED coverage of livestock farms are valued at between €5 450 and €9 240 million/year and the related compliance costs would be between €265-812 million/year. Challenges with the implementation of such a significant scope expansion, especially the administrative burden on competent authorities, would be mitigated by introducing the tailored permitting framework. This adjusted framework would improve the efficiency of permitting within the IED, whilst retaining its effectiveness. Cleaner livestock rearing would also help preserving and improving the quality of rural territories.
- **PO5-b-expand existing IED activities, PO5-c-landfills and PO5-d-mining:** Potential benefits are likely to outweigh costs, although there is limited quantitative evidence available, especially with regards to the potential scope of option PO5-c and PO5-d.
- **PO5-e-aquculture and PO5-f oil and gas:** The balance of benefits and costs associated with this measure is uncertain and the scale of benefits, although uncertain, is unlikely to be significant when compared to the benefits that may accrue from PO5-a and even PO5-b.

[18] In addition to 4% of pigs and poultry farms already covered by the IED.

- **PO5-g align E-PRTR to IED***:* Although there is limited quantification of the benefits and costs, this measure would improve the coherence of the two instruments thus providing greater overall effectiveness.
- **PO5-h - align E-PRTR to MCPD and UWWTPD**: Whilst there are weakly negative economic impacts from this measure, there are considerable benefits from improved data on the environmental performance of MCP and UWWTP, as well as enhanced coherence between the two instruments and their reporting mechanisms resulting. This will empower citizens and policy makers, and therefore drive improved performance.
- **PO5-i-watch mechanism:** As this is a mechanism that may trigger future decisions, it is only when future decisions are in the making that impacts can be assessed. The mechanism includes a requirement for assessing impacts, suggesting that sectors would only be included in the scope where the cost-benefits balance is favourable. In the meantime, this sub-options ensures transparent monitoring of the relevance of sectors for inclusion in the scope, thereby informing society and policy makers.

Territorial distribution of activities is uneven across the Member States. Hence, Member States will not be equally impacted by the different PO5 sub-options. For example, EU aquaculture production is mainly concentrated in four Member States: Spain, France, Italy, and Greece; most of the upstream oil and gas activities are located in eight Member States: Croatia, Denmark, Germany, Greece, Italy, the Netherlands, Poland and Romania; extraction of non-energy minerals mainly takes place in countries such as Bulgaria, Germany, Greece, Finland, Portugal, Spain, and Sweden.

7.5.2. Retained sub-options

Table 12 lists the sub-options on industrial scope retained in the preferred policy package. It also summarises the broad rationale for selecting or discarding sub-options. Retained sub-options/alternatives appear in bold.

Table 12: Sub-options included in and discarded from the preferred policy package

5- Industrial scope	
PO5-a-cattle and tailored permitting	Steers the reduction of pollution from activities that have much less contributed to reducing emissions of pollutants than other sectors of society, in particular as regards ammonia and methane emissions. The scope increase results in the 10-40% largest farms being covered by the IED. The light tailored permitting regime allows proportionate regulation of the wide range of farm sizes.
PO5-b-expand existing IED activities	Closes loopholes in sectors and activities already covered by the IED where sub-activities with high pollution potential were not covered, e.g. textile finishing. Addresses the potential negative environmental impacts of rapidly growing batteries gigafactories.
PO5-c-landfills ***Alternative BAT conclusions*** *Alternative cover smaller landfills (discarded)*	Removes legal obstacle preventing the updating of historic BAT requirements dating from the 1990's, for landfills already falling under the IED. IED already covers the vast majority of landfills; covering smaller landfills would not be efficient.
PO5-d-mining	Contributes to establishing a level playing field at a high level of protection for extraction activities forecast to grow fast and responsible for significant emissions of pollutants. Regulates the emissions from the most polluting non-energy mineral extraction activities (metallic and industrial minerals).

PO5-e-aquaculture (discarded)	The sector is mainly comprised of micro-enterprises (around 80% of enterprises having less than 5 employees within the EU27 and are often 'family-owned'). Though nutrient loading is an important pressure that could be addressed by the IED, some other main environmental pressures (use of pharmaceuticals, invasive species, antibiotic resistance, biodiversity) from the sector are not typically regulated by the IED.
PO5-f-oil and gas (discarded)	A Commission proposal is forthcoming under the Methane Strategy to address methane emissions in the oil, gas and coal sectors (by far the main pollutant emitted from these activities).Whilst methane emission is a major environmental pressure from this upstream oil and gas operations, other emissions to water and soil pollution are considered significant. Hence, these activities are not at this stage retained for inclusion in the scope and would be monitored under the watch mechanism.
PO5-g-align E-PRTR to IED	Ensures that reporting under E-PRTR takes place for all IED installations, thereby enhancing coherence between the instruments.
PO5-h- align E-PRTR to other law *Alternative full alignment (discarded)* ***Alternative partial alignment***	E-PRTR is a useful instrument to establish reporting synergies with other EU law, in particular with the MCP Directive and the UWWTP Directive. Full alignment of scope would however require reporting by numerous SMEs. Partial alignment ensures proportionality of the measure.
PO5-i-watch mechanism	Organises ongoing monitoring of emerging concerns related to emissions from agro-industrial installations and inclusion of relevant activities within the scope of the IED and/or the E-PRTR, through delegated/implementing powers, based on clear criteria and full assessment of impacts.

8. PREFERRED POLICY PACKAGE

Table 13 lists the sub-options retained in the preferred policy package, as presented in section 7. Annex 3 presents the overall impacts of the preferred policy package. In case where the sub-options retained included a choice between two alternatives, the retained alternative is shown in italics as previously summarised in Section 7.

Table 13: Sub-options included in the preferred policy package

PO1- More effective legislation
PO1-a-achieving BAT-AELs-*full BAT potential:* Clarify rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, ensure transparent monitoring of related impacts on air and water quality, and require consideration of the full BAT-AEL range when setting ELVs **PO1-b-implementation and enforcement:** Empower competent authorities to suspend the operation of non-compliant plants, harmonise the rules to assess plants' compliance with their permits, make the provisions on penalties more stringent and improve transboundary cooperation in permitting **PO1-c-rights of the public-*enhanced public rights:*** improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available, requiring systematic public participation in permit reviews, *and* more granular reporting of emissions to E-PRTR in an INSPIRE-compliant manner **PO1-d- simplification:** clarify certain definitions and activity descriptions, delete the indicative list of pollutants in Annex II, compliance assessment rules under Chapter II of IED to take precedence over rules in other chapters and top-down reporting for livestock farms and aquaculture
PO2- Accelerating innovation
PO2-a-frontrunners: Facilitate the development and testing of emerging techniques *AND* allow more time for implementing these more innovative technologies and techniques **PO2-b-stimulate innovation- *INCITE***: Establish an INnovation Centre for Industrial Transformation & Emissions (INCITE) documenting innovation and recommending BREF revisions

PO2-c-supporting transformation-*plans:* integrating the operator's transformation plan in EMS
PO3- Contributing to a non-toxic and resource efficient circular economy
PO3-a-performance levels-*binding and benchmarks:* introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System **PO3-b-EMS:** Require operators to address Resource Efficiency, Circular Economy and Chemicals Management in their Environmental Management System **PO3-d-pollutants list:** Dynamically updating the list of pollutants to be reported **PO3-e-report resource use:** Require information on resource efficiency (energy, materials and water)
PO4- Supporting decarbonisation of industry
PO4-a-energy efficiency: Delete exemptions from setting energy efficiency requirements in IED permits **PO4-b-IED/ETS interface-*review***: Plan a review by 2028 of the interface between the IED and the ETS to maximise synergise between the instruments in light of innovation dynamics **PO4-c-disaggregated reporting:** Require more granular reporting for some GHG, in particular refrigerants
PO-5- Industrial scope
PO5-a-cattle and tailored permitting: Broaden current sectoral coverage of the IED and E-PRTR Regulation in rearing of animals (include cattle farms above a threshold within the range of 50-150 LSU, expand coverage to pigs and poultry farms above a threshold within the range of 50-150 LSU), and introduce a tailored permitting process for the rearing of animals **PO5-b-expand existing IED activities**: Extend the IED and E-PRTR sectoral scope by closing loopholes for smaller smitheries, regulating associated activities of textiles finishing, forging presses, cold rolling and wiredrawing; better coverage of the battery value chain by including the rapidly growing batteries gigafactories **PO5-c-landfills-*BAT conclusions***: enable the adoption of BAT conclusions for landfills **PO5-d-mining**: Include metallic and industrial minerals extraction in the IED scope[19] **PO5-g-align E-PRTR to IED**: Align E-PRTR activity descriptions to IED activity descriptions **PO5-h- align E-PRTR to other EU laws-*partially:*** E-PRTR scope to cover medium combustion plants between 20 and 50 MW and urban waste water treatment plants between 20 000 and 100 000 person equivalents **PO5-i-watch mechanism**: Establish a dynamic system to identify and include emerging activities/sectors of concern, according to significance of pollutant emissions, and the potential to address these issues

[19] Based on the assessment of impacts (Annex 8), it is concluded to focus the scope of this measure on only extraction and treatment of metallic and industrial minerals, i.e. to exclude quarrying activities.

The preferred policy package will generate significant and positive environmental impacts and incur limited negative economic impacts. Overall costs, will be largely outweighed by the benefits, whilst the problems identified by the IED and the E-PRTR Regulation evaluations would be comprehensively addressed, in addition to contributing to the EU's general objectives embedded in the EGD, the Glasgow Global Methane Pledge, and to levelling the playing field at a high level of protection.

The IED includes in its design safeguards to ensure that BAT requirements remain proportionate, i.e. that societal benefits are larger than economic costs incurred[20]. This proportionality was confirmed whenever a cost-benefit analysis (CBA) could be conducted. Quantification has been achieved for the two measures having the most significant impacts.

Under PO1-a, illustrative calculations, for NO_X emission reduction by five sectors resulting from measure IED#5, have estimated health benefits to be at least between €860 million and €2 800 million/year, and CAPEX and OPEX for businesses to be €210 million/year.

Furthermore, the assessment shows in particular that the main scope extension, under PO5-a *cattle and tailored permitting*, is proportionate. Based on the assessment of setting the threshold at 50, 100, 125, 150, 300, 450 and 600 LSU (*livestock unit*), thresholds within the range of 50-150 LSU for cattle, pigs and poultry farms came out as proportionate and most effective. This covers (i) an additional between 161 000 and 517 000 livestock farms covered by a tailored permitting process (approximately between 84 000-330 000 cattle farms and 77 000-187 000 pigs and poultry farms, depending on the specific LSU threshold), resulting in the 10-40% largest farms of the sector being covered by the legislation[21], out of a EU's existing c. 1.5 million non-subsistence farms. It would result in at least reducing the emissions of newly regulated farms by 12% for ammonia and 10% for methane[22]. The monetised benefits from reducing methane and ammonia are valued at between €5 450 and €9 240 million/year, depending on the specific LSU threshold, while the compliance costs are €265-812 million and administrative costs for both operators and public administrations, are €270-758 million[23], i.e. a benefit to cost factor of between 5-10 for the whole livestock (from which 4-8 for pigs and poultry and 7-14 for cattle).

Other scope increases bring under IED between 1 500 and 1 900 installations from other sectors covered by full IED permitting, i.e. an increase by 7% of the total of number of installations other than farms covered by the IED. As for industrial activities already within the IED scope, these are typically large, often multinational, companies. There is no evidence[24] of an intrinsically differing economic viability for BAT among Member States. If for an individual installation this does not hold, then a derogation can be applied for.

Little evidence could be found on a potential impact on competitiveness and prices of final products. Past reports summarising the cumulative costs of EU regulation of the EU energy

[20] see Article 3(10) on the BAT definition and Article 15(4) on derogations

[21] These 10-40% largest farms are responsible for 60-88% of emissions ammonia and 42-77% of methane from the rearing of cattle, pigs and poultry.

[22] This represents a 3-5% reduction of total EU ammonia emissions and 1.6-2.8% reduction of total methane emissions from the agricultural sector.

[23] This is split in €148-392 million for business and €122-366 million for public authorities, depending on the threshold within the range of 50-150 LSU.

[24] IED evaluation SWD(220)181 final.

intensive industry[25] indicate that environmental legislation is not a leading factor contributing to costs of operation. Within this picture, IED compliance costs are small compared to other costs (energy, carbon emissions allowances, workers safety) and it is very unlikely that sectors whose commodities are traded on global markets (e.g. aluminium, copper, meat) will pass IED compliance costs onto consumers.

The total administrative burden is estimated within a range of €356-600 million/year for industrial operators and €265-509 million/year for public authorities. Administrative activities and costs estimated for the selected policy measures will necessarily have some overlaps (e.g., many measures require adjustments of permit reconsiderations and updates and, therefore, some efficiencies could be identified), resulting in over-estimation of the overall administrative costs.

The preferred package will significantly support the EU's decarbonisation agenda and promote synergies and consistency of the EGD policies. In the shorter term, the scope extension will amplify the current IED role in regulating non-ETS GHG emissions[26], in particular methane, thereby supporting the Effort Sharing Regulation. Furthermore, the proposals to make BAT on energy efficiency mandatory across all IED permits and to require all IED operators to include in their Environmental Management Systems the outcome of energy audits will support the Energy Efficiency Directive. In the medium to longer term, the progressive uptake of technologies which cut both pollutant and GHGs emissions implies that, over time, more synergies will occur between the IED and the ETS, as well as impacts on the carbon market. Hence, coherence issues and opportunities for enhanced synergies that may arise will be addressed by the review, proposed also as part of the FF55 package.

Furthermore, actions under the innovation area will also contribute to a better understanding of how pollution reduction, decarbonisation and also a circular economy will be achieved. INCITE will provide a better mapping of innovative technologies that are relevant for depollution and decarbonisation. The requirement for IED operators to design, towards the end of this decade, their transformation plans will allow them to focus efforts towards achieving maximum beneficial synergies, based on technological innovation, between depollution, decarbonisation and circularity for the 2030-2050 horizon.

9. HOW WILL ACTUAL IMPACTS BE MONITORED AND EVALUATED?

The overall emissions of pollutants per sector, based on data reported by operators to the E-PRTR, will remain key indicators to track progress against the objectives of this initiative. The OECD has also identified[27] that PRTR data can be used to evaluate progress towards achieving United Nations Sustainable Development Goals, especially SDG 12.4. The improved E-PRTR will also allow better monitoring of industry's environmental performance at sector level:

[25] Implementing the "For a European Industrial Renaissance" communication COM(2014) 14 final; studies were carried out among others: for steel, aluminium, chemicals and ceramics sectors.

[26] Non-ETS GHG emissions currently covered by IED represent 4% of overall EU GHG emissions. After scope extension, this will be about 15% of overall GHG emissions.

[27] https://www.oecd.org/chemicalsafety/pollutant-release-transfer-register/using-prtr-information-evaluate-progress-towards-sustainable-development-goal-12.pdf

- The increased granularity of reporting of pollutant emission at installation level will allow analysis of the main processes within sectors whose environmental performance is improving or is lagging behind;
- The inclusion of reporting of resource use will allow defining new indicators on use of materials, water and energy, that will enable tracking of resource efficiency improvements;
- More dynamic updating of the list of substances covered by E-PRTR will allow defining emission indicators of substances of emerging and current concern. This will enable the tracking of improvements in the use and management of such substances.

These improvements will also help ensure that this monitoring can be effectively used in the wider Zero Pollution Monitoring and Outlook framework which will be published every two years from 2022 onwards[28]. At the same time, the data on air, water and soil pollution available through the Zero Pollution Monitoring will help evaluate the impacts of emission reductions stemming from the installations falling under the IED/E-PRTR Regulation.

A central concern in the revision of the IED is to ensure that the whole range of BAT-AELs is used. Analysis of this issue has been complex due to the lack of transparency of, and difficult access to, permits. The future harmonised 'permit summary' will dramatically ease the harvesting of ELVs set in permits, through automated IT tools. This will allow analysis sector by sector of the distribution of ELVs within the BAT-AEL ranges, at the end of permit revision cycles triggered by adoption of BAT Conclusions and improve clarity of information contained in the permits to public.

The scale of progress in emissions reduction will depend on the technological progress, outcomes of INCITE, any more frequent BREF reviews, and any actions that may be triggered as a result. Understanding this requires monitoring of the pace of development and uptake of innovations and the resulting required transformation of IED sectors for meeting the EU's 2030 and 2050 objectives. The harmonised permit summary will allow the quantification of the number of cases where new flexibilities supporting frontrunners in testing and deploying emerging techniques have been used. Wider impacts on innovation dynamics will be more complex to monitor. New indicators will be defined in an industrial transformation scoreboard published by INCITE that may include new indicators such as e.g.:

- Technology Readiness Level (TRL) of emerging techniques per sector;
- Emissions performance of emerging techniques;
- The anticipated "on the ground" uptake timeline of such techniques;
- Distance to target indicators, for each IED sector.

For the E-PRTR measures, the key indicators will include the timeliness and the completeness of reporting, broken down by Member States, sector and by environmental media. Web statistics from the Industrial Emissions Portal will allow the measurement of progress, with regard to the public's accessing of IED/ E-PRTR combined information.

Periodic publication of implementation information by Member States will complement this by providing readily-accessible, machine-readable, common-format information on key provisions via dynamic IT means. This will include information on:

[28] See COM(2021) 400 and SWD(2021) 141

- The granting of flexibilities to support emerging techniques;
- The setting of stricter permit conditions in permits where required to meet environmental quality standards;
- The granting of derogations allowing pollutant emissions higher than the BAT-AEL range;
- Enforcement action taken.

Perceptions on improvements to legal clarity will be monitored via the BREF process, through e-surveys addressed to the IED and E-PRTR stakeholder community.

The review, at a set date still within this decade, of the interaction of IED with the ETS and decarbonisation developments will be a key milestone in monitoring and evaluating this revamped and more holistic policy approach.

EUROPEAN
COMMISSION

Strasbourg, 5.4.2022
SWD(2022) 111 final

PART 2/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
{SWD(2022) 112 final}

Annex 1: Procedural information

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

The preparation of this file was led by DG Environment (ENV), with support from DG Joint Research Centre B.5's European IPPC Bureau (JRC.B.5).

The file essentially comprises a revision of existing "industrial emissions" EU legislation: the Industrial Emissions Directive (2010/75/EU) and Regulation (EC) 166/2006 on the European Pollutant Release and Transfer Register (E-PRTR).

The E-PRTR provides the most important reporting tool to track the reduction of pollutants to air, water and soil from IED (agro-)industrial installations via the IED's implementation, as well as some (agro-)industrial sectors which lie outside of the scope of the relevant annexes of the IED. Additionally, the E-PRTR has lower reporting thresholds for some activities than those that govern inclusion within the IED regime of permit-based application of "Best Available Techniques" and pollution prevention and control technologies.

This overall "industrial emissions" revision takes into account the two separate evaluations that were performed for the two legal instruments (E-PRTR and IED), and incorporates as many as possible of those recommendations that have resulted from those evaluations. In addition, the objective of the "two-in-one" revisions of existing EU "industrial emissions" legislation is to update the two instruments to be able to deliver the aims and targets of the wide-ranging and overarching policy aims as described in Section 2 (below).

Since this file comprises two combined sub-initiatives, they were included as two discrete items in the DECIDE/Agenda Planning database, as follows:

Commission proposal for revising the Industrial Emissions Directive (IED)	PLAN/2020/6608
Commission proposal for the revision of the E-PRTR regulation	PLAN/2020/8555

2. ORGANISATION AND TIMING

This joint "industrial emissions" initiative is a deliverable under the European Green Deal[1], the Zero Pollution Action Plan[2], the Circular Economy Action Plan[3] (CEAP) and has strong

1 COM(2019) 640 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640

2 COM(2021) 400 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827

3 COM(2020) 98 final https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF

links to the revised May 2021 Industrial Strategy for Europe[4], which in turn built on the 2020 Industrial Strategy.[5]

For E-PRTR, the **Inception Impact Assessment Roadmap** was published on 28 September 2020 with a feedback period until 26 October 2020[6].

For the IED, the **Inception Impact Assessment Roadmap** was published on 24 March 2020 with a feedback period until 21 April 2020[7].

The Inter Service Steering Group (ISSG) for the Impact Assessment was set up by the DG Environment. It included the following DGs and services: AGRI (Agriculture), CLIMA (Climate Action), ENER (Energy), ESTAT (Eurostat), FISMA (Financial Stability, Financial Services and Capital Markets Union), GROW (Internal Market, Industry, Entrepreneurship and SMEs), JRC (Joint Research Centre), JUST (Justice and Consumers), MARE (Maritime Affairs and Fisheries), RTD (Research and Innovation), SANTE (Health and Food Safety), SJ (Legal Service), TAXUD (Taxation and Customs Union) as well as ECHA (European Chemicals Agency) and the EEA (European Environment Agency). Meetings were organised between autumn 2020 and autumn 2021.

The ISSG discussed the Inception Impact Assessments from both the IED and E-PRTR sub-initiatives. Already at the first ISSG meeting (15.9.2020), it was decided to merge the Open Public Consultation process for the two sub-initiatives (see Annex 2). All ISSG meeting have covered both sub-initiatives to maximise the interaction and synergies between the two existing legal instruments, and their subsequent evolution. The ISSG meetings have discussed the main milestones in the joint process, in particular evidence gathering, coherence with other ongoing draft legislative initiatives, the consultation strategy and main stakeholder consultation activities. The ISSG has been consulted regarding, and has given input to, key deliverables from the support study, and the combined IED / E-PRTR draft Impact Assessment report prior to its submission to the Regulatory Scrutiny Board (RSB).

3. CONSULTATION OF THE REGULATORY SCRUTINY BOARD (RSB)

An informal upstream meeting with the RSB took place on 7 October 2020.

After final discussion with the ISSG, a draft of the impact assessment was submitted to the RSB on 10 November and discussed at a meeting with the RSB on 8 December 2021.

Following the positive opinion of the RSB, changes were made to the IA in order to reflect the recommendations of the Board. Table A1-1 presents an overview of the RSB's comments and how these have been addressed.

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4 COM(2021) 350 final https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf

5 COM(2020) 102 final https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593086905382&uri=CELEX%3A52020DC0102

6 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

7 Industrial emissions – EU rules updated (europa.eu)

Table A1-1: How RSB comments have been addressed

RSB comments	How addressed
Main findings	
1. The report does not sufficiently explain how the revised IED and E-PRTR will interact with and support other legislation.	Additional sub-sections have been introduced in section 1 of the main report explaining the interaction of respectively the IED and the E-PRTR Regulation with relevant legal instruments. Related considerations have been fine-tuned in the rest of the impact assessment, including in Section 8 presenting the preferred policy package and its impacts.
2. The report is not clear how the 25 measures under the option supporting 'more effective legislation' have been chosen and why no alternative measures are envisaged.	For better clarity on the nature of the options and the policy decisions they entail, Option 1 has been split into four sub-options, two of which include alternatives related to some key measures. Further explanations concerning the process that has led to retaining measures has been provided.
3. The report is not clear on some relevant impacts of the envisaged measures, in particular on industrial competitiveness, Member States and consumers.	The description of potential impacts has been reviewed and clarified, where additional information was available, it has been added.
What to improve (comments summarised)	
1. The report should expand and strengthen its analysis of the coherence between the revised IED and E-PRTR and other legislation. It should improve its explanation of the interaction with the EU Emissions Trading System and be clearer about any overlap (or synergy) with the Common Agricultural Policy when it comes to adjustment costs. It should explain how IED would interact with the Effort Sharing Regulation (ESR) given that it is an EU-wide horizontal instrument imposing binding GHG reduction requirements on specific operators and sectors, while the ESR sets an overall reduction target but leaves it to Member States to determine the appropriate national mix. It should, for example, explain how methane emissions (potentially covered by both instruments) would be tackled.	As per finding 1 above. Furthermore: • The interaction of IED with the ETS has been revised in the problem definition. • The assessment of sub-option PO5-a includes explanation on eligibility of farms' adjustment costs under the CAP. • The contribution to FF55 and the longer term decarbonisation goals is discussed in section 8, presenting the preferred policy package and its impacts.
2. The report should consider alternatives for the package of 25 measures in the option supporting more effective legislation (option 1). Many of these measures are contentious or are not merely clarifying ambiguous provisions but are clearly increasing ambitions. The report should consider all options that are likely to emerge in the legislative process, including a more restricted package of measures.	As per finding 2 above.
3. The report should further develop the analysis of competitiveness impacts on industry (taking into account the high – in absolute terms – compliance costs even with only partial quantification) and assess the risk that operators may outsource their production to third countries. In particular, it should assess more thoroughly the impacts on competitiveness of the newly included industry sectors (e.g. livestock farms) and the risk that EU production will be substituted by third-country imports (benefitting from less stringent production requirements).	As per finding 3 above. The discussion of competitiveness has been extended, both in the introductory section and by introducing additional sub-sections on competitiveness impacts in the relevant sections summarising the assessment. Where costs could be quantified, this includes the discussion of their comparative relevance, including for livestock farms.

RSB comments	How addressed
4. The report should better explain, and present transparently, impacts on consumer prices (in terms of potential cost pass-through) and on third countries. It should clearly identify and analyse the impacts by Member State to reveal whether the implementation burden falls unevenly. It should assess territorial impacts, as the envisaged inclusion of the livestock sector is likely to affect in particular rural areas.	As per finding 3 above. The discussion of impacts has been extended in the assessment sections to better understand the likelihood of impacts on consumer prices, where available information allowed a comparative analysis of costs.
5. When it comes to the proportionality of the measures considered, the report should more clearly account for the fact that for some of the benefits there is a higher level of uncertainty that they will materialise when compared with the costs. The report also needs to explain better the combined impact (any synergies	The sections discussing proportionality have been expanded to better explain the assessment. In particular, the reasoning to set the threshold for covering livestock farms was added, which includes proportionality as a key parameter. The discussion of synergies between the package and climate policies has been expanded, notably in Section 8 presenting the preferred impacts and its impacts.
6. The report should be more explicit about any possible implementation issues and whether the necessary resources will be available across all Member States to ensure the consistent and effective implementation of the revised instruments.	Experience concerning availability of resources to Member States' competent authorities has been addressed in Section 1. The description of the proposed tailored permit for livestock farms has been enhanced, as well as the discussion of what this means in terms of alleviated administrative procedure for the Member States.
7. The report should better reflect the diversity of stakeholder views through the analysis and indicate how dissenting or minority views have been taken into account.	References to stakeholder views have been systematically expanded in the main report and a detailed overview of stakeholder views has been incorporated in Annex 2.

4. EVIDENCE, SOURCES AND QUALITY

To support the analysis of the different options, the European Commission awarded two **support contracts** to external experts.

For the IED Impact Assessment support, the consortium of consultants comprised: Trinomics B.V. (Consortium Lead), with Ricardo plc (Lead for the Specific Assignment), supported by VITO (Flemish Institute for Technological Research) NV, Wood plc and E3Modelling SA.

For the E-PRTR Regulation Impact Assessment support, the consortium of consultants comprised: RPA Europe srl and Risk Policy Analysts (RPA) (Lead for the Specific Assignment), Air Quality Consultants (AQC) and Aether, supported by Ökopol and ERG.

Evidence was compiled from the evaluation reports of the IED[8] and the E-PRTR[9], as well as via specific desk studies and data collection performed as sub-assignments, feeding into the overall impact assessment work.

Further information is given regarding the evidence bases compiled by the external consultants in the following annexes:

- Annex 8 (IED) – Shortlisted measures

[8] SWD(2020)181 final available at https://europa.eu/!HP74fW
[9] SWD(2017)710 final available at https://europa.eu/!bC98wG

- Annex 9 (E-PRTR) – Shortlisted measures; and
- Annex 10 (combined impact assessment of all options).

In addition, extensive consultation of stakeholders was carried out by the two teams of external experts, as detailed in:

- Annex 2 (Stakeholder consultation synopsis)

The two teams of external expert consultants worked in close cooperation with the European Commission throughout the different phases of the study, and partly in consultation with one another throughout the process, particularly in the latter stages of assembling a coherent evidence base and in assessing, screening and adjusting policy measures and options.

Annex 2: Stakeholder consultation

INTRODUCTION

The impact assessment accompanying the combined revision of the Industrial Emissions Directive (IED) and E-PRTR (European Pollutant Release and Transfer Register) Regulation was subject to a thorough consultation process. This included a variety of different consultation activities aimed at gathering the views of all relevant stakeholders and ensuring that the views of different organisations and stakeholder types were presented and considered.

This Annex describes the consultation activities that have taken place and presents a summary of views.

Part 1: Description of consultation activities

1. CONSULTATION ACTIVITIES - IED

- IED solely - feedback period via the Commission's "Have Your Say" interactive portal on the published **Inception Impact Assessment**[1] (154 responses; consultation period 24 March 2020 to 21 April 2020)

- Joint IED and E-PRTR **Public Consultation**[2] - online survey via the Commission's "Have Your Say" interactive portal (336 responses; 20 December 2020 to 23 March 2021). The survey contained 24 questions, four of which directly concerned the E-PRTR. Most were multiple-choice questions using Likert-scales of 5 options (most negative to most positive). The scales for most questions included one or more "opt-out" responses, such as "I don't know" to avoid forcing respondents into giving an opinion that they might not feel qualified giving. Five questions were open-ended, including one open question at the end, which asked the respondents for any further relevant feedback, information, or opinions they wished to share. It should be noted that respondents were able to provide comments to most questions by selecting "Other".

- IED solely - **Targeted Stakeholder Survey (TSS)**[3] consultation, which consisted of an online survey of a more detailed nature (235 responses; 8 February 2021 to 9 April 2021). The TSS questionnaire was developed in discussion and agreement with the European Commission including the Inter-Service Steering Group (ISSG). The TSS was by invitation only, to organisations with a known stake in the IED.

  The electronic questionnaire was launched using the online tool "Survey Monkey", pdfs and guidance regarding the questionnaire were hosted on a dedicated website[4] of the lead consultant, Ricardo. This consultation was carried out to enhance further the

[1] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12306-Industrial-emissions-EU-rules-updated_en

[2] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[3] https://cdn.ricardo.com/ee/media/assets/ied-ia_tss_1.pdf

[4] Revision of the industrial emissions directive – consultations (ricardo.com)

evidence base through the collection of more specialised feedback from targeted stakeholder groups on **six problem areas**, grouped by the options under consideration for the impact assessment study[5]. These problem areas are:

1. The environment is polluted (split by zero pollution ambition and non-toxic environment)
2. Climate crisis is happening
3. Natural resources are being depleted
4. Innovation - State of the art techniques cannot respond satisfactorily to problem areas 1 to 3 (above)
5. Private individuals have limited opportunities to get informed about, and take action regarding impacts caused by agro-industrial plants
6. Excessive burdens may affect the efficiency of policy instrument(s)

The questionnaire script included a number of multiple-choice questions. In many cases, respondents had the option to select an "other" option and then there was an opportunity to provide an open text response giving further information about this "other" option, or to provide further information about the response to the preceding multiple-choice question. At the end of the questionnaire, respondents also had an opportunity to provide any additional comments and to upload any supporting evidence.

Of the total 235 responses received, most of the respondents (71%) represented industry views, 21% were Member State representatives (split by national and local/regional), 3% were environmental NGOs and 5% were classified as 'Other'.

- IED and E-PRTR – Targeted stakeholder engagement via one-to-one interviews, carried out with key stakeholders from June to September 2021, to complement the other stakeholder activities and to ensure more in-depth views, specifically:
  - To gain more specific feedback, as required, on identification of options
  - To fill specific data gaps identified for the impact assessment.
- IED and E-PRTR - Targeted stakeholder engagement via **focus groups,** held in June-August 2021. The focus groups enabled stakeholders to engage in discussions at greater depth on key emerging themes. Stakeholders were selected based on their sectoral representation and a good geographical and stakeholder type distribution between environmental NGOs, industry representatives and Member States' Ministries and Competent Authorities was ensured to enable balanced discussions.

- Joint IED and E-PRTR: Two **Stakeholder Workshops** were held remotely via online meeting webinars on 15 December 2020 (IED = 350 persons registered; 253 attended; E-PRTR = 236 registered; 195 attended) and 7-8 July 2021 (IED = 395 registered; 278 attended; E-PRTR = 266 registered; 165 attended).

[5] These initial problem areas were subsequently re-structured into five problems during the latter preparation stages of this Staff Working Document. They cover the same issues with a slightly different breakdown, but the insights were easily mapped across from input reports and thus employed in the production of this SWD and associated external consultants' reports.

2. STAKEHOLDER GROUPS PARTICIPATING IN CONSULTATIONS - IED

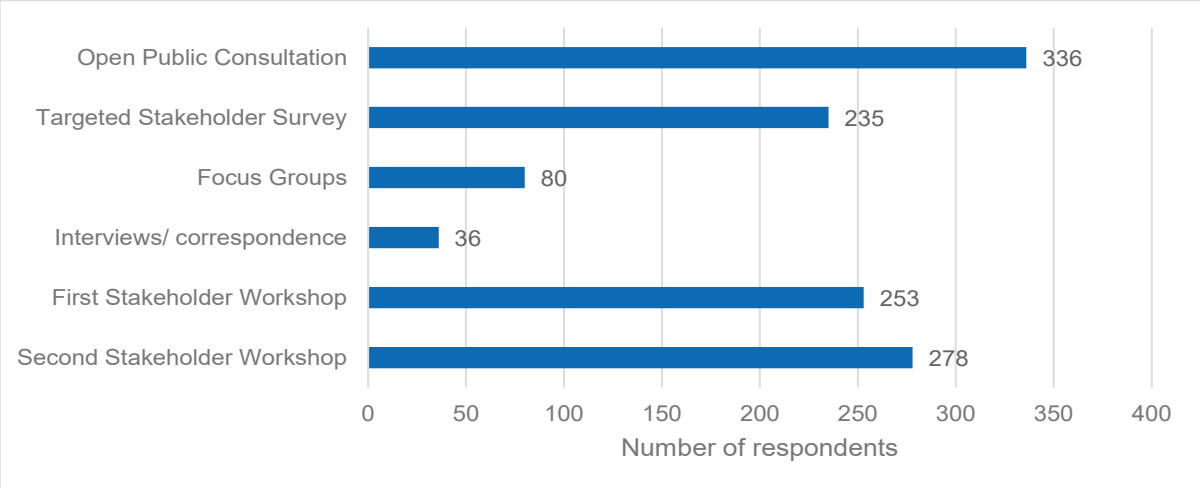
Table A2-1 below summarises the types of stakeholders who participated in the various stakeholder consultation activities.

Table A2-1: Stakeholder groups and sub-groups participating in IED-related consultations

Stakeholder Group	Stakeholders
1. Public authorities within EU Member States	• National level Member State Authorities • Regional/ local Member State Authorities
2. Industry	• Key industries involved in the IED • Business and trade associations for sectors under the scope of the IED • Individual operators of large agro-industrial plants • Technology providers
3. Other	• Environmental NGOs (main interlocutor – the European Environment Bureau, with additional climate and standards environmental NGOs) • General public/ private individuals • Workers' associations/ trade unions • Existing IED platforms, including the Industrial Emissions Expert Group (IEEG), the IED Article 13 Forum • European Commission and other EU services and expert groups/networks, such as JRC, ECHA, EEA • Technical experts, academics and research institutes • Third parties and countries with links to the IED

Figure A2-1 below illustrates the overall numbers of respondents per IED consultation activity, post-Inception Impact Assessment (noting that the Open Public Consultation and Stakeholder Workshops were joint IED/ E-PRTR consultation activities).

Figure A2-1: IED-related consultations and numbers of participants

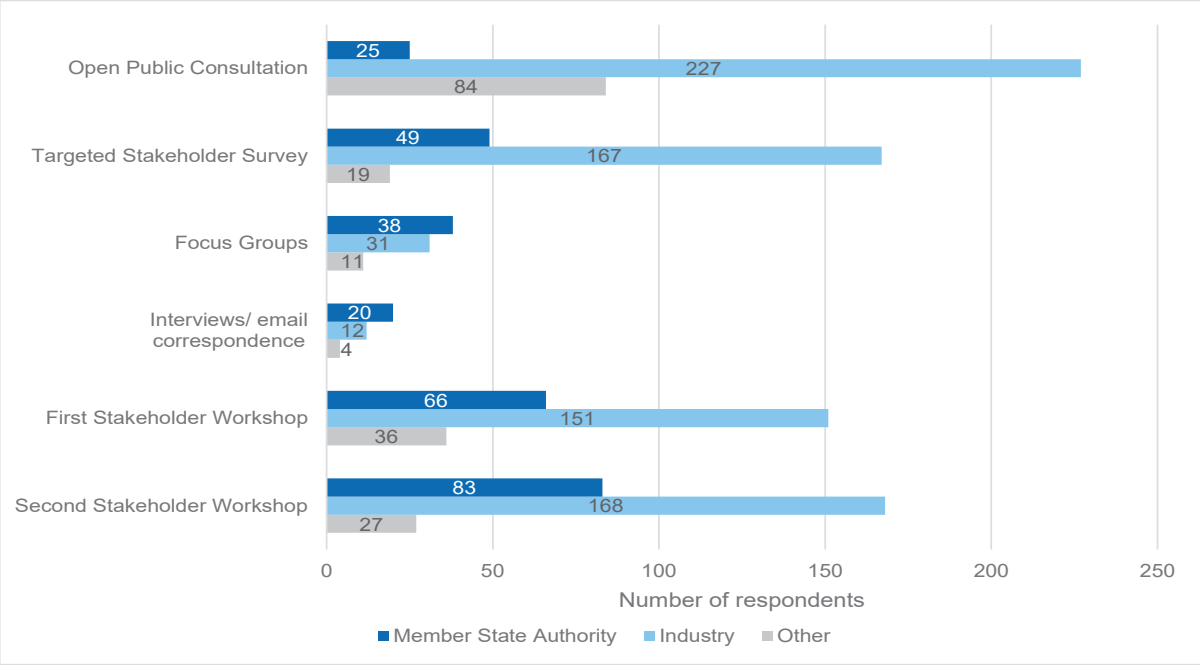


Furthermore, a breakdown of the proportion of the types of stakeholders participating in each of the consultation activities is illustrated in Figure A2-2. Figure A2-2 illustrates that there was a preponderance of industry representatives responding to, and interacting with, the

consultation activities, followed as a proportion by Member States' Authorities, and then a smaller share of "other" respondents (environmental NGOs, members of the general public, specialist independent/ consultancy/ think-tank experts, etc).

Throughout the analyses of the results, efforts have been made to compensate for the over-representation of industry and Member State respondents by not quoting pie charts of overall responses as if they were representative of a homogeneous "population" of participants. Instead, population groups are analysed separately, to explore the variations between the separate groups of respondents.

Figure A2-2: IED Consultations and breakdown of stakeholder participants by overall groups



3. CONSULTATION ACTIVITIES - E-PRTR

- E-PRTR solely - feedback period via the Commission's "Have Your Say" interactive portal on the published **Inception Impact Assessment**[6] (37 responses; consultation period 28 September to 26 October 2020)
- Joint IED and E-PRTR **Open Public Consultation**[7] (336 responses) – as in "IED" section above.
- E-PRTR solely - **Targeted Stakeholder Survey (TSS)**[8], consisting of an online survey of a more detailed nature (161 responses; consultation period 8 March to 30 April 2021).

[6] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[7] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12583-Industrial-pollution-European-Pollutant-Release-and-Transfer-Register-updated-rules-_en

[8] https://625a7483-1957-4fcd-9bee-bd29b4507dbb.filesusr.com/ugd/b48dda_9614b8ce29d74a68b10f80746e2aa845.pdf

The E-PRTR TSS questionnaire was developed in discussion with the European Commission, and subsequently put online utilising the survey tool, Alchemer. Intended to gather feedback for the impact assessment from stakeholders involved in implementation of the E-PRTR Regulation, this TSS grouped questions under six problem areas that broadly reflected the inception impact assessment, and was tailored with specific questions for the following types of stakeholders:

a. stakeholders responsible for providing data to a competent authority (facility operators)
b. stakeholders responsible for checking the data provided at national level and forwarding them to the European Environment Agency (regional and national competent authorities)
c. more general questions for all stakeholder groups.

d. E-PRTR solely – **Targeted telephone interviews**. Targeted telephone interviews, to complement the online TSS survey, took place with representatives of regional and national competent authorities, European institutions, representatives of non-EU PRTRs, representatives of the Kyiv Protocol Bureau, industry associations, civil society and other key stakeholders. The stakeholder interviews were grouped into two categories:

Stand-alone interviews with stakeholders who were not the primary target of the online survey (e.g. EU institutions, such as EEA, relevant units of the Commission, and the European Central Bank).

Follow-up interviews with survey respondents who expressed their interest to take part in interviews to further discuss their inputs to the survey. Survey respondents included two main stakeholder groups: industry associations and national authorities.

Stand-alone interviews commenced in March 2021 while the targeted survey was still open. Follow-up interviews mainly took place after the closure of the targeted stakeholder survey between May and August 2021. In total, 36 interviews were conducted.

- E-PRTR solely – **Focus Groups**. Focus group discussions were held online in August 2021 to complement the online survey and interviews. Representatives of Member State authorities, industry associations and the NGO community took part in the discussions. Attendance at the Focus Group was by invitation only. Two focus groups were organised to tackle different problem areas.

- Joint IED and E-PRTR: Two Impact Assessment information and Question/ Answer **Stakeholder Workshops**, held remotely via online meeting webinars on 15 Dec 2020 (350 persons registered; 253 attended) and 7-8 July 2021 (395 registered; 278 attended).

4. STAKEHOLDER GROUPS PARTICIPATING IN CONSULTATIONS - E-PRTR

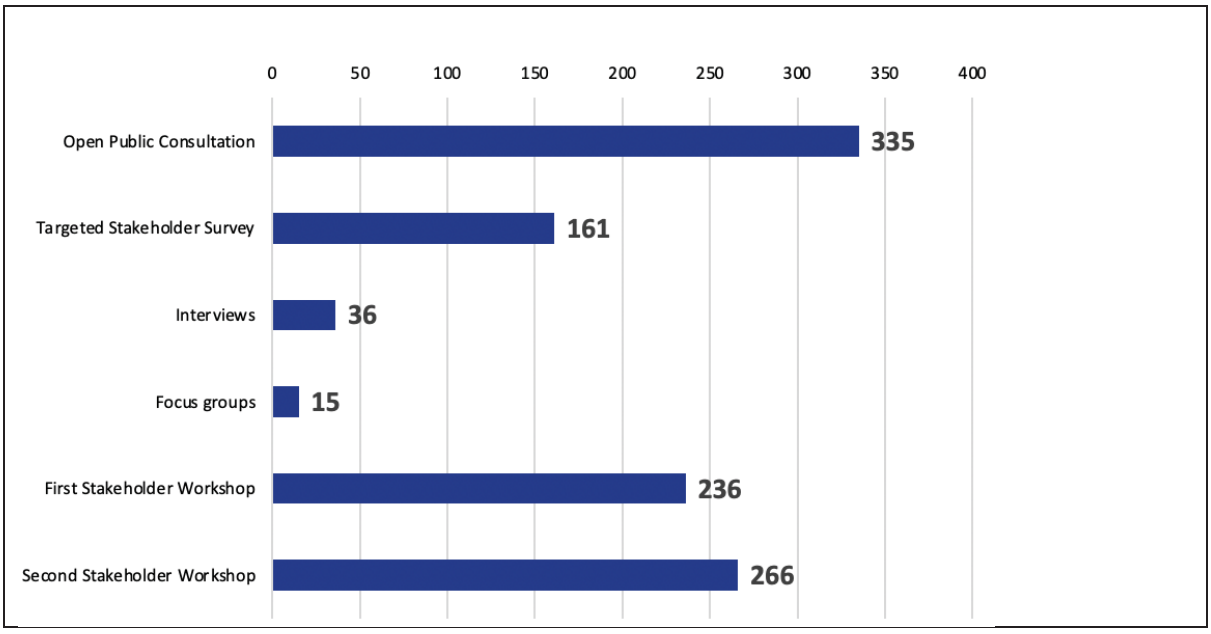
Table A2-2 summarises the types of stakeholders who participated in the various E-PRTR stakeholder consultation activities.

Table A2-2: Categories of stakeholders consulted

Stakeholder Group	Stakeholders
1. EU Member State public authorities	• National level authorities • Regional/local authorities
2. Industry	• Key industries in the scope of the E-PRTR Regulation • Business and trade associations for sectors in the scope of the E-PRTR Regulation • Public utility providers
3. Other	• NGOs, specifically the European Environment Bureau • The general public • Academics and research institutes • Representatives of the Kyiv Protocol Bureau • The European Environment Agency • The European Central Bank • Other Units within the European Commission DG Environment

Figure A2-3 below summarises the number of respondents by consultation activity for the E-PRTR and joint E-PRTR/ IED consultations.

Figure A2-3: Number of respondents by consultation activity



Part 2: Summary of stakeholder views on defining the problems

This section summarises the views of the different types of stakeholders with regard to defining the problem areas and placing relative weights of importance on them.

Civil society and environmental NGOs consider all problems to be of high relevance, in particular regarding:

- environmental impacts being insufficiently addressed by the IED
- the need to have the E-PRTR pollutant list updated more quickly to take account of new threats[18]
- limited access to information on installations' performance levels.

Limited access to information is perceived by all stakeholder groups as an important element to address.

However, differences occurred in the evaluations of industry and business associations, who were rather neutral (but not negative) in recognising problem area 3 (resource efficient and less toxic production). Industry and business associations were also rather neutral in recognising the problems of Problem Area 4 (decarbonisation) pointing to potential additional reporting costs and risks of overlaps with the ETS. For Problem Area 5 (scope), industry and business associations brought into play similar costs arguments, and claimed that existing national regimes and exiting EU legislation tackled most of the problems encountered sufficiently well already.

It is notable that a consensus of all stakeholders agreed that Problems Area 2 is a real issue that requires design and implementation action – namely, that the IED is limited in its efforts to engender, facilitate, harness and promote innovation.

Part 3: Summary of stakeholder views on the options

1. INTRODUCTION

This annex provides a summary of the views of stakeholders on the various options. The reports from the consultants supporting this impact assessment contain the full details of those consultations.

2. STAKEHOLDER VIEWS ON POLICY OPTIONS CONTRIBUTING TO EFFECTIVENESS (PO1)

This section summarises views of the measures comprising PO1 across five themes;

a. PO1: Ensuring that BAT-AELs are achieved

Almost all NGOs who participated in the OPC noted that the directive's mechanisms regarding the achievement of BAT-AELs required some changes, many changes or a complete system overhaul. Furthermore, NGOs responding to the TSS were broadly supportive of all the measures IED#1 to IED#5, which are grouped within this theme. NGOs were also supportive of shorter derogation periods if necessary.

This is consistent with NGO views provided in in the context of the environmental reporting fitness check[19], where the "*EEB also argued that reporting has informed the dissemination of*

[18] E-PRTR evaluation - SWD (2017)710

information about polluting activities, which has helped to significantly improve the performance of heavily polluting industries, as well as informing the identification of pollution hot spots and targeted measures to improve the quality of the environment and human health".

Half to two- thirds of public authorities, EU citizens and other respondents also believe that at least some changes are required to improve the effectiveness of the IED. Member State and other public authorities offer, however, more neutral or mixed views as to how that may be done, with some authorities supporting the measures proposed IED#1 to IED#5 (Table A2-3). With regard to derogations, authorities consider that any time limit should be set on a case-by-case basis.

By contrast, fewer than 20% of companies and business associations considered that at most only minor changes are required. Industry stakeholders are not as supportive of measures IED#1 to IED#5 as they believe these measures are unlikely to have any significant positive impacts. These respondents do not support a time limit for derogations or suggest that the limit should be set on a case-by-case basis if at all.

Table A2-3: Stakeholder views on PO1, Measures IED#3 to IED#5

PO1	Supportive	Unsupportive	Neutral
IED#3 Amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases.	Only **Member state national authorities** consider the measure would have a significant impact on emissions to water. Some **Environmental NGOs** support this measure and they consider it should be BAT to monitor emissions from both direct and indirect discharges.	**Industry representatives** consider the measure would only have a slight impact across emissions to air, soil water, and GHGs. They consider a large-scale centralised system for waste water treatment the most economically efficient approach, removing pollutants more effectively than decentralised systems.	**Environmental NGOs, Member State regional authorities and representatives from other groups** consider the measure would have a moderate impact on emissions to water.
IED#4 Amend Article 18 to require that stricter ELVs are set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions.	**Environmental NGOs** consider the measure will have a significant impact across emissions to air, soil water, and GHGs	**Industry representatives** consider the measure would only have a slight impact on emissions.	**Member State national and regional authorities**, as well as representatives of other groups believe the measure would have a moderate impact on emissions.
IED#5 Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the	**Environmental NGOs** believe the measure will have a significant impact across the environmental	**Industry representatives** thought the measure would only have a slight impact across the mediums	**Member State national and regional authorities** consider the measure would have a

[19] See page 103 of https://ec.europa.eu/environment/legal/reporting/pdf/Reporting%20and%20monitoring/support_fitness_check_report.pdf

PO1	Supportive	Unsupportive	Neutral
starting point is the lower limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT Conclusions only allows meeting a higher ELV within the BAT-AEL range.	issues examined. **Member State national and regional authorities** believe the measure will have a significant impact on emissions to air and water. **Other organisations** believe the measure will have a significant impact on all media apart from emissions to soil.	examined. They consider that it could have a detrimental effect on the IED's effectiveness as a tool to reduce environmental impacts in an integrated approach, citing BAT-AEL ranges as crucial to accommodate interactions between pollutants.	moderate impact on emissions to soil and GHG emissions.

b. PO1: Homogenising and enhancing enforcement

Almost all the environmental NGOs support these measures IED#6 to IED#7. In the TSS, environmental NGOs considered that all of the enforcement options presented in the survey would likely improve IED implementation. In particular, 100% of NGOs that provided a response thought there would be a significant improvement following the introduction of common compliance assessment rules with ELVs under Chapter II of the IED. The 'other' stakeholders also expected improvements as a result of implementing the proposed measures, with all respondents expecting at least a moderate improvement for both allowing competent authorities to suspend operation of non-compliant plants (IED#6) and for elaborating Article 79 on penalties applicable to infringements of the provisions on the IED (IED#8).

Member State authority respondents generally perceive some albeit limited opportunities for these measures to improve the IED's effectiveness. Typically, around two thirds of the local/regional Member State authority respondents anticipate at least a moderate improvement from implementing these measures. Almost all of the national Member State authority respondents expect at least a moderate improvement following from the introduction of common compliance assessment rules with emission limit values under Chapter II of the IED (IED#7). Mixed responses were received for each of the other measures, tending towards the general expectation of a slight improvement in the IED's effectiveness from the implementation of these other measures.

The majority of industry respondents consider that these measures will have no impact, that is, expect no value from their implementation. Industry stakeholder respondents anticipate a far less significant impact than NGOs, with the most used response being that there would be no impact across any of the measures.

c. PO1: Tackling transboundary pollution

All environmental NGOs and the majority of 'other' stakeholders support this measure (IED#9), and indicated that improved cooperation between neighbouring Member States could result in moderate to significant reductions in transboundary pollution from (agro-) industrial plants. It was noted that issues that currently contribute to the transboundary pollution problem include 'lack of established communication channels between Members States and coordination from the EU', and so this measure can help. One local/regional authority also added that having EU-law, covering all types of diverse scenarios that can entail pollution for neighbouring countries, can solve a great deal of uncertainty.

Industry stakeholders and Member State authorities indicate far less support for this measure (IED#9), with 76% of industry respondents, 67% of local/regional authorities and 71% of national authorities indicating that such a measure would result in slight to no impact on transboundary pollution. Stakeholders consider that one of the most important obstacles in cross-border cooperation is the diversity between EU and international rules, all applicable in different situations.

d. PO1: Improving and expanding the public's access to information and access to justice

A large majority of environmental and civil society NGOs consider that information is moderately or very difficult to access and all consider a policy option on access to information to be relatively or very important. Between about 65% and 70% of public authorities, EU citizens and other respondents to the OPC also consider a policy option on access to information to be relatively or very important. In addition, some NGOs stated, in open text responses to the OPC, that access to information is insufficient and inconsistent across MS.

Industry respondents are generally less supportive of these measures. About 50% of business associations and companies/ business organisations that responded to the OPC considered a policy option on access to information to be relatively or very unimportant. In open text responses, a group of six business associations (of 21 who provided open text responses) and three companies (of 16) argued there is a need to protect sensitive information.

Furthermore, in the **E-PRTR** consultations, stakeholders provided many comments on improving of the reporting of data. Data quality and timing of the reporting were the most discussed topics. Additionally, the significance of guidance was emphasised to improve the quality of data and general efficiency of the reporting. Figure A2-4 summarises the major themes that emerged.

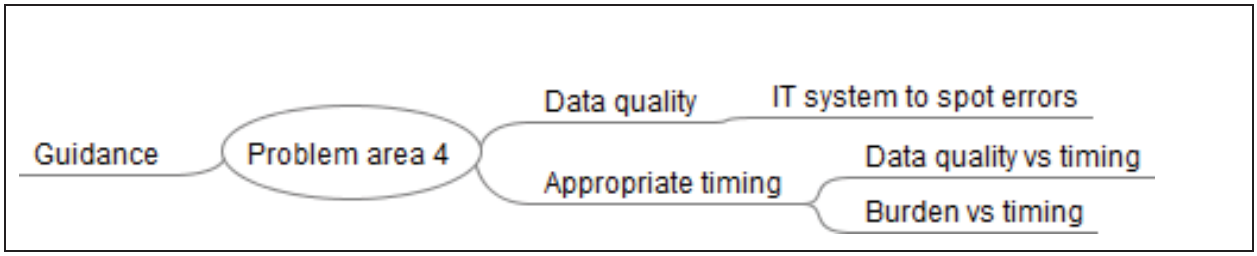
Regarding **renewed access to justice provisions** from the OPC, business associations and company/business organisations overall felt that the public access to justice functions very well for industrial activities. The opposite view is held by all NGOs who typically believe that public access to justice does not function well. A largely mixed view has been provided by public authorities and EU citizens.

Business associations thought most strongly that public access to justice functions well with respect to their right to bring a case before a court, or to ask for a judicial review in their Member State, with around 90% of business association respondents stating that this was functioning very well. A similar level of functioning was stated with respect to all public access to justice elements covered in the OPC, at a slightly lower level for individual enterprise respondents (75%) stating that it was functioning very well.

Environmental NGOs thought this access was functioning very poorly; 82% of environmental NGO respondents thought that it was functioning very poorly for both public access to justice in my Member State and public access to justice at the EU level. 93% of environmental NGOs who expressed an opinion also felt public access to justice was functioning very poorly for other related elements. A very similar level of responses was also provided by civil society NGOs, with a clear view that public access to justice was functioning very poorly across the OPC scenarios.

Public authorities and EU citizens however provided a very mixed view, with no discernible clear stance for either stakeholder group as to how public access to justice was functioning.

Figure A2-4: Themes in problem area 4



Respondents in all E-PRTR stakeholder groups observed that there were issues with the quality of the reported data, which further elaboration of the automated QA systems could help improve.

There was a discussion regarding the possibility to reduce reporting times (E-PRTR measures#47a and #47b). There were two alternatives: reduced reporting times of 3 months for either ALL facilities (E-PRTR #47a) or SOME facilities (E-PRTR #47b) facilities. Feedback from across the range of stakeholders stated that neither of these accelerated reporting schedules would be possible to implement, and that they would lead to the risk of a decrease in data quality, whilst also causing an increase in reporting costs and administrative burden in general. These two measures were screened out (see Annex 13).

e. PO1: Clarifying and simplifying existing legal requirements

Stakeholders are largely in favour of amending the legislation to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants (IED#14). Industry stakeholders commented on the ambiguity resulting from Article 42(1) (including that it has blocked the introduction of waste co-gasification solutions to the EU market for over a decade) and the classification of waste, and the need for improvements to Article 42 around the natural gas comparison and end of waste criteria methodology. A Member State authority also considers the natural gas comparison test to be subject to interpretation.

The majority of industry stakeholders (60%) and Member State authority respondents (93%) indicate that the harmonisation of averaging periods that would occur from new Chapter II rules taking precedence over other compliance assessment provisions (IED#16) would be very helpful or slightly helpful. This is primarily because these stakeholders expect a reduction in administrative burden from avoiding compliance assessment for multiple rules (averaging periods), with almost all stakeholders indicating there would be little to no environmental impacts of the change.

One industry stakeholder representing the electricity industry has an opposing viewpoint, stating that while the power sector has been advocating for aligned averaging periods, it has now been four years since the publishing of the LCP BATC and, as such, competent authorities and operators have already devised ways to accommodate the discrepancies, so any changes should be considered carefully.

Stakeholders did not generally provide opinions on whether they supported or opposed the deletion of Annex II (IED#15). The majority of industry stakeholders (66%) indicate that they primarily refer to the BAT Conclusions when reviewing and setting permit conditions, i.e., that Annex II of the IED "List of polluting substances" is not a primary reference when they consider permit conditions. However, 42% did indicate they refer to Annex II at least to some extent.

3. STAKEHOLDER VIEWS ON POLICY OPTIONS SUPPORTING INNOVATION (PO2-A TO C)

PO2-a (Facilitate the development and testing of emerging techniques): Industrial federations and operators (for example, FuelsEurope) support these measures as they introduce wider flexibilities and impose no additional requirements on IED operators.

Technology suppliers (such as Accessa) believe that this measure will not deliver any significant change in the use of innovative techniques or technologies for emission reductions. Suppliers believe that these exemptions (more months without AEL requirements) are not key drivers of investment decision-making by IED operators and their parent companies.

Member States and other public authorities were not explicitly in favour or against this policy option. In a focus group, Spain's IED focal point requested European guidelines on how to justify and allow these derogations to ensure a level playing field.

PO2-b (Establish shorter BREF cycles OR an INCITE: Most stakeholders' comments state a relatively neutral position and explain that the feasibility and efficiency of these measures will depend on the specific features and how they are implemented. For example, German representatives stated that "*if we establish the Innovation Observatory [read INCITE] it is key to institutionalise it within the IED. It should be mentioned in the expanded Article 13 where its mandate, role and procedures are clarified*." Concawe, initially unsupportive, requested in a second workshop that shorter BREF cycles only applied to new plants. The Copper Federation (in the workshop) and the Iron and Steel Federation (in the focus group) shared the same concern, as well as being concerned about the large amount of resources that would be necessary to implement these measures effectively ("*How will it be secured that the EIPPCB and Member State experts have sufficient time and resources to conduct these reviews at an increased rate, and with an increasing number of elements to be taken into account? The in-depth technical exchange to develop BREFs was highlighted during the review as a key pillar of IED success, and this should not be compromised*.").

Eurofer and Euroelectric stated in the focus group that the evidence to underpin INCITE documents might be based on a few data points or it may not be reliable if it is based on pilot plants (or low TRL assets). German representatives said in the second workshop that public authorities do not have resources to review (many) permits every five years and this could also generate negative impacts on private companies.

Certain MS focal points stated that INCITE could provide support (analysing, summarising or validating evidence) on emerging or novel techniques.

Table A2-4: Stakeholder views on PO2-b

PO2-b	Supportive	Unsupportive	Neutral
IED#19: shorter BREF cycles	No (explicit) positive feedback provided from any stakeholder	Industry had requested a clearer statement on whether this would apply to major retrofits; also expressed concern it may generate negative impact on investment cycles.	During FG event on innovation MSs focal points had (implicit) neutral position.
IED#20: INCITE	MS have been supportive explaining that information might be useful for the	Industry has requested that INCITE does not deliver legally binding decisions or deliverables (so those remain in the TWG). Concerns that data to support INCITE	Certain requests on detailed implementation decision to ensure that it is efficient.

PO2-b	Supportive	Unsupportive	Neutral
	BREF reviews and for public authorities	deliverables might be weak or based on few data points.	

PO2-c (Supporting transformation): Industrial operators (such as Concawe or Eurofer) were generally in favour of more time to implement BAT conclusions during energy transformation because this imposes no additional requirement and adds flexibilities.

The industrial operator, Eurofer, was neutral about these measures; they reiterated that sectoral transformation will take a long time, and that the IED is not the best tool to support the sector. During the second workshop, some stakeholders asked for clarity on the sectors that are planned to be covered by this measure.

German representatives suggested that transformation plans should be required as early as possible: "*2035* [the original deadline for the permit review obligation] *is not a little too late. It is much too late to come up with a plan for decarbonisation. The time is mature already now to start working on this. This decarbonisation plan needs flexibility for amendments but should show a serious consideration and assessment of options and planned investments. The plan will be a moving target since the future cannot be predicted. Work should start at the latest when the new IED will be transposed into national legislation, i.e., in the course of the year 2027*".

Table A2-5: Stakeholder views on PO2-c

PO2-c	Supportive	Unsupportive	Neutral
IED#21: Allow more time to implement BAT-C if transformation required	Industrial operators in favour of this measure since it recognises the complexity of plant retrofits.	No negative feedback for this option	Certain federations stated that this transformation may take longer than 10 years and IED might not have large impact.
IED#22: establish a permit review obligation and require transformation plans	No explicit supportive feedback	Member state suggesting that this may be needed earlier than 2035	-

4. Stakeholder views on policy options concerning resources and chemicals (PO3-a to g)

Overall, environmental NGOs were in favour of the measures proposed in this policy option. They responded positively on the expected benefits and environmental impacts of the measures. For example, environmental NGOs strongly urge for more elaborate and harmonized reporting of information on resource efficiency, circular economy and the use and management of chemicals (PO3-b); for increased public access to such information; and for binding levels or benchmarks for such environmental issues (PO3-a). There are concerns that the continuous improvement requirement of environmental management systems, and their sections for resource efficiency and circular economy plans and chemical management systems, is too vague, and environmental impacts should therefore be bound in some way.

On the contrary, industry was generally not in favour of the policy measures and options concerning IED addressing this problem area, indicating that the expected environmental

benefits are small, while associated administrative and compliance costs would be significant. There are a number of concerns on the proposed measures, such as that:

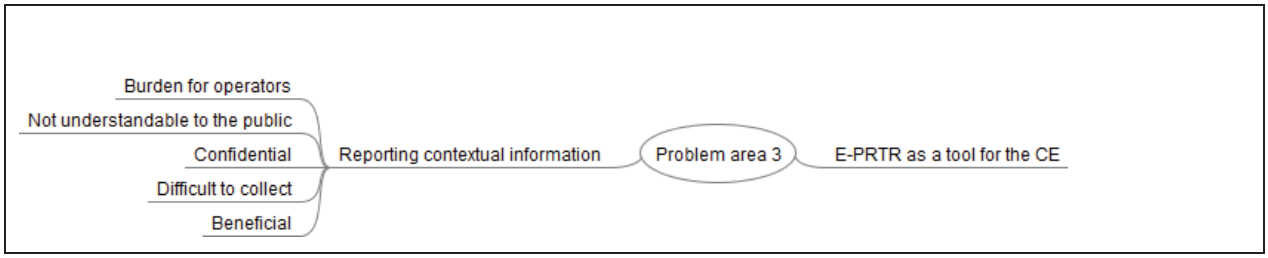
- mandatory reporting of resource efficiency and circular economy reporting could come into conflict with Confidential Business Information protection (PO3-b);
- binding BAT-AEPLs could conflict cross-media considerations for some pollutant emissions (PO3-a); and
- binding BAT-AEPLs may not sufficiently take into account differences in process or product characteristics and, as a result, limit potential innovation and development of products or processes in the future (PO3-a).

With regard to the Chemical Management Systems (CMS) component (PO3-b), industry stakeholders voiced concerns about the potential overlap with REACH and suggested that better implementation of REACH could be a more important focus rather than additional requirements under IED. This position was countered by NGO representatives, who suggested that a CMS was not an expansion of requirements, but was rather a strengthening of coherence between REACH and IED policy instruments. Further, if CMS becomes a requirement, some representatives from industry sectors associated with wastewater and waste generally commented that it would be useful that the CMS would not only record chemicals that are intentionally used, but also reactants/by-products, as these represent a significant challenge for waste sectors to manage.

Public authorities, both national and local/regional, provided a more mixed response to the proposed policy measures and options that concern IED. While expectations on administrative costs were comparable with those of industry, the expected impact of the measures was more positive. For example, some public authority representatives expressed their preference for a resource efficiency and circular economy plan, which could be linked to reporting requirements and BREF benchmarks, rather than making BAT-AEPLs binding in the same manner as BAT-AELs (PO3-a). This confirmed or echoed some of the concerns mentioned by industry. Some of these public authorities were also in favour of more elaborate reporting of resource efficiency and circular economy information. Others, however, were more in favour of binding BAT-AEPLs wherever appropriate (PO3-a), whilst it was recognized by some that derogation conditions, such as those of BAT-AELs, could result disproportionately burdensome in the case of BAT-AEPLs. Public authorities also highlighted that requirements for a chemical management plan had already been discussed and added to some BREFs (most notably the textiles BREF), and that a tailored or sector-by-sector approach may be needed to focus or adapt to the issues that are relevant for each sector and avoid undue administrative burden (PO3-b).

In the **E-PRTR** consultations, most comments related to contextual information requirements and the role of E-PRTR as a tool for tracking the progress towards the circular economy. Figure A2-5 summarises the major topics that emerged in the discussions.

Figure A2-5: Themes in problem area 3



Both industry and public authorities were mainly negative about the requirement to report E-PRTR contextual information. Respondents argued that reporting contextual information will require a lot of effort and will become a burden e.g., *"It is difficult to precisely assess the additional time that our operators would spend on reporting this information, but clearly this would be significant. We have not been able to quantify precisely what this additional time would be. It is a very demanding exercise. They are asking for very detailed information, on energy and so on."*

Additionally, industry pointed out that contextual information will not serve its purpose to inform the public because its interpretation requires specialised knowledge e.g., *"There are also issues surrounding this information being used to compare facilities which are not comparable due to differences in processes, production volumes etc. For the chemicals industry every process is unique and the provision of contextual data to make it seem like they are comparable would lead to inaccurate conclusions being drawn by end users."*

Industry also highlighted that contextual information could disclose specific business details that are confidential and publicizing such information might affect competition law,

However, there were two positive responses about including contextual information, highlighting that it could be **beneficial**, while recognising possible pressure from the industry e.g. *"Yes, there is always resistance from the industry. There should a balance between the desire of industry and that of the public. Definitions are really important; they need to be very consistent."*

Most respondents did not see E-PRTR as a tool for tracking the progress on resource use and suggested that it should be implemented by a different legislative tool e.g., "*We would encourage the use of other monitoring ideas for measuring progress towards the circular economy but do not see the E-PRTR as a tool to do this. Emissions are not linked to the circular economy."*

5. STAKEHOLDER VIEWS ON POLICY OPTIONS CONTRIBUTING TO DECARBONISATION OF INDUSTRY (PO4-A TO D)

Environmental NGOs consider that a revision of the IED has the potential to translate international and EU climate targets into legal obligations. NGOs have launched a petition on this matter[20]. Currently, the IED does not systematically address climate protection, which needs to be added explicitly. They support the inclusion of scientifically based GHG emission limit values under the scope of the IED and the introduction of mandatory energy efficiency requirements. Accordingly, the current exclusion provisions in Article 9(1) and Article 9(2) of the IED must be deleted.

NGOs note that there is no duplication of regulation between the IED and the EU ETS and believe that dedicated decarbonisation and GHG mitigation provisions for the energy intensive industries should be set as target level BAT. This could foresee differentiated compliance periods, depending on the scale of effort to be made by industry in terms of deep process switching.

Member States authorities agree that the BREF process should be more flexible and sectoral plans (and for one Member State installation specific plans) with reduction targets could be developed.

[20] https://caneurope.org/eu-industrial-pollution-law-revision-essential-to-cut-greenhouse-gases-and-pollutants/

Member State authorities would generally maintain the provisions in Articles 9(1) and 9(2), as voluntary energy efficiency agreements are in place and distortions of competition between sites covered by ETS and others could occur. GHG BAT-AELs under the IED would bring limited additional contribution in terms of carbon neutrality and an issue of double regulation could result in terms of compliance obligations. In addition, due to the ongoing revision of EU ETS there are uncertainties in estimating the future added value by IED for emissions covered by ETS. However, at least one Member State considered that the IED could take a more active role in decarbonisation.

Industry representatives agreed that a fair balance between pollution reduction and energy usage for abatement is needed. However, they consider that potential additional measures within the IED to accelerate direct and indirect GHG emission reductions from plants could hinder the effective functioning of the EU ETS, jeopardising its success and efficiency.

Furthermore, industry considers that the IED should avoid covering GHG emissions and energy efficiency where these are already covered by the EU ETS, as the IED is not suitable for regulating them. GHG emissions of IED activities which are not covered by the ETS Directive can already be addressed in the frame of the IED through the BREF (e.g., methane slip values in the LCP BREF). The current system efficiently avoids any overlaps between the two pieces of legislation while ensuring that pollutants can be regulated and reduced by either of them.

Industry emphasised that deleting the provisions under Article 9 of the IED would create uncertainties related to the investment framework and cancel the benefits brought by a market-based instrument for plants covered by the EU ETS, leaving the choice for operators to make the most cost-efficient investments. In addition, this could also have adverse effects on the carbon price signal delivered through the EU ETS. Furthermore, industry feedback indicated that by setting a constraint on GHG emissions at the level of each unit, instead of at the installation level, the IED would leave no flexibility to operators to optimize abatement options through a cost-efficient approach, making the industry less competitive. In addition, the inclusion of GHG conditions in BREFs for installations outside the scope of EU ETS would probably lead to slight environmental impacts, since those small installations are not the main contributors to GHG emissions.

In the **E-PRTR** consultations, there was little discussion about the role of E-PRTR for tracking the progress in decarbonisation but neither were there negative reactions. On the reporting of disaggregated HFCs, HCFCs, CFCs and PFCs, a significant part of two stakeholder groups – researchers, NGOs, public and authorities – noted that this was important, whereas only a small share of industry representatives also considered it to be important.

6. STAKEHOLDER VIEWS ON POLICY OPTIONS CONCERNING SECTORAL SCOPE (PO5-A TO I)

Stakeholder input is summarised at the level of the sub-options below. In addition, much factual input was provided by stakeholders, via the overall consultation process, and two specific consultations and studies performed: (i) to inform PO5-a considerations; and (ii) to inform considerations regarding PO5-b to PO5-f . This factual input has been extensively used in the sections considering IED and E-PRTR scope extension in Annex 8, pp. 184 *et seq.*

a. PO5-a: rearing of animals (cattle farming, expand IRPP AND a tailored permitting process for the rearing of animals)

NGOs are generally in favour of expanding the scope of the IED as proposed, and they are also critical of the effectiveness of existing regulation. As an example, one NGO points

out that the IED approach of using thresholds can lead to avoidance of regulation by placing farm sizes just below the threshold. NGOs also criticise the existing level of ambition of the IRPP BAT conclusions. This criticism was also echoed by some Member State authorities during focus group discussions, who mentioned that the IRPP BATC upper BAT-AELs rarely go beyond the existing national requirements.

Several Member States are also in favour of inclusion of cattle farming within the IED. For example, the German Environment Agency (UBA) has provided evidence highlighting the potential positive benefit-cost ratio of including cattle farming within the IED, already established in 2012, and provided details on environmental benefits that can be obtained from the implementation of these proposals. Albeit generally supportive of this policy option, Member State stakeholders also have concerns over introducing excessive additional administrative burden, and hence support a tailored approach to minimise burden that can accommodate those Member States already regulating smaller farms.

Further, several notes were made on the overall effectiveness of this without a "regulatory framework for the sector". This is noted because SMEs in particular are faced with increasing administrative burden via having to respond to the demands of various different EU Regulations and Directives. The tailored approach could be seen as a way to answer this, at least partially. An example is provided in that the IED is important on IRPP for its BAT on land spreading of manure, from which the Nitrates directive can benefit. Having more integration between the two directives is seen as key.

On the lowering of IRPP thresholds, a business association campaign (6 stakeholders) provided feedback on details of the existing IED regulation that they do not feel are effective, with a large focus on the reporting and monitoring measures (i.e., which could be addressed through the tailored approach). The level of feedback on IRPP scope expansion was not as detailed as on the scope extension to cattle farming, with two main points: the opinion that it is too soon to do an evaluation and update, given the 2017 publication of IRPP BATC, and repeated concerns about administrative costs.

A Member State also opposed this based on it leading to additional farms being covered under the IED, via the argument that these farms were already covered under national legislation.

On the tailored approach to permitting, overall Member States are in favour, largely based on argumentation that there is a lot of other potentially overlapping regulation and that this is an approach that could help avoid unnecessary additional administrative burden. Various specific points of feedback were given by Member States and Industry on elements of the current IRPP BATC and permitting approaches. Among NGOs, the main message was that the EC should ensure that environmental protection standards are not compromised in favour of efficiency.

Industry stakeholders have mixed views about this policy option, not wholly in favour or against. Some industry representatives highlight the continued problem of excess manure production and would implicitly support measures that helped to resolve this issue. Other industry (associations) make overt statements against further regulation (both extension and expansion), with the opinion that there already is enough environmental regulation on the sector.

On the extension to cattle farming, Business Associations are generally unsupportive of expansion of the IED into cattle or could support a "limited expansion", while they highlight issues that they see with the current implementation of the IRPP BREF and associated BATC. As an example, one association highlight that the cattle sector is already subject to

other EU regulations and, therefore, do not support this expansion to avoid regulatory overlaps or duplication. Another business association also highlighted the existing regulations and the need to avoid overlap, although they were not explicitly in favour or against. On the other hand, individual company respondents tended to be supportive of the inclusion of cattle farming within the IED, although these stakeholders did not include individual farm SMEs.

In a different context, drinking water companies and water authorities also regularly express their concerns about the continuous increase of water treatment costs, notably related to emissions to water from rearing of livestock, e.g. in relation to nitrate and pesticide removal from surface and groundwater.

Table A2-6: Stakeholder views on PO5-a

PO5-a	Supportive	Unsupportive	Neutral
IED#31 Include cattle rearing	Business case made by some MS authorities to include cattle farming. Strong support from NGOs across the board. Implied support from some businesses who highlight the extent of remaining manure issues.	Explicit feedback provided by industry associations who state not to be in favour of this option, citing the presence of existing EU and national regulations.	FG participants (MS representatives) had implicit neutral positions, as opportunity was given for vocal opposition.
IED#32 Amend capacity thresholds for rearing of pigs and poultry	Support from NGOs for all measures on the basis of observing that the IRPP sector emissions are still very high. One Member State also expressed explicit support for lowering the IED thresholds.	Two Member States did not support this measure, citing concerns on administrative cost and competitiveness of industry.	Most Member State Authorities did not express explicit support or opposition. Some acknowledged the need, but observed current IRPP BREF ambition levels may be too easy to meet. Thus, it does not capture all potential environmental benefits that could be made at reasonable cost.
IED#33 Introduce a tailored regulatory framework for installations carrying out rearing of animals	Member States are generally supportive of this measure. Almost all Member States that participated in the Focus Group highlighted that there is existing regulation and that the IED should avoid overlap.	Questions on this topic were often used to repeat the point of being against scope extensions/expansions, and little specific feedback was provided on the tailored approach by industry.	NGOs generally emphasised that the tailored approach should not result in lower environmental protection standards.

b. PO5-b: Extension of current sectoral scope in battery production, smitheries, textiles, forging presses, cold rolling, wiredrawing, *AND* shipbuilding and ship-dismantling.

Environmental NGOs appear generally supportive of expanding the scope of the IED to cover the sectors within this option. They consider the environmental pressures arising from the sectors that would be covered by this policy option to be significant. Further, they

consider the potential for reduction of these pressures were the policy option to be implemented as moderate to significant.

Industry respondents, however, are generally not convinced that the IED could benefit these sectors. They nevertheless generally identify the environmental pressures arising from the sectors under this policy option as being slight to moderate. They also consider the potential for reduction of these pressures if the option were implemented as slight to moderate. In addition, industry notes impacts for each of the measures on EU competitiveness, EU market share and on trade with third countries.

Member state respondents have more neutral views. Their estimates of environmental pressures and scope for reduction if the policy option were implemented tend to be similar to, though slightly higher than, the estimates from industry. These respondents generally indicate that there is some legislative basis for these sectors in their Member State and, in around 50% of cases, there are also financial instruments and voluntary measures.

Table A2-6: Stakeholder views on PO5-b

PO5-b	Supportive	Unsupportive	Neutral
IED#34 Include battery production	Environmental NGOs anticipate a significant reduction in most environmental pressures if IED provisions are applied. One MS authority supports including lithium-ion battery production, sorting and recycling plants in IED.	Industry stakeholders generally suggest that reductions in environmental pressures if IED is applied will be slight to moderate.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are applied.
IED#36 Include forging presses, cold rolling, with capacity exceeding 10 t/h, and wiredrawing, with capacity exceeding 2 t/h	Environmental NGOs anticipate a significant reduction in many environmental pressures if IED provisions are applied. One MS authority explicitly supports inclusion of cold rolling with capacity exceeding 10t/h.	Industry stakeholders generally suggest that reductions in many environmental pressures if IED is applied will be no impact to slight. However, they also anticipate moderate to significant impacts for energy use, resource/material use and water use.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are applied. It is also queried whether cold rolling and wire drawing are already covered by the Ferrous Metals Processing BREF.
IED#37 Include finishing activities with the existing capacity thresholds in activity 6.2 (pre-treatment or dyeing of textile fibres or textiles)	Environmental NGOs indicate moderate to significant environmental pressures from textile activities below current IED production capacity thresholds. Some mention that microplastics could be covered. One national MS authority suggests that printing and finishing be included.	Industry stakeholders generally suggest that environmental pressures from textile activities below current IED production capacity thresholds are slight to moderate.	National MS authorities anticipate slight to moderate reductions in most environmental pressures if IED provisions are extended. One national authority opposes lowering the threshold, as this would significantly increase administrative burden for industry.

PO5-b	Supportive	Unsupportive	Neutral
IED#38 Include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW in activity 2.3(b) (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW)	Environmental NGOs indicate significant energy and waste generation environmental pressures from smitheries below current IED production capacity thresholds.	Industry stakeholders generally suggest that environmental pressures from smitheries below current IED production capacity thresholds are of no impact to slight impact. One national MS authority suggested no change as lowering the threshold would reduce competitiveness of companies concerned.	National MS authorities generally indicate slight to moderate environmental pressures from smitheries below current IED thresholds. One national MS authority, noting that few smitheries currently fall under IED, suggests retaining the current limit of 50kJ per hammer but removing the requirement on calorific power.

c. PO5-c: Revision of the activity's capacity threshold AND/OR adoption of BAT conclusions for landfills

NGOs (environmental and non-environmental) and civil society stakeholders endorse this policy option. In particular, NGO stakeholders consider that landfills should be covered by the IED and the associated BREFs process.

Member State and other public authorities have mixed views about these policy option. Firstly, most public authorities disagree that the threshold for inclusion within the scope of the IED should be reduced. Smaller landfills than the threshold are not considered viable, and they are already set so low that they are exceeded by a large majority of landfills that meet the requirements of the Landfill Directive (in conjunction with Council Decision 2003/33/European Commission). Further, just over half the Member State authorities consulted disagree that that BAT determination of Annex I activity 5.4 landfills should be done by adopting BAT conclusions.

However, the rest considers that moving the definition of BAT for landfills from the Landfill Directive to the IED could have improved environmental impacts. Moreover, they noted that, from a circular economy perspective, there could be economic gains due to reduced pollution and better use of resources, and considering administrative costs, if IED WT plants are operated by the same operator as the landfill sites (e.g., Sweden), many landfill operators already have knowledge of IED BREFs and BAT Conclusions, which could reduce the administrative burden.

Some authority stakeholders also mentioned that there are only a few existing landfills in operation so impacts would be insignificant (e.g., Finland), and that these landfills are currently regulated effectively, e.g., by the Landfill Directive 1999/31/European Commission in conjunction with Council Decision 2003/33/European Commission on waste acceptance.

Industry stakeholders are not generally supportive of this policy option. They consider that as landfills are regulated with permits, monitoring, etc., as part of the Landfill Directive, it does not need to be included within the IED. This includes respondents specifically from the chemicals sector. In particular, stakeholders are concerned about duplication and inefficiency and consider that moving the definition of BAT for landfills from the Landfill Directive to the IED would have negative economic impacts, increase administrative costs and technical requirements, and would not necessarily result in significant improvement of emissions when compared to the counterfactual.

The Landfill Directive is already regarded as being sufficiently detailed in prescribing techniques for landfills. Therefore, these stakeholders consider that it would be more effective to review and update the existing legislation instead of introducing additional and overlapping legislation via the IED. In fact, some stakeholders suggested deleting activity 5.4 from Annex I of the IED in order to avoid double regulation. One industry stakeholder, representing material recycling for energy production (waste incineration), supported the extension of the IED to landfills and methane emissions.

Table A2-7: Stakeholder views on PO5-c

PO5c	Supportive	Unsupportive	Neutral
IED#39 Facilitate the adoption of BAT conclusions for activity 5.4 landfills	All NGOs in favour. 78% of local/regional authorities consulted support this, and 47% of national authorities.	53% of national authorities consulted disagree. Industry stakeholders not in agreement.	Public authorities have mixed views
IED#40 Revise the capacity threshold in Annex I for activity 5.4 landfills	-	Most Member State authorities believe the threshold should stay the same. They are already set so low that they are exceeded by a large majority of landfills, and smaller landfills than the threshold are not viable.	-

d. PO5-d: Mining and quarrying

E**nvironmental NGOs support inclusion of mining and quarrying under the IED**. Their main focus is on mining of energy sources, particularly coal and lignite, where control under IED is seen as a manner of phasing out these energy sources on sustainability grounds. Some focus particular attention to control of methane and of water use. However, some stakeholders have suggested that there is a need to ensure control of mining activities related to essential services, i.e., those mining and quarrying activities that will feed into the zero-pollution ambition of the EU, focusing on renewable energy sources and electrification in general.

Member States authority stakeholders noted that the application of the IED to mining and quarrying activities would have the largest environmental impact of all potential new activities considered for the expansion of the IED's scope. These stakeholders also confirm the existence of current European and national legislation regulating the sector, and the expectation that adopting the IED would lead to an increase in regulatory burden. One Member State representative was unsupportive of this option because of the existing legislation at European and national level.

Industry representatives consider that mining and quarrying activities are already legislated (EIA, Extractive Wastes, Rehabilitation and specific national permitting processes) and the inclusion of this sector in the IED would primarily increase the regulatory burden with limited additional benefit. In addition, industry stakeholders note the heterogeneity of mining and quarrying facilities and, hence, the potential difficulty in applying commonly applicable BAT. Consequently, industry stakeholders consider that the introduction of IED permitting would primarily drive additional and potentially duplicative burden that would harm competitiveness without a significant net improvement to the environment.

e. **PO5-e: Aquaculture**

Environmental NGOs support the inclusion of aquaculture under the IED. Their main points focus on the emissions from aquaculture farms, specifically to water and soil depending on their location as well as GHG emissions and emissions from energy use, where the IED would provide definitive emissions limits and an EU-wide integrated licensing framework to support more consistent environmental regulations. Some NGOs focus on supporting the facilitation of sustainable development within the sector and contributing to the delivery of the 'Farm to Fork' Strategy.

Member State stakeholder representatives also appear supportive of the inclusion of aquaculture within the scope of the IED. In particular, authority representatives note that setting permit conditions could have a positive impact on the environment, particularly for emissions to water, energy use, materials and resource use, and waste generation. They also consider that this could happen with little to no impact on the administrative burdens of business and other economic costs. However, the evidence provided does suggest that the existing legislation regulating aquaculture in some Member States (namely the highest producers in the EU) is already burdensome for businesses and may affect the EU's competitiveness.

Industry representatives argue that, while they recognise the environmental impacts, the inclusion of aquaculture in the IED would create multiple layers of regulation and bureaucracy on top of existing legislation (Water Framework Directive, MSFD, etc.). They state that this would increase administrative costs for businesses and could introduce barriers and/or disruptive for producers. Thus, industry stakeholders consider that the inclusion of aquaculture in the scope of IED would result in economic costs that are unlikely to lead to significant, additional environmental improvements.

f. **PO5-f: Upstream oil and gas**

In general, stakeholders regarded upstream oil and gas as a significant contributor to emissions to air, water and soil, as well as GHG emissions. This is also the case for energy use, water use and waste generation. Stakeholders additionally expected, with high probability, that the introduction of IED provisions could significantly improve these environmental impacts of the sector.

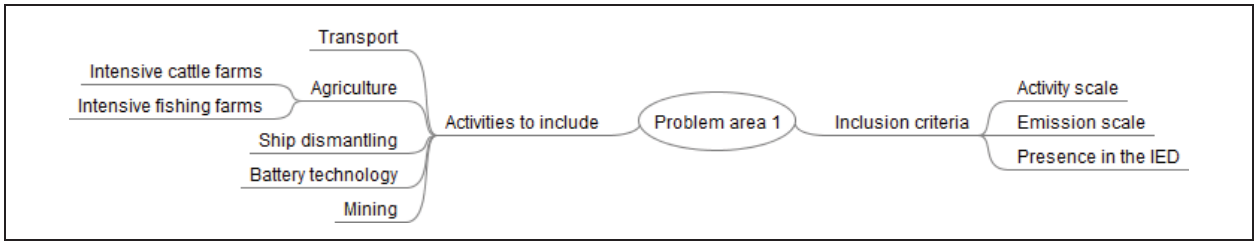
Some Member State stakeholders note that they already regulate the sector nationally. There is, therefore, some variation in how the sector is regulated across Member States. However, it appears that regulation mostly relates to the exploration and opening of new sites and does not include environmental inspections or prescription of BAT for environmental performance.

Industry stakeholders are, in general, unsupportive of expanding the IED to cover upstream oil and gas, especially as they expect that this would lead to significant increases in regulatory burden, reductions in EU competitiveness and EU's market share.

g. **PO5-g: Align E-PRTR scope to IED activity descriptions**

E-PRTR respondents mostly commented on activities that should be included in, or excluded from, the E-PRTR Regulation. There were no contradictory opinions in different groups of the respondents (public authorities, NGOs and industry) in this problem area. Figure A2-6 summarises the major themes that emerged in the discussion.

Figure A2-6: Themes in problem area 1



Some respondents provided general criteria that would prescribe what activities the E-PRTR should cover. **Criteria for inclusion** mostly addressed the scale of activities. However, other criteria, such as the scale of emissions, the presence of an activity in the Industrial Emissions Directive (IED) were also covered, e.g. "*If it's in the IED, it should be included. If it's not in the IED, it shouldn't be included*."

Respondents also named **specific activities** to be covered by the E-PRTR. These activities included five areas – transport, agriculture, ship dismantling, battery technology, and mining e.g. *"With regards to cattle farms and fishing farms, we have proposed a revision of the IED directive to include these two. If this happens, they should be maintained in the scope of the E-PRTR regulation."*

h. PO5-h: Revise E-PRTR activity descriptions regarding MCPs and UWWTPs

Q23 of the TSS asked '*How important is it to extend the E-PRTR activity threshold to cover combustion plants with the following capacities*?' giving response options of 1 – 5 MW; >5 – 20 MW and >20 – 50 MW. The majority of the industry stakeholders thought it was not important at all and noted that lower reporting thresholds would require a large number of plants would have to report for the first time. This would require monitoring and reporting systems to be installed and additional personnel due to higher workload and administrative burden. Although the authority representatives considered a threshold extension to plants with the capacity of 1-5 MW not important, the majority indicated that a threshold extension to >5-20 MW and >20-50 MW plants was important. All respondents in researchers and NGOs group considered it important for all capacities.

Question 24 of the TSS asked '*For the purpose of legislative coherence, how important is it to lower the existing threshold for UWWTP from 100,000 p.e. to the options below*?' and giving response options of 1,000 p.e.; 2,000 p.e.; 5,000 p.e.; 10,000 p.e.; 50,000 p.e.; and 'other'. Most industry respondents did not think it was important, whereas researchers and NGOs considered it important for all options. The majority of authority representatives thought that lowering the threshold was important for 10,000 and 50,000 p.e. plants, not as important for 5,000 and 2,000 p.e. plants, and not at all important for 1,000 p.e. plants. There was a suggestion to consider basing UWWTP reporting thresholds on actual wastewater load to the plant rather than plant capacity. Lowering the threshold to 10,000 p.e. was considered relevant by several authority stakeholders, especially for nitrogen and phosphorus. It was also noted that, for coherence with the Urban Wastewater Treatment Directive (UWWTD) and for practicability, both reporting obligations should be streamlined. Similarly, industry stakeholders suggested aligning thresholds with the UWWTD. In addition, lowering of the threshold to 10,000 p.e. was supported by some industry stakeholders.

PO5-i: Establish a dynamic system to identify and include emerging activities of concern

For the E-PRTR, NGOs and authorities support the establishment of a more dynamic instrument.

Whilst applying this option to the IED was only considered at a late stage of the impact assessment process, and was therefore not subjected to consultation, stakeholders have provided their views concerning the potential inclusion of a wide range of activities. Those views vary across stakeholder groups, depending on the particular activity as referred to above.

Part 4: Fit for Future Platform Opinion on the IED – received 6th December 2021

The Fit for Future Platform (FFFP) Opinion on the IED was submitted to the European Commission on 6.12.2021. It should be noted that the FFFP's views were given separately to the formal OPC, TSS and related Focus Group/ interviews consultations of the IED/ E-PRTR Revision Impact Assessment consultation process per se.

Summary description of Fit for Future Platform Opinion – December 2021

Table A2-8 (below) gives a summary of the FFFP suggestions, in which the European Environmental Bureau's dissenting remarks within the Platform are shown, in parallel to the Platform's suggestions. Many of the suggestions of the Platform refer to might achieve a "better implementation" of the IED, which fit in with some of the PO-1 "Effectiveness" measures as described throughout the Impact Assessment.

Subsequently, Table A2-9 summarises possible follow-up actions per suggestion of the FFFP.

Table A2-8: Fit for Future Platform views

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
Introductory text regarding IED Stated that the IED comprises five important pillars: 1. Integrated approach 2. Use of BAT 3. Flexibility (of permits etc) 4. Inspections 5. Public participation	Disagree with the citing of "flexibility" as a key pillar of the IED. The over-use and abuse of "flexibility" in permit conditions and derogations from BAT requires Competent Authorities administrative burden with respect to the time need for interpreting the situations and excess evaluations.
Suggestion 1 – Duration of permit process a) Increase effectiveness and speed re. provision of permits with regard to initial permits, and their updates/ revision. b) Link IMPEL to this process. To be achieved by assessing the practices of the EU-27 Member States, to engender and spread best practices.	

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
Suggestion 2 – Duration of BREF process Suggest, to accelerate and improve the BREF process: a) A more systematic methodology to achieve BAT-conclusions b) A stronger focus on main issues c) Resolving the Confidential Business Information ("CBI") issues during BAT determination.	
Suggestion 3 – Digitalisation recommendations Inter alia: a) Implement unified coding of IED permits. – Thus to facilitate ready readability of permits, authorisations and controls for Member States' Competent Authorities. – Also to enable easier cross-comparisons across Member States. Assess feasibility and applicability of continuous consumption and emissions monitoring to installations other than the energy sector.	
Suggestion 4 – Monitoring provisions a) To be clarified better in BAT-conclusions Allege that some monitoring is not clear, and is an unnecessary excess burden for operators with regard to achieving/ checking BAT use.	– Disagree with the validity of the criticism. If greater guidance is needed, it should be to more closely align monitoring with the "polluter-pays-principle".
Suggestion 5: Baseline Reports–Groundwater and Soil a) Suggest further guidance is necessary re. Art. 22 IED (site closure), also with regard to Baseline Reports.	– Such Baseline Reports have been required since 2010, and guidance was issued in 2014. Content of the Baseline Reports should rather be made more publicly accessible, e.g., via the EEA Industrial Emissions Portal Vers. 2.0.
Suggestion 6 (noted as "5" in the Opinion) – Avoiding overlapping requirements Revise Annex I of the IED where there are activities with more minor impacts that may be directly associated, to avoid overlaps.	Instead, it would be better to focus on include internalisation of external costs, including climate debt.
Suggestion 7 (noted as "6" in the Opinion) – Functioning of BREF process a) Utilise systematic BREF guidance Avoid 'disproportionate burden' on operators.	Rejects notion of some data being requested that is non-essential in compiling BREFs.
Suggestion 8 (noted as "7" in the Opinion) – Clarity and Harmonisation [New "Revision"-type suggestion rather than solely "better implementation"] a) Introduce concept of "single property" as opposed to "installation" b) Above concept to enable technical assessments for "whole site" as opposed to	– Concept too complex, and could lead to a very difficult attempted assessments of multiple risks, causing delays to permit authorisations/ changes. – "Site"-approach – suitable for Seveso-style risks instead.

Summary of Fit for Future Platform Views	European Environmental Bureau dissenting responses
several "installations" (where applicable) Revise definitions/ more thorough IED implementation.	– Retain "installations" for IED. – Harmonise, instead: o Article 15.4 derogation practices o Compliance assessment (uncertainty measurement methods) Significance thresholds for breach situations and findings of inspections.
Description/ "Global Dimension" a) Recommend a study overall of costs-benefits of implementing BREFs in sectors. This to be used to enable benchmarking of the performance of EU industry sectors with that of non-EU competitors.	Rather, modify the IED to enable industry sectors' decarbonisation commitments to be achieved and monitored.

Potential follow-up of the 2021 FFF platform opinion on IED

Table A2-9 summarises possible follow-up suggestions in response to the Fit for Future Platform's adopted opinion regarding how to improve the Industrial Emissions Directive and its implementation.

Table A2-9: Fit for Future Platform suggestions, with indicative possible follow-up actions by the European Commission and other actors

FFFP suggestion	Possible follow up
Suggestion 1: Duration of the permit process	This is considered under the baseline, as part of the European Commission's ongoing implementation and compliance support activities, in particular by facilitating the exchange between Member States of good practices to promote a swift revision of permits.
Suggestion 2: Duration of the BREF process	Post-revision of the IED, a review of the implementing act containing the guidance on drawing up of the BAT ReFerence documents (BREF guidance) is likely. This review would provide the opportunity to streamline and shorten the process as far as possible.
Suggestion 3: Entering the digital age for the authorisation and control phases	An EU-level common electronic permit is probably not feasible given the diversity of national approaches. However, the IED revision includes the assesspment of a requirement for a harmonised digital permit summary, for which the Commission could establish a common format.
Suggestion 4: Monitoring provisions	Improvement of the monitoring provisions included in BAT conclusions and ensuring their consistent application could be discussed as part of the future revision of the BREF guidance, post revision of the IED.
Suggestion 4: Baseline reports on soil and groundwater (numbering error in the FFF opinion)	Existing guidance for the Baseline reports is already in place, but there is a Commission commitment to review the implementation of the provisions on the soil baseline report as part of the Commission's implementation and compliance support activities. This review should ensure better compliance by the Member States. It should be noted that the legal base underpinning the IED already allows Member States to take stricter measures, such as requiring baseline reports in a wider number of cases.

FFFP suggestion	Possible follow up
Suggestion 5: Overlapping requirements	The problem may be due to the lack of BAT conclusions for some directly associated activities in IED sectors, rather than the wording of Annex I that defines the sectoral scope of the IED. This issue will be checked during future BREF reviews.
Suggestion 6: Functioning of the BREF process	The continuous improvement of the BREF process includes revising data collection and processing methods. In particular, the definition of key environmental information (KEI) as well as the processing of confidential business information (CBI) is the subject of agreements within each Technical Working Group undertaking the revision of a BREF. As part of the IED revision, a provision establishing clear legal rules on the processing of CBI is being considered.
Suggestion 7: Clarity and harmonisation	This assertion is not consistent with the outcome of the IED evaluation and of consultations undertaken as part of this impact assessment. On the contrary, the IED's approach to permitting individual facilities has been proven to be effective, also regarding related provisions, such as defining 'operators' and the combination of permits.
Description 8: Global dimension	Both the IED evaluation and this impact assessment have examined competitiveness aspects. No significant impacts have been identified. The EU's IED BAT approach is seen as best practice internationally; many third countries are working towards adoption of similar approaches or standards at national level. In support of such dynamics, BAT Conclusions have been posted on the web in all UN languages. The Commission also funds OECD work to exchange good practices on BAT, and publishes authoritative reports that showcase the EU approach.

Annex 3: Who is affected and how?

INTRODUCTION

This annex sets out the practical implications of the preferred policy package for the various types of stakeholders concerned. It describes the actions that the enterprise or public authority might need to take in order to comply with the obligations under the revised legislation and indicates the likely costs to be incurred in meeting those obligations, or where quantitative information is not available the nature and magnitude of such costs. It also presents the implications for the public.

1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

Businesses already falling under the scope of the IED and/or the E-PRTR

At entry into effect of the revised legislation (i.e. transposition date for IED and entry into force date for the E-PRTR Regulation), installations will have to report in more detail on their environmental performance and will face enhanced scrutiny from the competent authorities. This includes more complete reporting to the E-PRTR at installation level rather than at facility level and renewed attention and wider scope of the already required Environment Management System (EMS) to better address resource efficiency and use of safer substances. Furthermore, operators will have to make environmental information easily accessible to the public on the Internet.

On the one hand, operators benefitting from IED derogations and flexibilities will have to justify the need for their continuation. In particular:

- Installations releasing substances to the sewer will have to verify that the treatment plant receiving their waters is able to appropriately handle those substances and that the load of pollution exiting the treatment plant does not exceed the pollution load of an installation which would have its own treatment plant. If this is not the case, operators will have to install additional onsite abatement techniques in their own installations.

- Installations benefitting from derogations that are not limited in time will have to plan for the end of such derogations, or justify the need for continuation to the satisfaction of the competent authority.

On the other hand, frontrunners will be able to get sufficient time to test emerging techniques.

After publication of revised BAT Conclusions, installations will have to agree with the competent authorities the Emissions Limit Value (ELV) - within the whole BAT-AEL range – that truly reflects BAT performance for their particular installation. Operators will face new requirements to reduce emissions of GHGs that do not fall under the ETS.

Frontrunners firmly committing to meet a ‘step change’ in lower emission levels via deployment of emerging techniques instead of BAT will be given more time to comply with revised BAT Conclusions.

To prepare the 2030 review of individual installations’ permits, operators of installations will have to draw up and discuss with the competent authorities their Transformation Plan, which entails an integrated consideration of future investments to optimise each installation’s contribution to decarbonisation and zero pollution, in line with the 2050 objectives for each aim.

The above concerns all installations except those active in rearing of pigs and poultry. The latter will benefit from the new tailored permitting or registration regime that will focus on key issues, and simpler reporting to E-PRTR, resulting in a significantly reduced administrative burden. However, this depends on whether Member States decide to maintain the full IED permit for those installations or to move to the proposed tailored approach.

Installations newly falling under IED

The IED will become applicable to activities newly brought under its scope when the Commission adopts BAT Conclusions for individual activities. The Commission will prioritise the drawing up of new BREFs, as well as the revision of existing BREFs, to cover installations newly falling under the revised IED. This would result in adoption of relevant BAT Conclusions between 2025 and 2030.

New installations permitted after their date of adoption will have to comply immediately with the BAT Conclusions, which would concern most the high growth sectors like battery manufacture for electric vehicles. Existing installations would have four years to comply, as is currently the case, which would concern mainly contracting or slow growth sectors, such as landfilling and textile finishing.

The cattle sector will face a new regulatory environment through the application of the IED tailored permitting and registration approach, that includes less requirements than the full IED permit. This will require operators to implement measures to meet emission levels reflecting the use of BAT.

Competent authorities

Upon entry into effect of the new legislation, the competent authorities of the Member States will have increased responsibilities in ensuring that the environmental performance of installations reflects the application of BAT.

Increased responsibilities will be ongoing, as permits are considered and installations are inspected. This includes a more rigorous examination of permits issued or reviewed to reflect ‘true BAT performance’ and to support sectoral front-runners. Additional responsibilities will also comprise a strict assessment of the need for derogations, the requirement for enhanced cooperation with authorities in charge of air and water quality, where an environmental quality standard is at stake. Related additional activities will include stricter enforcement of

permits, and more systematic and deeper cooperation with the authorities of other Member States, where installations have, or are suspected of having, significant transboundary environmental impacts.

Key additional tasks include ensuring public participation in all permit reviews that have significant environmental impacts; monitoring the continuous improvement of the environmental performance of installations through their EMS, including the implementation of energy efficiency measures reflecting requirements of the Energy Efficiency Directive; and reviewing permits to incorporate the operator's Transformation Plan.

The public

The new legal provisions should not have any perceptible impact on the cost of consumables. Hence, the public will only enjoy benefits, as the obligations under the IED and the E-PRTR solely apply to businesses and public authorities, and aim at improving the quality of the environment.

The public concerned will have more complete and easier access through the Internet to information on the operation of IED installations, in particular through the publicly available harmonised permit summary and environmental reporting by installations.

The public concerned will have the right to participate in all important permit review or issuance procedures.

Other

Experts from Member States, industry and NGO involved in the BREF process, as well as the Commission services, will have to devote increasing resources to cover in greater depth certain issues than in the past. Such issues concern especially GHG emissions, material, water and energy efficiency, water reuse and the use of safer chemicals.

New networks of experts will be set up to contribute to INCITE, which will also require additional resourcing by the Commission services, as well as the resources of the concerned experts who provide their input to the successful running of INCITE.

2. SUMMARY OF COSTS AND BENEFITS

The following table provides the summary of costs and benefits per problem area for the options included in the preferred policy package.

<table>
<tr><th colspan="4">I. Overview of direct and indirect Benefits and estimated costs (total for all provisions) – Preferred Option vs BAU</th></tr>
<tr><th colspan="2">Businesses</th><th>National Authorities</th><th>Citizens and Consumers</th></tr>
<tr><td>More effective legislation (PO1)</td><td colspan="3">PO1 will improve the effectiveness of the IED and the E-PRTR Regulation by clarifying and simplifying the IED legislative framework; improving public access to information, coherence with the broader EU legal framework and policy objectives, especially the European Green Deal, zero-pollution ambition and the Aarhus Convention; and will level the playing field and raise standards of laggard Member States, especially in environmental protection.</td></tr>
<tr><td colspan="2">Direct benefits:
The measures introduced on the E-PRTR will result in administrative cost savings for reporting – in total by 10.2 million/year. This counterbalances the additional administrative costs related to IED measures referred to below, resulting in overall limited increase in administrative costs for businesses under this option (2 million/year)
Savings stemming from clarification and simplification in the IED and the E-PRTR that could not be quantified
Indirect benefits:
Improved level playing field primarily by homogenising and clarifying the requirements that businesses should comply with and expected enforcement practices
Improved environmental performance could have operational benefits in the medium to longer term, for example, through increased energy efficiency</td><td>Direct benefits:
Less duplication of effort, taking advantage of synergies via greater cohesion with related business and environmental ministries and departments
Indirect benefits:
Clarifying and simplifying existing legal requirements will translate into reduced administrative costs
Costs:
Authorities will need marginally more resources for bringing together and sharing data and information
Total administrative burden €19 million/year</td><td>Direct benefits:
Improved quality of the environment via lower levels of emissions to air, water and soil
Participation in permitting of installations responsible for significant emission of pollutants
Indirect benefits:
Improving public access to information will increase public leverage and ability to influence the environmental performance ambition
The reduction in pollutant emissions linked to use of safer chemicals will have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden
Illustrative calculations for health benefits</td></tr>
</table>

Costs: • Installations will need to employ more resources due to an increase in the frequency and/or depth and breadth required in permit reconsiderations, derogations and exemptions. This will constitute one off costs as they will materialise once per 10 years, corresponding to a yearly average of 12.4 million/year • Operational costs may increase or will be brought forward, primarily by introducing more stringent requirements and limiting the duration and/or reducing the likelihood of approval of derogations from implementing BAT Conclusions. This will also affect CAPEX: illustrative estimations for five sectors estimate CAPEX for reducing NOx emissions to represent €210 million/year		from reductions of NOx emissions in five sectors estimate this to represent at least between €860 million and €2 800 million/year

Accelerating innovation (PO2)	PO2 is expected to introduce incentives for operators to develop, test and deploy more innovative technologies in a context of rapid technological advancement and a need for deep industrial transformation in sectors regulated by the IED. The scale of impact of this measure would depend on the take-up and the findings of INCITE.

Businesses	*National Authorities*	*Citizens and Consumers*
Direct benefits: • Streamlined investment to develop and test innovative techniques and technologies • Effective and efficient intervention in updating BREFs through the INCITE's monitoring **Indirect benefits:** • Putting the EU's industry in the front-foot of transformation, potentially gaining first-mover advantage and exporting acquired know-how or innovative techniques **Costs:**	**Direct benefits:** NA **Indirect benefits:** NA **Costs**: • Administrative burden €4 million/year. This stems mainly from occasional one-off activities linked to permit reconsiderations following BREF reviews and inspection/enforcement	**Direct benefits:** • Access to information about state-of-the-art techniques • Improved environment through faster deployment of innovative techniques **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden. The scale of such

• Additional capital and operating expenditures will be needed from operators, although the scale is uncertain and would depend upon the response by IED operators and the selected novel technologies • Heavy industry transformation mainly be driven by the climate policy requires significant investments. This option may lead to an increase in and/or bring forward costs for IED operators, especially capital expenditure, by encouraging industrial transformation and favouring innovative and emerging technologies • Administrative costs are estimated at €23 million/year. This stems mainly from occasional one-off activities linked to permit reconsiderations following BREF reviews, less from yearly monitoring and reporting activities (1.1 million/year)		benefits will depend on the degree of acceleration of technological progress
Contributing to a non-toxic and resource efficient circular economy (PO3)	PO3 would enhance the status of the parts of BAT conclusions whose legal status is unclear. The EMS will provide sufficient flexibility for the pertinent actors. This will encourage a more efficient and circular use of resources with the lowest possible administrative, operational and capital costs. In the longer term, installations will contribute more to a circular economy and a resource efficient model of business and will move to using safer chemicals.	
Businesses	***National Authorities***	***Citizens and Consumers***
Direct benefits: • Operational cost savings in the longer term due to improved resource efficiency, reduced waste and carbon footprint • Market likely to reward good performers **Indirect benefits:** • Encouraging research and innovation **Costs**: • 60%-80% of IED installations may be affected, resulting in	**Direct benefits:** • Clarity on how to implement BAT conclusions **Indirect benefits:** N/A **Costs:** • Administrative burden: €36 million/year	**Direct benefits:** • Reduced environmental footprint of industrial installations • Increased public access to information on emission of all pollutants by individual industrial installations **Indirect benefits:**

administrative costs for those operators; costs induced by measures to improve chemicals management, circular economy and resource efficiency will depend on the complexity of installation's plans and systems • Administrative burden: at €101 million/year		• Enabling benchmarking of the environmental performance of different industrial activities • The potential reduction in pollutant emissions linked to use of safer chemicals is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden
Addressing decarbonisation of industry (PO4)	The scale of benefits of PO4 will depend on how energy efficiency and associated GHG and other pollutant emissions reductions incentivised via the IED may interact with the EU ETS framework. The benefits would include positive impacts on air quality; the efficient use of resources; waste production, generation and recycling; innovation and research; and levelling the playing field.	
Businesses	***National Authorities***	***Citizens and Consumers***
Direct benefits: • Economies of scale stemming from an integrated approach towards transformation (depollution and decarbonisation) • Improved energy efficiency **Indirect benefits:** • Encouraging more investment in developing and testing innovative techniques and technologies **Costs:** • Additional capital and operating expenditures related to energy efficiency measures implemented by operators is uncertain and would depend upon the response by IED operators, and whether those measures are needed to comply with other climate or energy law (e.g. the Energy Efficiency Directive). • Administrative burden: €28 million/year	**Direct benefits:** N/A **Indirect benefits:** • Cooperation between authorities in charge of the IED and the Energy Efficiency Directive should ease overseeing of overall implementation **Costs:** • Administrative burden: €21million/year	**Direct benefits:** • Information and better understanding of all GHG emissions (going beyond CO_2) **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden

Industrial scope (PO5)	PO5 is the most significant option in terms of costs. It will more than triple the number of installations covered by the IED, mainly in the livestock-rearing sector. The tailored regulatory framework will significantly mitigate the associated administrative burden.

Businesses	*National Authorities*	*Citizens and Consumers*
Direct benefits: • IED permitting provides a recognition that installations apply BAT, improving the green credentials of the company • Levelling of EU playing field **Indirect benefits:** • Encouraging more investment in developing and testing innovative techniques and technologies **Costs:** • Depending on the capacity thresholds, livestock production will bring additional 84 000-330 000 cattle farms and 77 000-187 000 pig and poultry farms under the IED scope, representing together with the farms already covered by IED less than the largest 10-40% non-subsistence farms, out of the c.1.5 million farms within these sectors. The tailored approach reduces the administrative costs associated with IED permitting by 20 to 30%, depending on the specific activity. Compliance costs will be both one-off (abatement techniques) and recurring and should be between €265-812 million/year • Other scope expansion will bring additional 1 500 to 1 900 installations under the IED that will be subject to full IED permitting, possibly including some SMEs. The associated costs for businesses should not surpass €265 million/year • Administrative costs of between €181-425 million/year stem mainly from IED related obligations (€145-390 million/year).	**Direct benefits:** N/A **Indirect benefits:** N/A **Costs**: • Depending on the capacity thresholds, livestock production will bring additional 84 000-330 000 cattle farms and 77 000-187 000 pig and poultry farms under the IED scope. The tailored approach reduces administrative costs associated with IED permitting by about 30% through • Other scope increase will bring additional 1500 to 1300 installations under the IED scope that will be subject to full IED permitting • Administrative costs: €141-385 million/year	**Direct benefits:** • Participation in permitting of installations responsible for significant emission of pollutants • Increased public access to information on emission of all pollutants by individual industrial installations **Indirect benefits:** • The potential reduction in pollutant emissions is likely to have indirect benefits such as improving public health and labour productivity, reducing social and healthcare burden • Minimum expected reductions in methane and ammonia emissions are valued at between €5 450 and €9 240 million per year (using damage costs and carbon price)

Annex 4: Analytical methods

INTRODUCTION

Due to the breadth of the sectors covered by the two policy instruments of the Industrial Emissions Directive and the Regulation on European Pollutant Release and Transfer Register, the Impact Assessment is not based on a single methodology, but rather on a variety of qualitative and quantitative approaches that have been synthesised qualitatively. Most Policy Options will likely induce various magnitudes of effects on agro-industrial operators, associated technology providers, Member States' Competent Authorities and the general public, which it is very difficult to quantify at high accuracy levels at the overall EU level. The assumptions and methods used for the assessment of these impacts are described in the respective sections in Annex 10.

The following summary of the analytical methods used subdivides the description into two parts:

- **PART A**: Industrial Emissions Directive
- **PART B**: E-PRTR regulation

A. IED - Tasks, Analytical Methods, Policy Screening, Impact Assessment of Measures and Overall Options

Overview of tasks and methods

The methods employed were developed according to the European Commission's Better Regulation Guidelines and Toolbox, adapted based on the time available to complete the Impact Assessment support work and the report team's wealth of practical experience in delivering impact assessments. For example, the report team previously led the 2019-2020 evaluation[21] of the current IED framework and was involved in the previous industrial emissions policy impact assessment completed in 2007, which are two key sources of evidence for this report.

The Impact Assessment support work was structured around seven tasks, represented in Figure A4-1 below.

Each task was based on and/or followed the EC's Better Regulation Guidelines and Toolbox. These are described below.

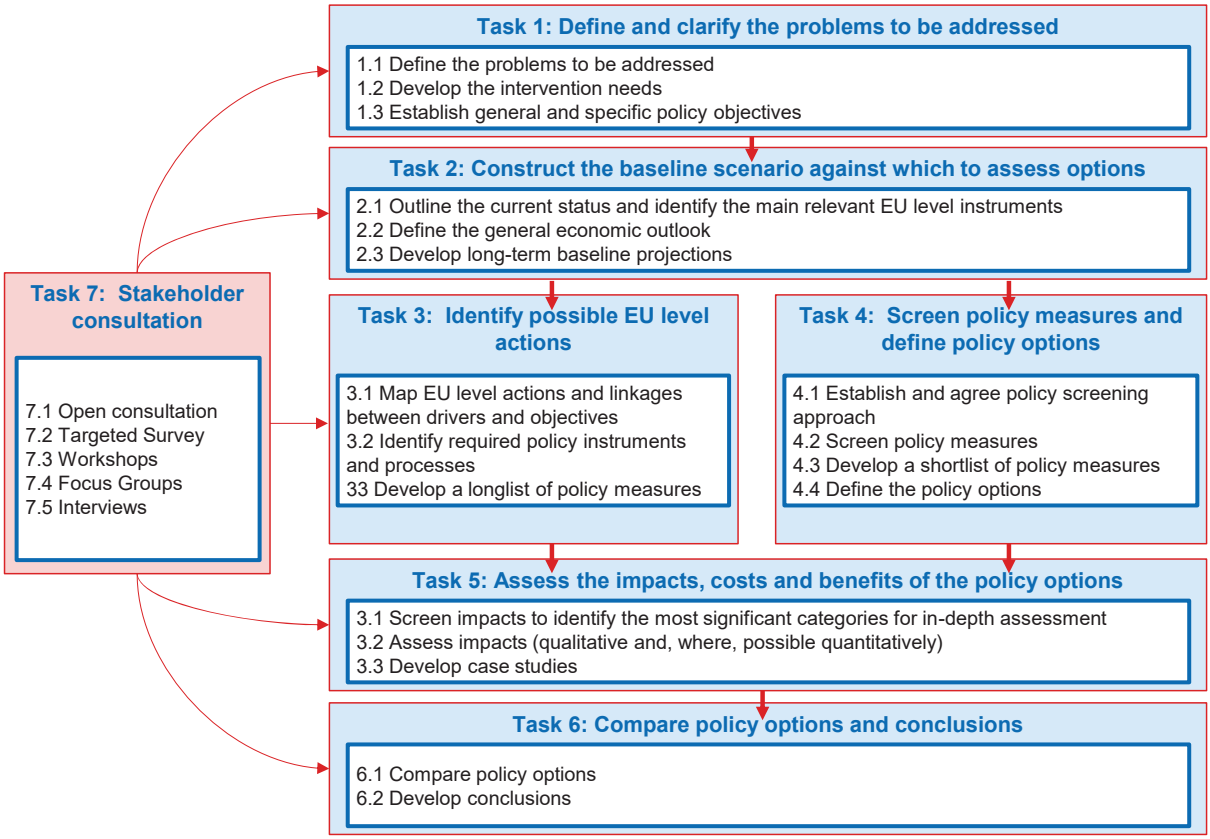
- **Task 1: Define and clarify the problems to be addressed.** The recent evaluation of the IED has been a key source of evidence to review, define and clarify the problems to be addressed as part of the revision for the IED. The approach taken to review the problems facing the IED was inspired on Tool #14 of the Commission's Better Regulation Toolbox. General and specific objectives were also set following Tool #16

[21] SWD(2020)181final: https://europa.eu/!HP74fW

and building on the European Commission's commitments as outlined within the European Green Deal and other published strategies and plans.

- **Task 2: Construct the baseline scenario against which to assess options.** The study considered how the status quo would likely evolve, including the existing problems as well as the Commission policy action without further policy change within the IED framework. This work was inspired in the broader Commission Better Regulation Guidelines, and particularly drawing from Tool #14 and Tool #17.

Figure A4-1: Overview of the tasks of the impact assessment support work



- **Task 3: Identify possible EU level actions.** Whilst the baseline was being defined, the study team engaged with the European Commission and stakeholders to develop a longlist of policy options that could address the problems identified. Tool #17 of the Commission's Better Regulation Toolbox sets out a process to consider a variety of policy measures in addition to the baseline that would address the problems and problem drivers as these might evolve, which was followed for this Study. Over one-hundred and thirty measures or actions were identified that could be adopted to address the problems facing the IED and contribute to achieving the objectives set.
- **Task 4: Screen policy measures and define policy options.** Not all policy measures or actions were viable. The report team therefore developed a screening process based on Tool #17 of the Better Regulation Toolbox. Eight criteria (see Section 3.1, this

Appendix) were established and defined, and experts employed a set of guidelines and judgement to rate each policy measure against these criteria. This screening process produced a draft shortlisted that was discussed and iterated with experts and the European Commission, and finally checked for suitability. Forty-four measures were retained for in-depth assessment and packaged into policy options that were aligned to the identified problem areas.

- **Task 5: Assess the impacts, costs and benefits of the policy options.** A longlist of possible impacts was developed and screening, based on Tool #19 of the Better Regulation Toolbox. From these, thirteen impact categories were identified as likely to be significant for a more in-depth assessment. Across these impact categories, different types of costs and benefits were considered in line with Tool #58-60 of the Better Regulation Toolbox. A multi-criteria analysis was employed, building on the policy screening process (Tools #57 and #63). An evidence-based qualitative scoring approach was taken to rate each policy measure and option.
- **Task 6: Compare policy options and conclusions.** This evidence on impacts, costs and benefits was employed to compare policy measures and options and develop conclusions as to whether a given option would contribute to achieving set objectives and generate benefits that would be likely to outweigh costs.
- **Task 7: Stakeholder consultation.** Stakeholder engagement was a horizontal task, central to this support study and feeding into all of the aforementioned tasks. The consultation activities and data analysis carried out in this Study were based on Tool #54 (and others) of the Better Regulation Toolbox. These activities included an open consultation, a targeted survey, workshops, focus groups and interviews.

Multiple methods were employed across these tasks, which may be grouped into three types:

1. Desk research and rapid evidence reviews
2. Analytical methods
3. Field research/ stakeholder feedback and validation.

The following sections describe the use of these methods in this report.

1. Desk research and rapid evidence review

Evidence utilised has been collected from literature (studies, reports, articles) to support the analyses in most of the tasks, especially in Tasks 1-5, in line with Tool #4 of the Commission's Better Regulation Toolbox. Four steps were generally followed:

- Review of the core sources for this report, such as the recent evaluation of the IED and the European Commission's Inception Impact Assessment and associated feedback.
- Carrying out an evidence mapping exercise to identify key needs and/or gasps.
- Undertaking a rapid literature review:

- Systematic web search with the use of search tools including Google, Google Scholar, Web of Science and others
- Coverage of a wide range of stakeholders' sources, such as industry, government, trade journals, etc.
- Considering a diverse set of document types, such as policy reports and studies; documents from the European Commission; grey literature (e.g. industry association briefings, etc.); proceedings of conferences, symposia, and meetings; academic articles.

- Screening of literature to determine the types of information contained and the extent that the data is reliable and sound.

The outputs of this process are the evidence base that underpins the impact assessment.

2. Analytical methods

A range of methods were employed to support this report. The following sections provide an overview to three methods employed to support the tasks outlined earlier. These are:

- Screening approaches
- Case studies
- Impact Analysis
- Standard Cost Modelling

2.1. Screening approaches

Screening exercises were employed across various tasks, especially in Tasks 3 and 4, for example, to develop long and short lists of possible and viable policy measures or options.

Each screening exercise consistent of at least five steps:

- Define the objectives of the screening process
- Develop and agree a set of screening criteria
- Carry out the screening exercise
- Review and assure outputs
- Develop conclusions

The primary screening exercise carried out was to develop the shortlist of policy options, moving from a longlist of over 130 policy measures to a shortlist of 44. Policy measures. This was an iterative process drawing on the evidence collected and expert judgement of the consultant team, experts at the Commission, and stakeholders consulted during this report.

The criteria for screening the policy measures (Task 4) were developed in accordance with Tool #17 of the Better Regulation Toolbox[22]. These criteria are outlined below.

[22] Tool #17. How to identify policy options. URL: https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-17_en_0.pdf

1. **Legal feasibility:** Policy measures must respect the principle of conferral. They should also respect any obligation arising from the EU Treaties (and relevant international agreements) and ensure respect of fundamental rights. Legal obligations incorporated in existing primary or secondary EU legislation may also rule out certain options. We have, therefore, considered whether measures were compatible with EU law and obligations arising from the EU treaties and international agreements, including by answering:
   - Is the measure compatible with EU Treaties?
   - Is the measure legally feasible to implement and enforce?
   - Will the measure respect fundamental rights?

2. **Technical feasibility**: It was considered whether the measures may be technologically and technically feasible to implement, monitor and enforce, including by answering:
   - Would the measure be technologically and technically possible to implement?
   - Is there a system in place to monitor the implementation and impact of the measure (or could it be established)?
   - Would Member State Authorities be able to inspect and enforce any possible sanctions under the measure?

3. **Stakeholder acceptability**: It was established whether the measure could garner the necessary stakeholder support for legislative adoption at the EU and MS level, including by answering:
   - Is the measure consistent with EU-level and MS policies and public positions?
   - Does the measure instil legislative certainty?
   - Could the measure cause competitive distortion (e.g. by limiting the growth of certain industries or creating discrimination between industries based in different Member States)?

4. **Effectiveness**: The external consultant team also explored the extent to which the measures could contribute to addressing the specific problem(s) and/or meeting the objectives that it is seeking to address. The following questions guided this exploration:
   - To what extent could the measure contribute to protecting the environment by reducing pollution (concerning air, water, soil and waste) and/or the use of potentially toxic substances?
   - To what extent could the measure contribute to achieving climate neutrality by 2050 and/or a more circular use of resources?
   - Does the measure directly promote or incentivise investment in technological innovation and/or rapid uptake of state-of-the-art technologies that can reduce the environmental footprint of industrial activities?

5. **Efficiency**: The external consultant team assessed at a high-level the extent to which measures can improve social, economic and environmental welfare in an efficient way, especially when compared to the alternatives. The following queries guided the assessment:
   - Could the measure have significant, positive social and environmental impacts e.g., reduced pollution, lower GHG emissions, lower use of resources, more green jobs, etc.?
   - Could the measure have a high-cost burden on consumers, businesses and/or public institutions e.g., higher price of consumer goods, lower production efficiency, etc.?
   - How do the expected benefits and costs compare?

6. **Proportionality**: The external consultant team determined the extent to which the measure can address the problem that it is targeting to explore whether this proposed way is proportionate to the costs or constraints that may arise from implementing the measure. The following questions guided this evaluation:
   - To what extent are the costs resulting from the regulatory actions taken by the EU proportionate to the potential environmental and health benefits?
   - Could the measure have a disproportionate impact on smaller companies?

7. **EU added value**: The external consultant team considered the likely advantages of EU-level intervention to resolve these problems, compared to actions at the national level, including - but not restricted to - answering the following :
   - Could the measure result in a more consistent approach across the EU than national-level alternatives?
   - To what extent could the measure help raise standards in those Member States which are lagging behind on environmental protection?
   - To what extent would the measure be more cost-effective at the EU versus national level?

8. **Coherence**: The compatibility of the measure with existing policy frameworks at the international and EU level (e.g., European Green Deal, Chemical Strategy for Sustainability, EU ETS legislation, E-PRTR, and UWWTD) was determined. In particular, the experts assessing this were guided by the following queries:
   - Is the measure compatible with EU acquis?
   - Is the measure coherent with the objectives and/or actions set out in the European Green Deal, the Chemical Strategy for Sustainability, EU ETS, E-PRTR and Urban Waste Water Treatment Directive revisions, etc.?

The experts carrying out the screening exercise scored the policy measure against each of these criteria: 5-high score, 3-medium score, and 1-low score, or any integer in between.

The external consultants' team developed general guidelines, outlined in Table A4-1 below, for what generally constituted each score for each criterion. These general guidelines were

aimed at providing some consistency to the task from the start, although the screening process was iterative and the experts carrying this out had multiple opportunities to come together and calibrate their assessment effectively based on evidence available and their expert judgement.

Table A4-1: General guidelines for scoring across each criterion

Criteria	(5) High score	(3) Medium score	(1) Low score
1 -Legal feasibility	Compatible with EU Treaties, and legally instruments to implement and enforce are available.	Compatible with EU Treaties, but some doubts as to whether legal instruments are readily available to implement and enforce.	Not compatible with EU Treaties or no legal instruments available.
2-Technical feasibility	Technology and techniques available to implement, monitor, inspect and enforce measure.	Technology and techniques available to implement measure, but doubts on how to monitor, inspect, and enforce measure.	Measure cannot be implemented technically, or measure cannot be enforced, inspected, or monitored.
3-Stakeholder acceptability	Consistent with policies and public positions, instils certainty and does not cause distortions.	Consistent with policies, but not necessarily fitting with public positions or instil certainty.	Inconsistent with current policies, not necessarily fitting with public positions, instil certainty and could cause unwanted market distortions.
4 -Effectiveness	Contributes significant/clearly to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Contributes, potentially, to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Doubtful contribution to any of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.
5 -Efficiency	Evidence of clear benefits to limited costs or significant benefits to some acceptable/ proportionate costs.	Doubtful evidence on benefits but limited costs, or clear evidence on strong benefits and doubtful evidence on potentially high costs.	Limited expected or high uncertainty on benefits, but some or clear evidence on high costs.
6 -Proportionality	Benefits are high and/or address objectives at the lowest possible cost, based on evidence. SMEs not impacted disproportionately.	Benefits are high and/or address objectives at relatively low cost, based on evidence, but SMEs affected disproportionately.	Costs are too high for potential benefits -e.g. industry struggle to compete, etc.- based on evidence. SMEs affected disproportionately.
7 -EU value added	Bringing more consistency across the EU, raising standards across countries, and more cost-effective at EU-level.	Clear evidence on one or two of: Bringing more consistency across the EU, raising standards in some countries, and more cost-effective at	Unclear evidence on any of: More consistency across the EU, raising standards across countries, and more cost-effective at EU-level.

Criteria	(5) High score	(3) Medium score	(1) Low score
		EU-level.	
8 -Coherence	Compatible with EU acquis and coherent with EU plans/strategies' objectives.	Compatible with EU acquis and coherent with some of EU plans/strategies' objectives.	Not compatible with EU acquis or coherent with a limited set of EU plans/strategies' objectives.

The output of this exercise is a robust and consistent shortlist of retained policy measures selected to tackle the problems and drivers identified in Task 1. This shortlist of measures packaged into policy options and taken forward for an in-depth assessment of their potential impacts, costs and benefits.

2.2. Case Studies

Three sectors were selected to develop case studies of expected industrial transformation needs. The objective of the case studies was to explore with expert representatives from specific industries, Member States' authorities and NGOs what could be the expected potential impacts on emissions of GHG and other key environmental pollutants, via anticipated transformation in the specific industry sectors selected. Secondly, how might the existing IED framework, and proposed changes to the IED/ E-PRTR regulatory instruments, impact thee changes.

Sectors were selected by a process of comparing evidence on the availability of alternative processing/ production techniques with an estimate of the level of transformation that would most likely be required, on a sector-by-sector basis, as pertinent to the highly carbon-relevant IED sectors listed below:

- Iron and steel
- Glass and ceramics
- Chemicals
- Downstream oil and gas (refineries)
- Pulp and paper
- Cement
- Textiles
- Slaughterhouses

Experts within the consultancy consortium carried out a shortlisting assessment, taking into consideration the two main criteria (level of transformation needed, and techniques' availability) outlined above. This assessment concluded that the following three sectors should be taken forward, based principally on the following arguments:

- **Iron and steel** - on the grounds that a variety of decarbonisation solutions should be available to this sector in the near- to mid-term;

- **Downstream oil and gas** (refining) - with regard to the adaptation to bio-derived feedstocks and also higher percentages of bio content in end-products; and
- **Cement** - with regard to possibilities for the incorporation of additional quantities of "waste" as fuel feedstock, circular economy possibilities with regard to reused concrete "demolition waste" as an ingredient, as well as evolving cement and clinker techniques.

A case study for each of these three sectors was developed, based on the most recent publicly available evidence, expert opinion and information collected through the consultation activities carried out for this report.

2.3. Impact Analysis

The impacts of the IED and, therefore, any necessary revisions are inherently dependent upon the independent BREF process and the associated BAT conclusions. Moreover, technological progress is very uncertain; therefore, the evidence available has limitations as to the (especially future) technologies that operators might adopt as a result of changes to the IED, how much these might cost and the specific extent to which their adoption might lead to better environmental performance.

These and other limitations have meant that the impact analysis has been built on a partial evidence base, which has then been complemented by informed expert judgement and opinion.

A qualitative analysis framework inspired by both Multi-Criteria and Cost-Benefit Analysis (as per Tools #57 and #63 of the Better Regulation Toolbox) was employed. Six steps were followed, as shown below:

- Identification of the **key economic, environmental and social impact** categories for a more in-depth assessment, defined these categories practically, and selected proxy indicators that helped to build an evidence base and understanding of the scale of potential impacts.
- Development of a **qualitative scoring framework** on a scale of "-10 to +10 points" for policy measures across each impact category. Individual policy measures were qualitatively scored, summed up and amalgamated into a rating at the 'policy option' level (or combination of policy measures). The scoring reflects the direction (positive or negative) and magnitude (weakly to strongly, limited or unclear) of the qualitative assessment of the likely impacts.
- Mapping and assessment by a **team of experts** with respect to impacts of measures across the categories, each expert covering between 3-8 measures from the original shortlist of over 50 measures.
    - Experts were encouraged to use their existing specialised knowledge in their domain, as well as the outputs of the policy screening exercise, together with readily available evidence regarding the subject of the measures. This enabled the experts to score the proposed measures against the impact categories in a first and rapid two-week iteration. This iteration also centred on identifying

key evidence gaps. Sources of evidence for this iteration included, as already mentioned, the recent IED evaluation and Inception Impact Assessment, complemented by data from Eurostat, E-PRTR, the EU Registry, and a range of sector-specific literature, studies and publications.

- Three additional iterations were conducted, each time building on any additional evidence identified and the ongoing adjustments to measures from interactions with stakeholders and the European Commission.

- A **re-calibration exercise** was carried out after every iteration from the team of experts and comments were provided by the consortium economist lead. This was to ensure that the ratings were internally coherent within teams, across teams, and challenged constructively overall to achieve consistency and consensus. The scope of the measures and evidence of the likely scale of impacts were used to test and validate the relative position of each measure in terms of its economic, environmental and social impacts.
- A **policy/ impact aggregation exercise** was implemented upon the definition of policy options. The qualitative and quantitative analyses were carried out for individual measures. It should be noted that aggregated **policy options** might combine up to as many as sixteen discrete measures (e.g., PO1). This exercise was centralised, and an index was developed to ensure that the aggregation of points across the impact categories, costs and benefits from combining policy measures could be mapped on to the -10 to +10 scale utilised.
- **Validation and quality assurance** activities were also taken forward with a team of experts within the consultant team.

Key economic, environmental and social impact categories

All key impacts of the policy measures on the core stakeholders – public authorities, industry (large and smaller businesses), citizens and workers, third countries – were identified, mapped, and screened. An assessment of the expected absolute and relative magnitude of these impacts and their likelihood was carried out in line with Tool #19 of the EC's Better Regulation.

The result of this screening of impacts was that thirteen economic, environmental, and social impact categories were selected for use in the in-depth impact assessment as part of this study, outlined in the Table below. For clarity, a brief description is provided of the specific impacts and proxy indicators considered in this assessment of options for the revision of the IED.

Table A4-2: Significant impacts for in-depth assessment and core indicators

Broad impact category[23]	Specific impact category	Description
Economic impacts	Administrative burdens on businesses	Any administrative costs, enforcement costs and/or direct regulatory charges, including but not only through the permit application, derogation and BREF processes, monitoring and reporting, hosting inspections, etc.
	Operating costs and conduct of businesses	Substantive compliance costs, that is, the additional capital expenditure and/or operating expenditure (excluding administrative burden) that are required to comply with the policy measures' requirements. This may include upgrading installations and equipment, using alternative inputs of production, etc.
	Competitiveness of businesses	Comparative advantage of the industry in an international context and how this may be affected by changes to the costs of doing business in the EU; and any impacts on the level playing field in the EU.
	Position of SMEs	Overall costs of the measures on the industry across differences in business size; that is, whether the average administrative and compliance costs per employee are comparable across larger and smaller businesses or there is a significant difference in the impacts by size.
	Innovation and research	Level of investment in Research and Development and expected innovation outcomes that may result from the implementation of proposed measures.
	Public authority impacts	Administrative, compliance and enforcement activity by public authorities and other costs related to the BREF, permit-setting and derogation-granting processes; compliance assessments and inspections; and/or ensuring public access to permit procedures, among others.
Environmental impacts	Climate	Emissions of Greenhouse Gases into the atmosphere (tonnes of CO_2 equivalent)
	Air quality	Emissions of pollutants to air, which may include NOx/SOx, NMVOC, dust, NH_3, Hg, or any other pertinent pollutant.
	Water quality and resources	Releases of heavy metals (Cd, Hg, Pb, and Ni), N and P or any other pertinent pollutant to water.
	Soil quality or resources	Emissions of pollutants to soil, which may include Arsenic, Cadmium, Chlorides, Chromium, Copper, Halogenated Organic compounds, Lead, Mercury, Nickel, Polychlorinated Biphenyls, Total Phosphorus and Zinc.
	Waste production, generation and	Volume of waste generated (tonnes) and recycled (tonnes).

[23] The assessment of social impacts and associated ratings focus on how the measures may affect employment levels across the EU. Public health and public health system impacts are indirectly related to environmental impacts and, therefore, are captured within this category and noted for completion. Similarly, reductions in polluting emissions may indirectly affect labour productivity and other economic impact categories. These benefits, where directly related to the environment and usually captured as part of the monetisation of these benefits through the use of damage cost functions, have been qualitatively captured in the environmental impacts category to avoid confusion with the analysis and interpretation of the ratings.

Broad impact category[23]	Specific impact category	Description
	recycling	
	Efficient use of resources	Volume of energy consumed (TWh), volume of "virgin" water consumed (m^3) and volume of "re-cycled" water consumed (m^3).
Social impacts	Employment	Number of employees, in full-time equivalent, in industry and/or public authorities.

Qualitative scoring framework

Having identified the thirteen impact categories of special significance for this Study, a qualitative scoring framework was developed, first on a scale of -10 to +10 points for policy options (or combination of policy measures). This was to ensure that the framework was effective at showcasing the relative significance of the impacts of policy measures, also when comparisons were made at the higher level of 'options' and 'packages of options', whilst maintaining internal coherence.

The scoring reflects the direction (positive or negative) and magnitude (weakly to strongly, limited or unclear) of each measure, option, or package of options. The language used to describe each measure's potential economic, environmental or social impacts was based on uniform descriptors outlined in Table A4-3 below, with intermediate scoring options being allowed along the spectrum.

Table A4-3: Coding used to present expected impacts

××××× ×××××	×××××	×	O	✓	✓✓✓✓✓	✓✓✓✓✓ ✓✓✓✓✓	U
Extremely negative	Strongly Negative	Weakly negative	No or limited impact	Weakly positive	Strongly Positive	Extremely positive	Unclear

Guidance was provided to the project team, to ensure that even though the assessment was qualitative, an iterative process with a centralised re-calibration exercise was always expected and planned from the start.

Firstly, the scope was considered:

- "No or limited impact" would be used where a measure/ option affected <1% of the installations in the baseline or equivalent
- "Weakly (negative or positive)" would be utilised where a measure/option affected 1%-10% of the installations in the baseline or equivalent
- "Strongly (negative or positive)" would be used for a measure/ option affecting 10% - 75% of the installations in the baseline
- Conversely, neither 'weakly' nor 'extremely' would be allowed in the rating scheme where a measure/option affected the above range of 10% - 75% of the installations in the baseline

- The use of the highest rating, i.e., 'extremely' (negative or positive) would be restricted to those measures/options affecting **>75%** of the installations. The most striking illustrative example of this category concerns the options expanding the IED's scope to include cattle farms and additional IRPP farms, which would affect a number of installations equivalent to more than 300% of the baseline scenario.

Secondly, the intensity of the expected impact when compared to the baseline on a per unit basis was explored via a similar rating scheme

- 'No' or 'limited' impact would relate to a measure/option that could lead to a change of <1% in a unit cost or benefit (e.g. administrative burden)
- 'Weakly (negative or positive)' would relate to a measure/option that could lead to a change of >1%-20% in a unit cost or benefit
- Neither 'weakly' nor 'extremely' (negative or positive) would be allowed to be used where a measure/option could potentially lead to a change of between 20%-75% in a unit cost or benefit
- 'Extremely' (negative or positive) would be reserved for those cases in which a measure/ option could lead to a change of >75% in a unit cost or benefit. Again, a representative example of the use of 'extremely' is the proposal to include over 160 000 additional farms in the scope of the IED via PO5a options (IED measures #31, #32 and #33) ; this yields huge environmental benefits, and at the same time is likely to increase the administrative burden considerably, even with a tailored permitting framework.

These two sets of overall guides were considered by the experts in the project team and combined with their knowledge and expert opinion. The outcome was the production of a qualitative rating that was supported by the evidence available.

Thirdly, experts carried out a scoring exercise following the scale outlined in Table A4-3, that is, on a scale of -10 to 10 points, to enable comparability and coherence between policy measures and options with very different and varied degrees of impact. These adjustments were carried out centrally, with support from the expert teams, to maximise coherence and comparability.

To avoid confusion across categories, the qualitative assessment employed focussed on direct impacts of the policy measures (or options). As an illustration, significant and direct environmental impacts from the retained policy options, especially on air quality, are also likely to have substantial and positive indirect effects on human health and the public health and social care system across the EU and potentially beyond, which would in turn yield significant positive social impacts. These impacts would also benefit the economy by improving labour productivity and other economic factors.

These indirect impacts have been captured as part of the qualitative assessment of **environmental impacts;** however, in order to avoid 'double-counting', these indirect impacts have **not** been added into the consolidated qualitative ratings for economic impacts, or social impacts.

As a further point of clarification, the qualitative scoring framework of -10 to 10 points was identified as the most effective scoring range to ensure that two complementary aims were achieved:

- Reflecting, as proportionately as possible, the differences in expected impacts across policy measures, policy options and packages of options. As an illustration, a small number of policy measures (e.g. IED #31, part of PO5a on Livestock Rearing) was assessed to have benefits of more than 10 times the points (or number of 'ticks') than other policy measures (e.g. IED #17, part of the Emerging Techniques suites of measures in PO2a). However, when balancing the overall comparison, it is necessary to broadly maintain this comparative numerical relationship in a coherent manner whilst successfully proportionately mapping the individual assessments onto the single "-10 to +10" selected point scale.
- The internal coherence of the scoring framework in difference contexts needed to be ensured, such as when it is employed to assess measures across each of the thirteen impact categories. The scoring framework needs to allow a summation of the allocated points, to enable them to be mapped, to then produce an assessment at the total policy measure level, and subsequently one step further, by summing and mapping at the higher levels of policy option, or policy package. As an illustration, three policy measures (e.g. IED #31-33, measures under PO5a –Rearing of Animals) were assessed to have benefits of three to six points (or 'ticks'); therefore, when grouped together as the policy option level (PO5-a), this agglomerated policy option has to have six points (or 'ticks') – possibly more, depending on fine tuning, to ensure internal coherence when using the qualitative scoring framework, i.e., the "-10 to +10 point" scale.

On an overall scale of impacts, the majority of policy measures (and options) are expected to have significantly lower impacts than measures and options related to expanding the scope of the IED, i.e., the PO5 series of measures and options. The end member of highest 'points' scoring is PO5-a (extending the scope of the IED to include cattle and additional installations of IRPP). Without utilising a sufficiently wide scale such as that selected (i.e., the -10 to +10 point scale), the majority of non-PO5 policy measures, of much less significance than PO5-a, would become almost *de minimis* by comparison, solely registering a score in the lower 'points' of the scale (e.g. between 0 and 1). Therefore, the chosen -10 to +10 point scale was favoured over narrower more conventional options, such as point scale ranging from -5 to +5, to enable an adequate differentiation of magnitudes to be appreciated. This is further considered in 'Policy/ impact aggregation' below.

Detail on the inputs used by the teams of experts

The teams of experts mapped and assessed impacts of measures across the categories, each expert covering between three to eight measures from the original shortlist of over 50 measures.

- These experts were encouraged to use their existing knowledge and readily available evidence to score qualitatively in a first and rapid two-week iteration where evidence

gaps were identified. Key sources already mentioned - including the recent IED evaluation and Inception Impact Assessment - were complemented by data from Eurostat, E-PRTR, the EU Registry, and a range of sector-specific literature, studies and publications.

- Three additional iterations were conducted for the measures being considered. Each iteration built on additional evidence identified during the process, also taking into account any ongoing adjustments to measures resulting from interactions either with stakeholders or the European Commission key IED/ E-PRTR team and Inter-Service Steering Group.

Re-calibration exercise

The outputs of the assessment by the team of experts were brought together and reviewed by a central team, including the lead economist of this project, after each iteration. This re-calibration exercise was performed multiple times, and also served as a way to identify evidence needs, doubts and areas for further exploration. It also allowed the team to produce overall rankings of measures/options, e.g., in terms of their scale and direction of potential net impacts, which the team could test with a wider network of experts available to the consortium of consultants, as well as with the European Commission and stakeholders.

Policy/ impact aggregation

A centralised team also used the ratings by measure to aggregate impacts up to the level of policy options (i.e., combinations of measures). An index (or mapping approach) was developed to ensure that the aggregation of 'points' across the impact categories, costs and benefits from combining policy measures could be mapped to this -10 to +10 scale coherently.

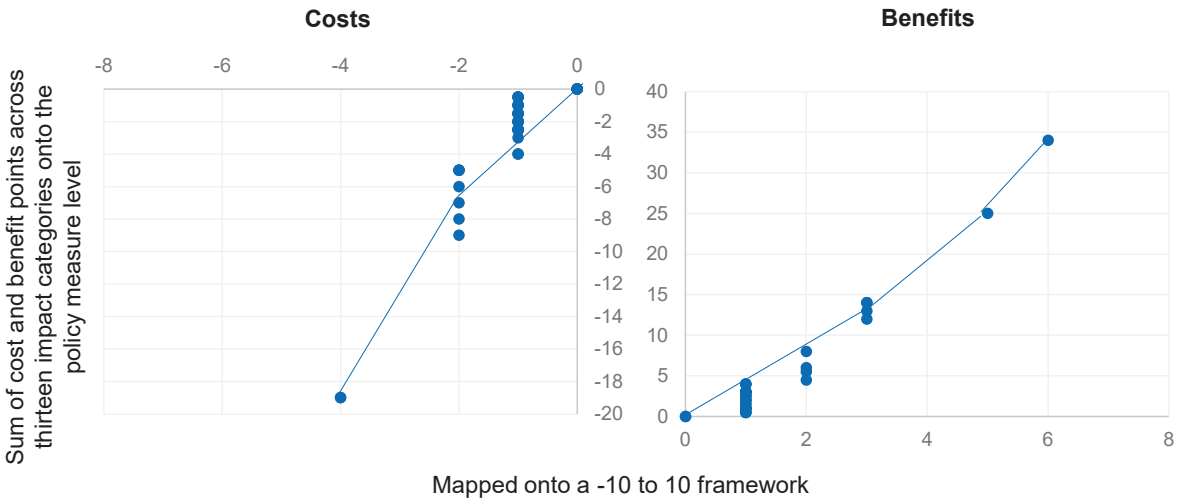
For example, "+1 to +4 points" on environmental impacts would represent one green tick, whereas a score of "-25 to -21 points" on economic impacts would represent five crosses. Finally, for internal coherence, this index had to be rated against the maximum number of ticks and crosses that could be achieved in the event of developing a package of all of the policy options available (or those alternatives with the greatest impacts) with respect to the extremities of the scale, i.e., -10 or +10 points.

Further re-calibration was also required during this policy aggregation exercise. In particular, the exercise highlighted that the weight of specific measures might not be as representative as expected. Therefore, any such doubts were reviewed and contrasted with the expanding evidence base. Generally, this exercise did not generate any *different* overall ratings or conclusions per measure, but instead improved the ability to differentiate and compare between options (i.e., combinations of multiple measures) and their internal coherence.

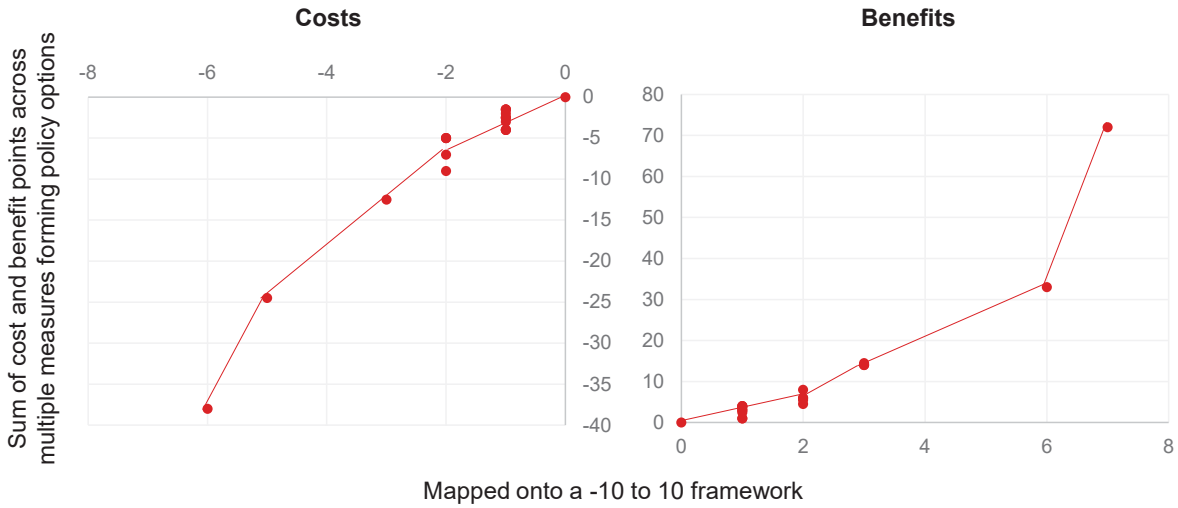
Overview Summary of Steps with Visual Depiction

To illustrate this and earlier steps, as well as the rationale for using a scale of -10 to +10 points, the descriptions provided so far are complemented by a brief recapitulation and some visual illustrations.

- First, each measure was assessed against thirteen categories using the -10 to +10 point scale to maintain the expected relative position of measures across each of these categories (e.g. relative costs and relative benefits, etc.) as much as possible.
- Secondly, having scored each measure across the thirteen categories, it was necessary to aggregate this up to the measure level for the three broad impact categories (environmental economic and social), together with the costs and the benefits, so that each measure could be assessed and compared. This meant that a mapping exercise was required between the sum of all the 'points', e.g. all the costs and benefits, onto the proposed -10 to +10 scoring scale. The figure below illustrates how this mapping was performed, to maintain a broadly proportionate position for each of the policy measures.



- Thirdly, policy options (or combination of measures) also needed aggregation of 'points' against each broad impact category, as well as total costs and total benefits for their assessment and comparison. A mapping exercise was again required between the 'sum of all the points of the measures making up each option' and the -10 to +10 point scale. The figure below illustrates this mapping and shows the limitations, whilst keeping a relatively proportionate position for each of the policy measures, on a "-10 to +10" point scale. Neither the costs nor the benefits graphs below represent one strictly linear relationship between allocated points. The explanation is because, as policy measures are progressively packaged into the options with the varying scale and/or depth of change required, the differences in relative impacts across them grow further apart. This effect can be noted most markedly between points -5 and -6 in "costs", and between points +6 and +7 in the "benefits" aggregated plots.



- Fourthly and finally, leading policy options can be aggregated into a preferred policy package. Therefore, the maximum points that could ever be obtained from any combination of policy options must map onto the overall "-10 or +10 points" scale, so that the preferred policy package can be depicted, whilst retaining internal coherence. It is at the third and fourth stages in the scoring and aggregation process that the E-PRTR-related options were added, and carefully scored in full calibration with their estimated weight of qualitative impacts compared to the IED policy options.

The value of a "-10 to +10 point" scale is that it depicts and compares concisely and proportionately the relative position of policy measures, policy options and potential packages of these options, whilst ensuring internal coherence.

Validation and quality assurance

Validation and quality assurance activities were organised with a team of experts within the consultant team. This included the review and testing of the resulting balance of costs and benefits per policy measure/ option. The overall ranking of policy options, in terms of the scale and direction of total and net benefits, as well as across impact categories, were also presented to test and validate their relative position.

Finally, where evidence was available, a more traditional cost-benefit analysis framework was employed. This was primarily the case for assessing policy option to expand the scope of the IED to also include cattle farming and more rearing of pigs and poultry installations. The methods employed follow the guidelines provided by Tool #59 of the Better Regulation Toolbox. This analysis, nevertheless, was partial and only included the core costs and benefits expected from this policy option.

2.4. Standard Cost Modelling

A bottom-up cost modelling approach was employed to estimate the additional administrative costs (or administrative burden) on businesses and public authorities that would result from the adoption of the retained policy measures or options inspired by the Standard Cost Modelling approach outlined in Tools #59-60 of the Better Regulation Toolbox.

In line with Tool #60 especially, three general steps were taken:

1. **Preparatory analysis**. Firstly, this included the qualitative identification of the scope and type of potential administrative impacts of the retained measures (and options) on businesses and public authorities. This was then followed by the identification of evidence needs, e.g., baseline administrative requirements and additional inputs required, their intensity and frequency over a period (e.g. 20 years, as used here) and unit costs. Finally, sources were identified and desk research and a rapid evidence review was carried out, building on the recent IED evaluation, the previous IED impact assessment, the consultation activities, and other key sources of evidence.
2. **Data capture and standardisation**. The data available was collated for all the parameters identified in step 1, generally structured and saved within an Excel workbook.
3. **Calculation**. A specific baseline for each measure was quantified in line with the general baseline established as part of Task 2, and the potential additional administrative costs (that is, the administrative burden) generated by the retained measures or options were calculated employing the bottom-up cost modelling approach

Where evidence was available, estimates were produced for the effects of the measures or options on administrative burden over a period of 20 years (in constant 2020 euro), and annual average figures were developed and presented for comparison. Generally, this included estimates of the additional administrative costs (or burden) and savings associated with changes to the BREF and permitting processes in intensity, frequency and/or scope (one-off costs), as well as monitoring and reporting and enforcement and activities linked to inspections (recurrent costs). These assessments were quality assured by experts in the consultant team and validated, and uncertainties and sensitivities considered.

Basic assumptions behind all calculations are provided in Table A4-4.

Table A4-4: Cross-cutting evidence-based assumptions employed in the impact assessment

Specific indicator	Evidence-based assumptions	Comments and sources
Number of existing IED installations in the baseline	**52 000**	Average of the latest three years of data available via the EU Registry
Number of new IED installations expected each year in the baseline, on average	**500**	Average based on baseline data analysis carried out for this report
Number of permit reconsiderations (and updates) every year in the baseline, on average	**5 200**	Average based on the assumption that permit reconsiderations and updates may take place at least once every 10 years, in line with the BREF cycle
Number of BREF reviews completed in a period of 20 years	**60**	Based on the assumption that a BREF occurs at least once every 10 years, thus each of 30 sectors will be reviewed at least twice in the 20-year period
BREF review costs for one sector-operators (2020 €)	**€1 million - €7 million**, with a central estimate of €2 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
BREF review costs for one sector-public authorities (2020 €)	**€3 million - €14 million**, with a central estimate of €5 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
One-off costs of issuing new permits -public authorities (2020 €)	**€3 250 - €35 000**, with a central estimate of €23 400	Based on evidence from the IED IA 2007 (EC, 2007), adjusted for inflation over the period (GDP Deflator sourced from the World Bank and Eurostat), and contrasted with evidence gathered through the recent IED Evaluation (Ricardo et al, 2020)
One-off costs of issuing new permits -operators (2020 €)	**€10 000 - €62 250**, with a central estimate of €28 000	Based on data collected through stakeholder engagement for this report, the IED Evaluation in 2020 (Ricardo et al, 2020), and a study to analyse differences in costs of implementing EU policy (EC, 2015)
One-off costs of permit reconsiderations and updates -public authorities (2020 €)	**€1 600 - €17 500**, with a central estimate of €11 700	Based on an assumption employed in the IED IA 2007 (EC, 2007) that permit reconsiderations and updates costed around 50% of the permit issuance costs
One-off costs of permit reconsiderations and updates -operators (2020 €)	**€1 500 - €31 250**, with a central estimate of €14 000	Based on evidence provided by stakeholders engaged for this report, and complemented by evidence from the IED IA 2007 (EC, 2007).
Annual costs for managing information and systems - public authorities (2020 €)	**€100 - €3 000** with a central estimate of €2 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Annual monitoring and reporting costs-operators	**€150 - €12 000** with a	Based on evidence provided by stakeholders engaged for this report and the recent IED

Specific indicator	Evidence-based assumptions	Comments and sources
(2020 €)	central estimate of €8 000	Evaluation (Ricardo et al, 2020)
Inspection costs every two years -public authorities (2020 €)	**€500 - €12 000** with a central estimate of €9 600	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Inspection costs every two years -operators (2020 €)	**€125 - €5 000** with a central estimate of €4 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
One-off applications for derogations or exemptions - public authorities (2020 €)	**€550 - €4 250**, with a central estimate of €850	Although the burden is primarily on operators to develop and submit the application, it is assumed that public authorities spend half as much effort reviewing and engaging in the process
One-off applications for derogations or exemptions - operators (2020 €)	**€1 100 - €8 550**, with a central estimate of €1 700	Based on evidence from IED IA 2007 (EC, 2007), suggesting applications for derogations could require between 40 to 300 worker hours
One-off baseline reports - public authorities (2020 €)	**€4 000 - €20 000**, with a central estimate of €10 000	Based on an assumption public authorities would engage with baseline reports provided by operators and spend around 20% of the effort
One-off baseline reports - operators (2020 €)	**€20 000 - €100 000**, with a central estimate of €50 000	Based on the recent IED Evaluation (Ricardo et al, 2020)
Average hourly labour costs in EU-27 (2020 €/h)	**€29/h**	Latest Eurostat statistics for EU-27 (Eurostat, 2021)

3. Field research/ Stakeholder Feedback and Validation

As part of the study, a number of stakeholder consultation activities were carried out between December 2020 and Sept 2021 to confirm the problem definition and policy objectives, to gather insights and evidence on the policy measures and options identified, and assess the potential impacts of the longlisted and shortlisted policy measures and options aimed at addressing the problems identified. This enabled the potential policy measures and options to be discussed with stakeholders, as well as obtaining their feedback and validation of the draft ongoing evaluations being made.

These activities were carried out in line with the Better Regulation Guidelines (Chapter VII: Guidelines on Stakeholder Consultation and Chapter III, Guidelines on impact assessment). Four broad steps were taken across these activities.

- Development of a Consultation Strategy, mapping the scope and objectives of the consultation, listing key targeted stakeholders, consultation activities and a proposed timetable.
- Preparation of the Consultation documentation for each of the activities.
- Announcement and communication with stakeholders following due process.
- Documented stakeholder engagement.

The consultation activities are summarised in the Annex 2 synopsis, and a fuller description of the public consultations and their results is described in greater detail in Annex 12 (Extended summary of consultation activities).

These consultation activities included:

- An open public consultation launched on 22 December 2020 and open until 23 March 2021.
- Targeted stakeholder survey launched on 8 February 2021 and open until 9 April 2021.
- Two stakeholder workshops that took place in December 2020 and June 2021.
- Seven focus groups that took place between June and July 2021.
- Three case studies that were compiled in July 2021, based on feedback from three of the focus groups, coupled with external data, publicly available sectoral roadmaps and expert "foresighting"-type methods, to explore the likely evolution of three different sectors going forwards from the 2020s to the 2030s and beyond
- A series of one-to-one stakeholder interviews / correspondence between June and Sept 2021.

B. E-PRTR - Tasks, Analytical Methods, Policy Screening, Impact Assessment of Measures and Overall Options

1. OVERVIEW OF TASKS AND METHODS USED

The **analysis of problems** followed the major steps advised in BR Guidelines Tool #14. **Intervention logic**, an analytical tool used to understand and visualise how an intervention solves a specific challenge, was used to establish the links between problem drivers and policy options.

The development of the **baseline and analysis of options**, including the development of baseline, was based on the principles set out in BR Guidelines Tool # 17. In particular, an initial set of E-PRTR (sub)policy options was screened by using a set of criteria for determining which options to include or not as advised in BR Guidelines Tool # 17.

A description and, where possible, quantification of the economic, social and environmental **impacts** of the short-listed options was performed, following BR Guidelines Tool # 19. The main direct impacts were quantified and monetised (for both the baseline and the policy options under consideration). Furthermore, indirect impacts were quantified, where possible, and if not then they were assessed qualitatively with a clear indication of their nature and likely magnitude. **Costs and benefits** were disaggregated, as far as possible, according to each identifiable action under the different options and identified according to the standard typology of costs (e.g., administrative, enforcement) and benefits (BR Guidelines Tool #58 and #59). The **assessment** was undertaken in line with the Better Regulation Guidelines and, in particular, Chapter 8 of the Toolbox ("Methods, models and costs and benefits"). The overall qualitative scoring mechanism was carefully aligned with that utilised in the IED evaluation, as explained in Part A, Section 2.3 of this Annex.

Stakeholder consultation followed the advice outlined in BR Guidelines Tools # 53 – # 56. In line with BR Guidelines Tool #54, **questionnaire surveys** were used to allow the stakeholders and the public to voice their opinions on the improvement of the E-PRTR. To avoid limitations of a questionnaire survey in terms of the focus on pre-defined answer options, open questions and follow-up **interviews** were designed. **Descriptive statistics** and MS Excel were used for the analysis of quantitative data. Visual aids were used for the presentation of quantitative data. For interpreting qualitative data **thematic analysis** was applied and supported by NVivo content analysis software.

4. DATA SOURCES AND ANALYTICAL SUPPORT

Desk research comprised literature and evidence assessment, as well as quantitative assessment related to administrative burden.

Evidence and literature have been sourced via a number of routes: from references in the terms of reference for the E-PRTR impact assessment support study; from current work being undertaken by project partners; from reports and other evidence signposted by the European Commission; from a review of literature; and from respondents to stakeholder engagement

for this study through responses to the open public questionnaire, targeted stakeholder survey, interviews and focus groups.

The analysis of reported E-PRTR data, to date, has also been a key source of information, providing the likely number of facilities to be impacted by different policy options.

The inclusion of additional activities and the assessment of the administrative burden has been informed by the consultation of Eurostat statistics and the EU Registry on Industrial Sites. Consultation of other EU environmental legislation and the European Chemicals Agency's databases informed the suggestions for inclusion of additional pollutants within the E-PRTR.

5. CONSULTATIONS

a. Open public consultation (OPC)

The shared IED and E-PRTR online OPC offered the opportunity for interested individuals from any type of stakeholder groups to give their opinion on the revision of the IED and E-PRTR Regulation. The OPC was launched on the Commission's website.[24]

The questionnaire included 24 questions, of which four were specific to the E-PRTR. Submissions to the OPC were analysed qualitatively and quantitatively. All multiple-choice questions were summarised for results by stakeholder group.

b. Targeted stakeholder engagement: online survey

To gather more in-depth information from those stakeholders already possessing a good understanding of the E-PRTR and it implementation, a combination of targeted stakeholder consultation methods was used. A targeted online survey was utilised to gather the views of key groups of stakeholders, including Member States' authorities (at any level of administration and E-PRTR implementation), industry sector (individual companies or trade associations) or other types of organisations (e.g. environmental or civil society NGOs, research bodies, etc).

c. Interviews

Targeted telephone interviews to complement the online survey took place with representatives of regional and national competent authorities, European institutions, representatives of non-EU PRTRs, representatives of the Kyiv Bureau, industry associations, civil society, and other key stakeholders.

d. Focus groups

Focus group discussions were held to complement the online survey and interviews. Representatives of Member State authorities, industry associations and the NGO community took part in the discussion. Attendance at the focus group was by invitation only. Two focus groups were organised to tackle different problem areas.

[24] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/1913-Evaluation-of-the-Industrial-Emissions-Directive/public-consultation_it

e. Stakeholder workshops

Two workshops were held online prior to commencing the consultation process, and after the OPC and the TSS had closed.

6. Robustness of the Evidence

a. Overview

The level of credibility varies with regard to each source of information that has been used for the assessment. In principle, sources of information that are based on measured or reported information are believed to be quite certain. However, even in these cases the robustness depends on the correct measuring and reporting of the parameter concerned. It is assumed that even if there are errors, these are not systematic and there is not concerted manipulation.

In other cases, literature may draw itself on a lot of stakeholder opinion, or be based on a small sample or have other features that weaken its robustness.

Literature which originates from stakeholders with a particular vested interest are treated with greater caution. Such literature may selectively present information or present it in a certain manner to support an argument that the interested party may wish to pursue.

Stakeholder opinion presents similar risks to stakeholder-sourced literature. In their opinions, stakeholders may be seeking to manipulate the results to support their preferred outcome.

In the case of this assessment, industry holds opposite views to researchers and NGOs on many of the problem areas identified. In general, industry opposes drastic changes to the scope of the Regulation, pointing to the potential for significant increases in the administrative burden. Conversely, researchers and NGOs would like to see a significant revision of the Regulation. It seems relatively likely that authorities' opinions might be more objective, although individual Member States may also have specific outcomes in mind. It is therefore not surprising to find that Member States' opinions largely lie between those of NGOs/ researchers and industry.

To deal with the above issues, stakeholder opinions have been compared across the different stakeholder groups and in view of their different interests, a more robust composite stakeholder overview has been derived.

b. Levels of confidence

The level of confidence in the assessment is a result of the robustness of each of the individual information sources used and the degree to which the different sources could be used to corroborate each other.

The weakest confidence level is considered to be associated with answers where the only information available is stakeholder opinion. Since, in this case, most questions have been answered by all stakeholder groups, there is reasonably high degree of certainty that these answers have not been corrupted by a concerted effort to manipulate the findings. Where the

different stakeholder opinions are largely convergent, we can more likely have a higher confidence level that they are less biased.

For many issues, the pure opinion expressed in the surveys can be supported and contrasted with the opinions expressed in interviews or focus groups.

Where it is possible to compare findings from literature with stakeholder opinions, a much higher degree of confidence can be placed in the findings.

The highest degree of confidence is provided where multiple sources of information corroborate one another, taken together with multiple stakeholder opinions.

In the case of the assessment of the administrative burden, it has not been always possible to isolate completely the burden attributable to the E-PRTR Regulation from that attributable to the IED completely. Even the stakeholders involved in the implementation of these two legal instruments found it difficult to clearly separate the tasks, and, as such, the associated respective administrative burdens incurred by the IED and the E-PRTR Regulation.

Annex 5: Detailed baseline

INTRODUCTION

Consistent with tools #12 and #27 of the Better Regulation Toolbox, the baseline option represents a 'no policy change' scenario. That is, the baseline assumes that the current EU-level and national policies and measures continue in force and that the sectors are affected by the baseline economic expectations driven by the market context (Section 5.1.1).

In more detail for the IED, the baseline is the continuation of the existing legal framework and scope coupled with the continuation of any further development of BAT reference documents and BAT conclusions in the context of the information exchange under IED Article 13 led by the EIPPCB (section 5.1.1.3). The problems that have been identified with the implementation of the IED are assumed to remain, although their evolution will be subject to the ongoing market context developments.

1. MARKET CONTEXT

The expected evolution of the market context for the IED sectors is assumed to follow the projections modelled for the 'Fit for 55' climate package by DG CLIMA and DG ENER, which considers the impact of policies associated with achieving a net 55% reduction in GHG emissions by 2030 for the EU compared with 1990 levels.

These projections were developed using the PRIMES and GEM-E3 models by E3Modelling, as well as supporting work by IIASA using the GAINS model, and have been adopted as the baseline against which to assess the policy options for the revision of the IED.

The projections consist of a reference or "REF" scenario that is based on current policy framework, and a "MIX" scenario that is consistent with the policy packages proposed to achieve the 55% net reduction target by 2030. Both of these scenarios take into account the effects of and expected recovery from the COVID-19 pandemic.

Up to and including 2030 therefore, there are assumed to be implementation tools in place – from the Fit for 55 package – driving transformation change. After this point, post 2030, the baseline assumes that the energy system continues to decarbonise, with associated GHG emissions reduced by ~80% by 2050.

1.1. WHAT DO THE BASELINE PROJECTIONS TAKE INTO ACCOUNT FOR SECTORAL TRANSFORMATIONS

The GEM-E3 model which underpins the baseline projections is a macroeconomic computable general equilibrium model. The baseline projections take into account the structure of economic growth (consumption vs investment led growth), the policies that affect the energy system, the contribution of each sector in total GDP and insights from selected sectoral industrial outlooks.

The key trend in the sectoral economic outlook is that the EU economy dematerialises and becomes even more service oriented. That is, the services sector dominates, generating slightly over 76% of gross value added in the EU by 2050, while the shares in total GDP of industry is projected to decline slightly by 2030 and more so by 2050.

The baseline assumes the economy becomes more open to trade, i.e. the total share of imports and exports of GDP increases. Lower value added products such as textiles or ceramics are imported and trade is mostly focused on higher value added products such as equipment manufacturing. Construction and the demand for non-metallic minerals follows the pattern of investment growth, with the share of investment to GDP increasing over time.

Further, energy-related industries and, in particular, fossil fuel-based energy industries are assumed to be affected by the EU's existing climate and energy policies. Oil, gas and coke production is reduced over the projection period and, hence, their share in total value added is reduced over time. Specifically, as the fossil-based industries (coal mines in the short term and oil in the medium term) are forecast to decline, clean energy sectors are assumed to expand in the baseline, such as batteries, electric vehicles, photovoltaic and wind energy generation. The share of the total energy sector in total gross value added is expected to remain broadly unchanged as the substitution from imported fossil-fuels to higher-valued added domestic electricity production is expected to continue.

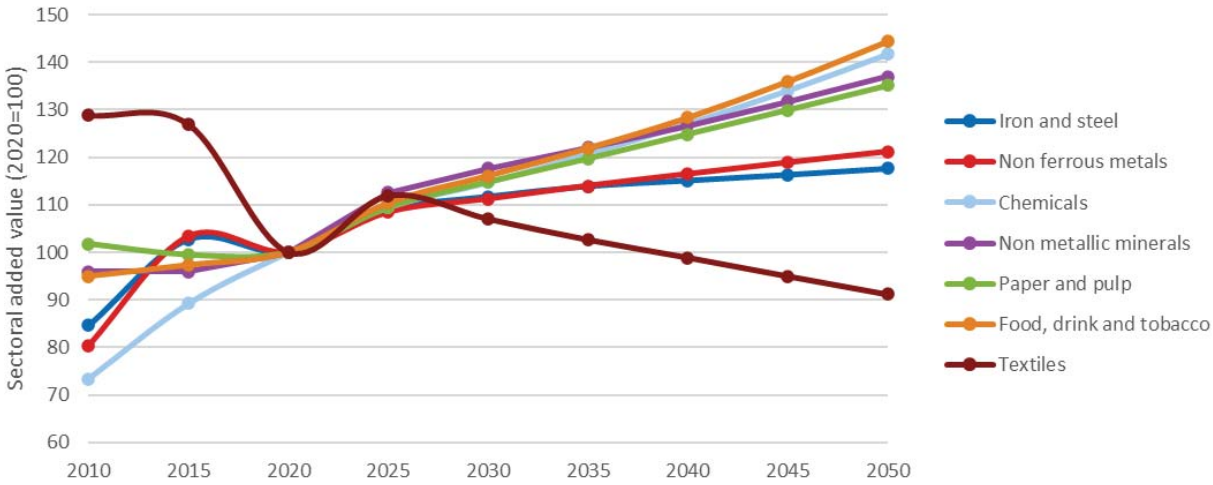
A full description of the PRIMES modelling is provided in supporting studies for the impact assessments of policy packages led by DG CLIMA. The sector classifications in PRIMES do not correspond precisely with those of the IED activities, and do not include all IED activities, but can be used to provide a high-level indication of the development of some of the industrial sectors and power generation.

Detailed projections for the industrial sectors in the baseline are provided covering sectoral added value, energy consumption (total), energy consumption by fuel type, energy intensity, carbon emissions and carbon intensity. Specific remarks are made on the embodied assumptions for the three spotlight sectors covered in the case studies, as well as on the context of the industrial transformation.

1.2. QUANTITATIVE OUTPUTS OF THE BASELINE

Sectoral added value is estimated to steadily increase in both the REF and MIX scenarios for most sectors from 2020 to 2050, although the textiles sector is expected to decline in value added from 2025, returning to levels closer to 2020 by 2040 but continuing to decline thereafter (Figure A5-1).

Figure A5-1: Sectoral added value of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



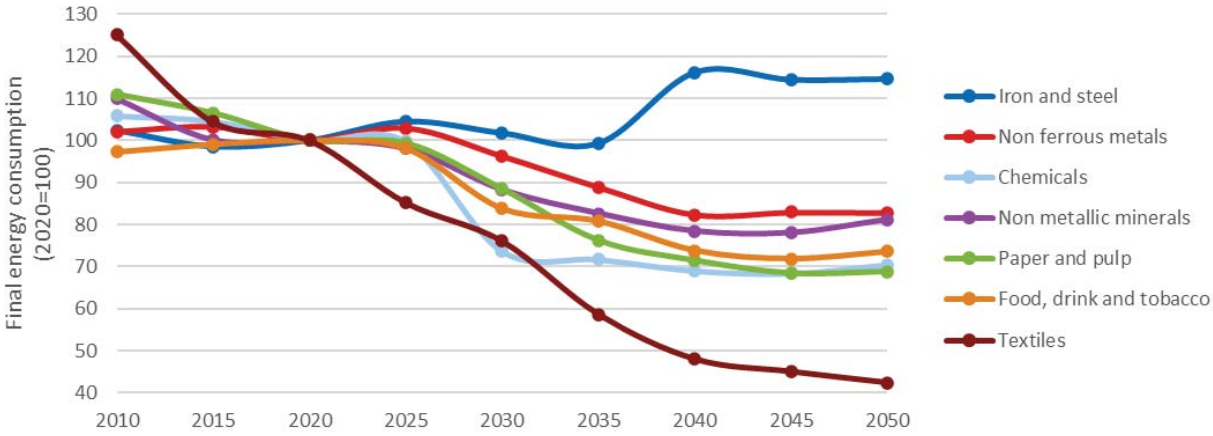
Source: PRIMES

Energy consumption for most industry sectors is expected to increase or stay relatively constant from 2020 but only in the short-term, and final energy consumption will generally decline thereafter to 2040, until remaining relatively level to 2050 (Figure A5-2). There are some notable exceptions. For example, energy consumed in the textiles industry will decline from 2020 and over the period. The iron and steel industry, however, will consume more energy than in 2020 in the shorter term to 2025, although this consumption is expected to decline to 2020 levels by 2035. Thereafter, final energy consumption for this sector would, once again, rise. The chemicals sector is also expected to have a slightly different energy consumption pattern. The sector's consumption of energy would decrease to 2030 and stay broadly constant to 2040.

The **iron and steel** sector is expected to experience a reduction in energy intensity from 2020 to 2035 but return to 2020 levels by 2040. The sector's energy consumption is expected to decline up to 2035, but rise thereafter. However, carbon intensity does not. This is due to the assumed adoption of new production processes in the iron and steel industry of higher energy intensity and lower carbon intensity – specifically the adoption of hydrogen for direct reduction of iron replacing the process of blast furnace and basic oxygen furnace steelmaking. This result appears surprising but it is not that the hydrogen is less energy

efficient but it is the accounting rules for reporting energy balances from Eurostat that leads to this result.[25]

Figure A5-2: Energy consumption of industry sectors in MIX scenario from 2010 to 2050 (2020=100)

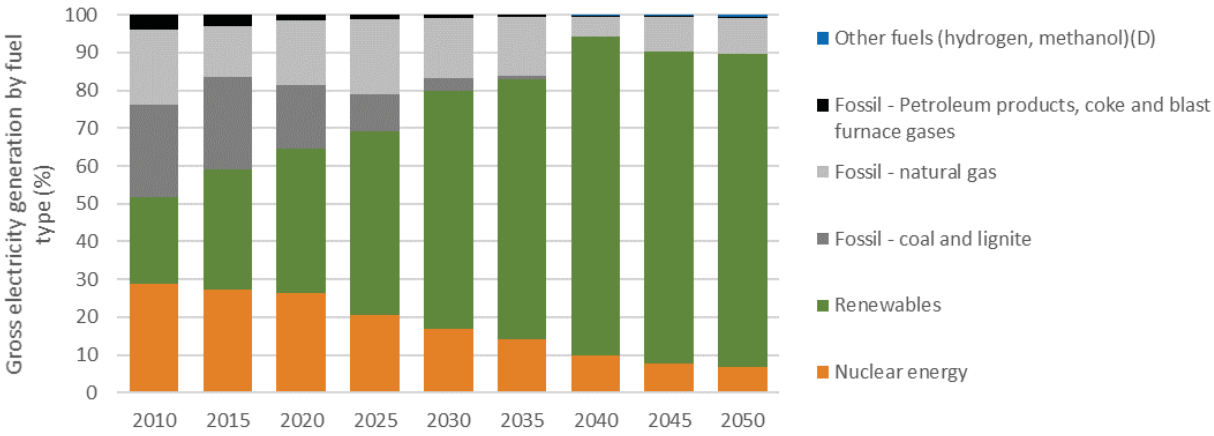


Source: PRIMES

The electricity generation mix by fuel types is expected to show significant expansion of renewable generation (from a range of sources, dominated by wind) to 2040, with commensurate reductions in fossil derived sources (Figure A5-3). The decline in use of fossil fuels for power generation is particularly marked for solid fuels, which drops to 3.5% by 2030 and projected to decline to less than 1% by 2035. Natural gas is assumed to remain present in the electricity mix in 2050 to the tune of 9 to 10%. This will come with a commensurate carbon reduction for those IED sectors using electricity to power their processes.

[25] Specifically, it means that the input used to the blast furnace process is not reported as the final energy consumption of Iron and Steel but reported separately as transformation input in blast furnace plants. The majority of the emissions in the Iron and Steel sector come from the blast furnace and the coke plant. The coke plant produces coking coal, which is used in the blast furnace both as a heat source and to reduce iron. The energy input used in the blast furnace to reduce iron are not reported in the final energy consumption of Iron and Steel but the emissions include these processes. The hydrogen used to reduce iron is reported on the Iron and Steel final energy consumption. Overall there is an increase in final energy consumption and a decrease in emissions as the carbon intensive process of BF-BOF is replaced by a clean process H2-DRI.

Figure A5-3: Gross Electricity generation by fuel type in MIX scenario from 2010 to 2050 (%)

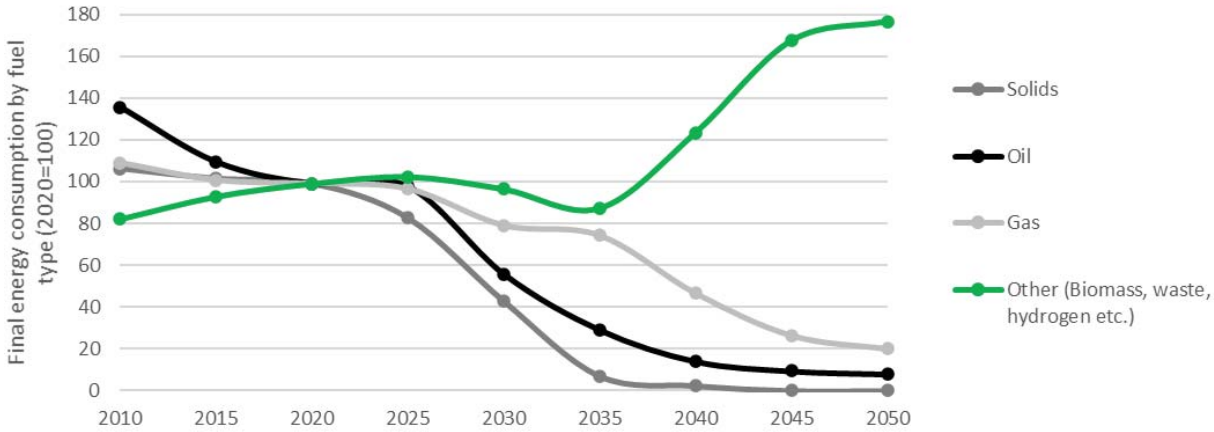


Source: PRIMES

The forecast of **energy consumed by fuel** for all industry sectors in PRIMES suggests that solid fossil fuels and oil will decline sharply over the period when compared to 2020 levels, with solids dropping to near-zero or zero from 2040, and oil down by 90% compared to 2020 levels by 2045. Gas consumption is expected to drop more slowly over the period, whilst consumption of other fuels, such as biomass, waste and hydrogen, is forecast to stagnate in the short-term, even suffer a slight decline in the early 2030s and rise sharply from 2035 onwards (Figure A5-4). This analysis excludes electricity and heat from Combined Heat and Power sources.

Broadly speaking, the reduction in consumption of fossil-derived energy sources for IED sectors would be expected to be commensurate with reduction in combustion related products such as SO_2, NOx and PM_{10}. Where sectors' energy needs switch to being fulfilled by other energy sources (biomass, waste, hydrogen), the relationship is not quite as clear. For those cases where hydrogen, a clean burning fuel, is expected to be used, such as in the steel sector, associated air pollutant emission reductions would also be expected. Where the switch is to biomass, some pollutant emissions deriving from fuel impurities such as heavy metals or sulphur would be expected to decline, whilst others forming over combustion conditions such as NOx would continue.

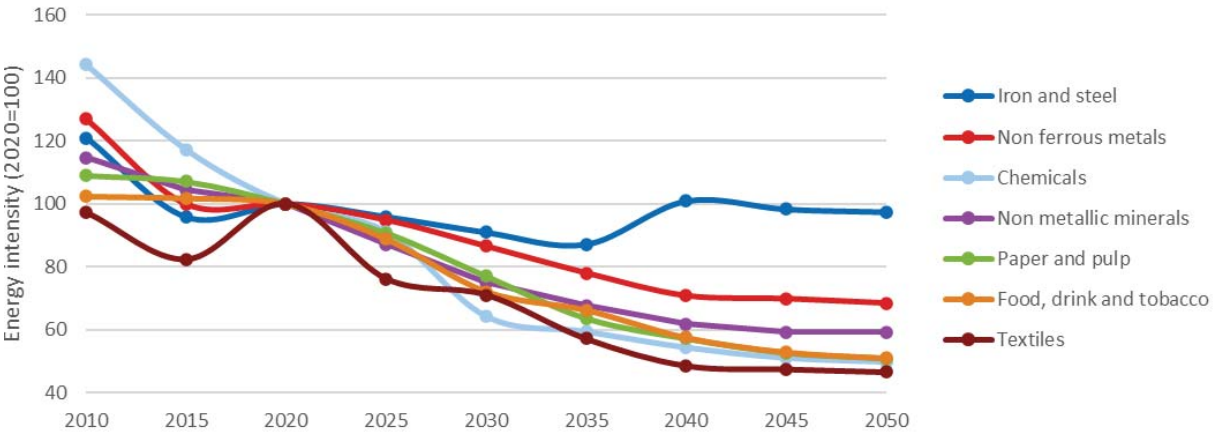
Figure A5-4: Energy consumption by fuel of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

The **energy intensity**, calculated as energy consumed per unit of gross value added per sector, is forecast to decline for most sectors over the period, reaching in the MIX scenario between 50% and 70% of 2020 levels, with the exception of the iron and steel sector as noted above (Figure A5-5).

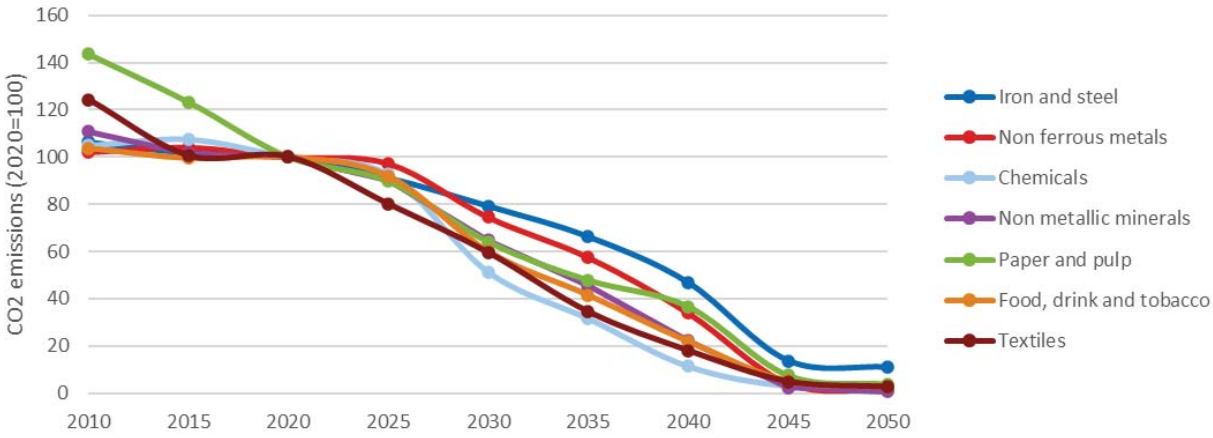
Figure A5-5: Energy intensity of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

Building on this and the expected fuel mix, the associated **carbon emissions** of the industry sectors, is forecast to drop significantly and steadily from 2025 to 2045 after which it is projected to plateau at 3% to 14% of 2020 levels (Figure A5-6).

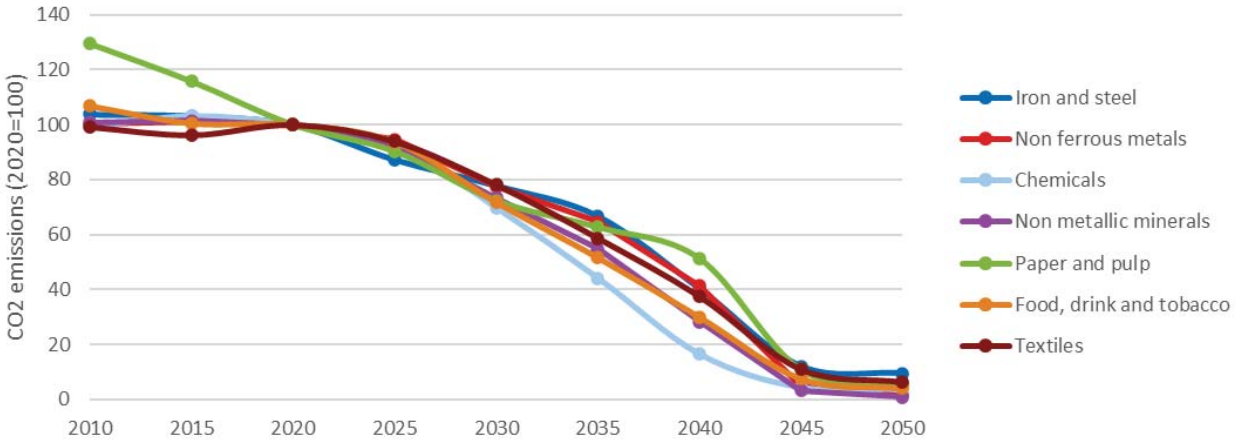
Figure A5-6: Carbon emissions of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

The associated **carbon intensity** of the industry sectors, calculated as tonnes of carbon dioxide equivalent emissions for each tonne of oil equivalent energy consumed per sector, is forecast to drop in both the REF and MIX scenarios, reaching in the MIX scenario between 70% and 80% of 2020 levels by 2030, and 1% to 10% of 2020 levels by 2045/2050 (Figure A5-7).

Figure A5-7: Carbon intensity of industry sectors in MIX scenario from 2010 to 2050 (2020=100)



Source: PRIMES

1.3. BASELINE ASSUMPTIONS FOR SPOTLIGHT SECTORS

For the **iron and steel sector**, the key change assumed in the MIX scenario related to the transformation changes to this sector is the switching away from the carbon-intensive process of steelmaking through the blast furnace / basic oxygen furnace route to a clean process using hydrogen for direction reduction of iron. This is assumed to occur after 2030.

The **cement** industry is expected to reduce emissions significantly when progressing towards 2050 both in terms of energy and process emissions. In the short term period the main options are fuel switching and efficiency improvements. For the medium to long term the following process are envisaged and included in the policy scenario:

- Fuel switch: use of alternative fuels (e.g. refuse-derived fuel, industrial waste, biomass waste) instead of fossil fuels; biomass is already being increasingly used)
- Reduced carbon intensity of processes: process replacement (dry instead of wet), material replacement (use of decarbonised raw material for clinker production and clinker substitution in cement production and reduction of clinker-to-cement ratio)
- Carbon Capture and Storage/Utilisation (chemical absorption, oxyfuel technology, calcium looping) is an option, particularly for remaining process emissions
- Electrification for process heat is challenging (high flame temperature 2 000°C), while plasma technology is under research; expected to occur only at the end of the time period
- Hydrogen is an option under study for use to fire kilns producing clinker

Regarding the oil **refining** industry, in the longer term demand for petroleum based products is assumed to decrease considerably reducing the need for refineries. Hence the number of refineries is expected to reduce over time and remaining refineries to shift their production processes. For the shorter time period waste heat recovery and overall horizontal process efficiency is the main option assumed to reduce energy consumption and CO_2 emissions from refineries. For the medium to long term, the measures assumed include:

- Deployment of Carbon Capture and Storage/Utilisation (oxyfuel combustion)
- Fuel substitution: furnace electrification (under study), hydrogen fuel for combustion in furnaces
- Use of biomass, hydrogen for feedstock substitution

1.4. INDUSTRIAL TRANSFORMATION

At a high level, the graphs in the previous sections suggest that economic growth in all but the textiles sector is expected to rise from 2025, and that this is against a backdrop of declines in energy consumption, energy intensity, carbon emissions and carbon intensity that begin in the 2020s, continue through the 2030s, and largely plateau to projected minimum values in 2040 (energy consumption and intensity) or 2045 (carbon emissions and intensity). Clearly, to continue to achieve sustained sectoral growth but with stark and significant reductions in carbon emissions, transformation changes across these sectors will be needed. This suggests that transformation change for IED industrial sectors that will begin during the 2020s to reach the Fit For 55 ambition targets of 2030 will need to continue along similar trajectories to achieve the overarching 2050 ambition level, and with these elements being achieved from an outcome perspective (GHG emissions) by 2045.

The IED could play a role in helping to cement and continue this transformation, and it has been noted how trends in reducing pollutant emissions would be expected to be correlated with such decarbonisation trends related to the use of fossil fuels, typically affecting NOx, SOx, PM_{10} and heavy metals (e.g. mercury). And it is not just related to fuel switches. The

innovative techniques needed to decarbonise would be expected to also impact on pollutant emissions, further aligning decarbonisation and zero pollution ambitions.

The three case studies described above in section 3 on the iron and steel, cement and refining industries make it clear how innovative and breakthrough decarbonisation techniques in these three energy intensive industries will also in many cases deliver dramatic reductions of overall pollutant emissions to air. Consequently, in the future iterations of BREFs and BAT conclusions of sectors where substantial breakthroughs of decarbonisation techniques have occurred which impact on IED scope (e.g. with effect on air pollutants, water releases, resource consumption etc.), Technical Working Groups (TWGs) may need to set BAT-AELs for pollutant emissions on the basis using those decarbonisation techniques as a reference. If this occurs, the usual IED permit review within four years of BATc publication would occur, potentially triggering the need for investment by industrial operators in decarbonisation techniques that have substantial co-benefits in terms of pollutant emissions or other environmental issues. This means that even if GHG emissions within the ETS scope remain unregulated by the IED, the obligation to apply BAT (i.e., to optimise overall pollution control) would drive investments into what could be considered primarily as breakthrough 'decarbonisation' techniques. In other cases, decarbonisation techniques may have overall negative impacts on pollutant emission and require definition of BAT to address those negative impacts. As one example, several sectors are considering the potential for how carbon capture techniques could be utilised for their decarbonisation pathways. This will consequently require the definition of BAT to address potential environmental issues such as potential leakage.

2. CURRENT STATUS, SCOPE, AND IMPLEMENTATION OF THE IED, AND EXPECTED EVOLUTION

The latest analysis of IED implementation reporting (2018) confirmed the recent status and trends (Ricardo, 2021). The IED implementation reporting is the key source of data and evidence employed to develop our understanding of the baseline for industry sectors at the level of granularity covered by the IED framework (Annex I).

On the number of installations within scope of the IED:

There are around 52,000 installations that fall within the scope of the IED (Table A5-1), of which ~50 300 are in operation. The number of IED installations increased slightly from 2015 to 2017 but declined from 2017 to 2018. The decline in number of IED installations was driven by the following sectors:

- Oil and gas refining installations (10% reduction between 2017 and 2018)
- Ceramic manufacturing (28% reduction between 2015 and 2017)
- Disposal of hazardous waste (19% reduction between 2015 and 2017)
- Landfills (10% reduction between 2015 and 2017)
- Combustion installations (1% reduction between 2015 and 2017 and 2% reduction between 2017 and 2018).

The largest number of installations is reported for 'other activities' owing to the large number of installations for rearing of poultry or pigs (IRPP) – making up around 40% of all the IED installations in the EU.

The changes observed in the total number of IED installations over recent years has not been significant at the EU level.

Table A5-1: Number of IED installations reported by EU27 (except Slovakia) to the EU registry (2018)

	IED activity	2018
1	**Energy industries**	**3 494**
1.1	Combustion	3 193
1.2	Refining	261
1.3	Production of coke	29
1.4	Gasification or liquefaction	11
2	**Metals production and processing**	**5 683**
2.1	Metal ore	31
2.2	Pig iron or steel	239
2.3	Processing of ferrous metals	824
2.4	Ferrous metals foundries	580
2.5	Non-ferrous metals	1 171
2.6	Surface treatment of metals or plastic	2 838
3	**Mineral industries**	**2 411**
3.1	Cement, lime and magnesium oxide	544
3.2	Asbestos	0
3.3	Glass	363
3.4	Mineral fibres	79
3.5	Ceramic products	1 425
4	**Chemicals industries**	**4 983**
4.1	Organic	3 012
4.2	Inorganic	1 087
4.3	Phosphorus-, nitrogen- or potassium-based fertilisers	154
4.4	Plant protection products	124
4.5	Pharmaceutical products	552
4.6	Explosives	54
5	**Waste industries**	**11 374**
5.1	Disposal or recovery of hazardous waste	2 368
5.2	(Co-) incineration of waste	754
5.3	Disposal/recovery of non-hazardous waste	2 796
5.4	Landfills	2944
5.5	Temporary storage of hazardous waste	2506
5.6	Underground storage of hazardous waste	6
6	**Other activities**	**28 262**
6.1	Pulp, paper, or wood-based products	920

	IED activity	2018
6.2	Textiles pre-treatment or dyeing	276
6.3	Tanning	29
6.4	Slaughterhouses, food products and milk	3 875
6.5	Disposal of animal carcasses	364
6.6	Rearing of poultry or pigs	21 309
6.7	Surface treatment	1084
6.8	Production of carbon	61
6.9	Capture of CO_2 streams	7
6.10	Preservation of wood and wood products	104
6.11	Independently operated treatment of waste water	233
	Total all activities	**56 207**

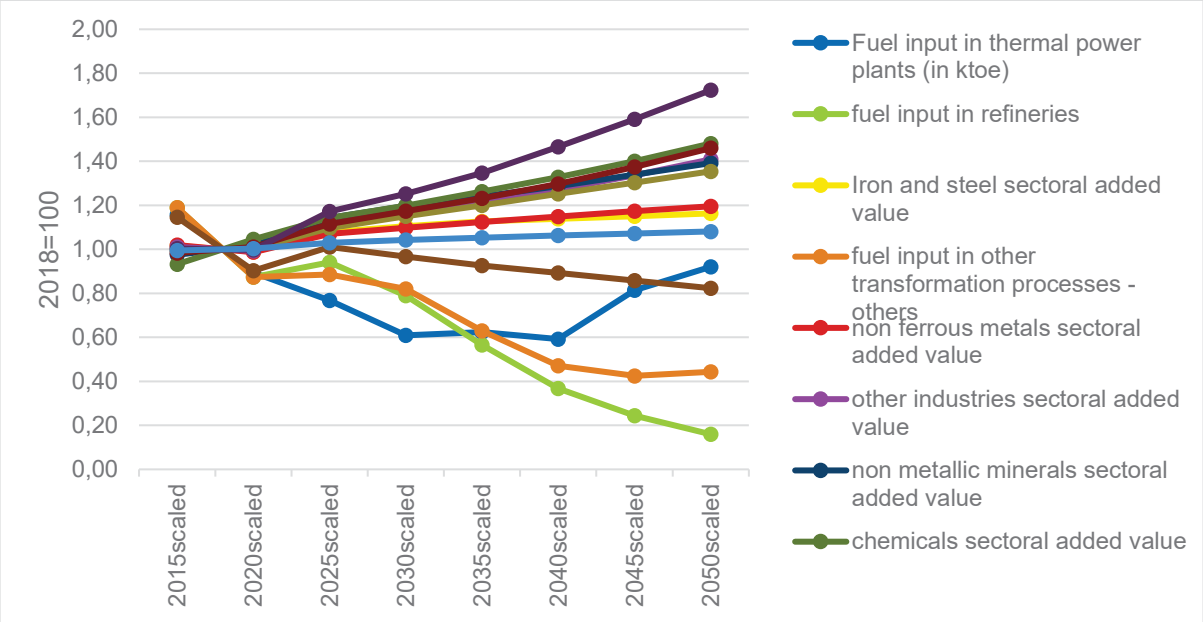
Source: EEA Registry Industrial Reporting Database v4 – version March 2021.

Possible future changes in the number of installations could be forecast to trend with the sectoral gross value added as per Figure A5-1. The number of installations in the baseline of the EU Registry have been projected forward based on their sectoral added value in most cases (source: PRIMES), using the most relevant indicator to each IED activity. The indicators used for this projection are shown below in Table A5-2.

Table A5-2: Indicator used to project number of installations (source: PRIMES)

PRIMES sector	Indicator from PRIMES MIX scenario
Thermal power generation	Fuel input in thermal power plants (in ktoe)
Refineries	Fuel input in refineries
Iron and steel	Iron and steel sectoral added value
Other transformation processes	Fuel input in other transformation processes - others
Non ferrous metals	Non ferrous metals sectoral added value
Other industries	Other industries sectoral added value
Non metallic minerals	Non metallic minerals sectoral added value
Chemicals	Chemicals sectoral added value
Paper and pulp	Pulp and paper sectoral added value
Textiles	Textiles sectoral added value
Food, drink and tobacco	Food, drink and tobacco sectoral added value
Market services	Market services sectoral added value
Agriculture	Agriculture sectoral added value

Figure A5-8: Indicators used to project number of installations, 2018=100 (source: PRIMES)



The results of projecting the installation numbers from the EU Registry to future years are shown in the table below.

Table A5-3: Projected number of installations

IED activity group	2017	2018	2020	2025	2030	2035	2040
1	3 117	3 494	3 124	2 740	2 191	2 180	2 025
2	5 567	5 683	5 629	6 233	6 457	6 662	6 858
3	2 241	2 411	2 451	2 757	2 884	2 992	3 104
4	4 903	4 983	5 208	5 699	5 973	6 288	6 616
5	11 058	11 374	11 305	12 859	13 506	14 165	14 916
6	27 194	28 262	28 339	29 678	30 303	30 907	31 535
TOTAL	**54 080**	**56 207**	**56 055**	**59 966**	**61 316**	**63 194**	**65 054**

On the BREF process and development of BAT Conclusions

The European Integrated Pollution Prevention and Control Bureau (EIPPCB) has led the development of BREFs and BAT Conclusions for the last decade, leading to the publication of around two BAT Conclusions documents each year on average since the inception of the IED. The evaluation of the IED found the 'BREF process' to be largely working well, with previous deficiencies having been addressed through the programme of continuous improvement that the EIPPCB has been running since 2014. It would be expected that the BREF process would continue in this way, with further minor improvements and development of new BAT Conclusions for the remaining IED activities not yet with BAT Conclusions (1st BREF review cycle) and would begin the process of revising BAT Conclusions already published (2nd BREF review cycle).

For the baseline, the BREF process and BAT Conclusions would be expected in the future to continue:

- Being coordinated by the EIPPCB, with Technical Working Groups numbering 60 to 250 people, comprised of the same mix of stakeholders as composed to date (representatives of EU Member States, industry, environmental NGOs, the European Commission, and the EEA and observer countries)
- Identifying the BAT that are most effective for achieving a high level of environmental protection
- Producing BAT Conclusions with BAT-AELs expressed as ranges from lower to upper levels, but with limited identification of which techniques can be used to achieve the lower end of the BAT-AEL ranges
- Not including BAT-AELs on GHGs
- Identifying (but sometimes to a limited extent) BAT-AEPLs (Ricardo et al, 2020) – though this is increasingly common for more recent BREFs e.g., increasingly setting requirements to monitor/manage water resource efficiency. Noting that AEPLs would continue to be viewed as non-binding by some Member States
- Accounting for cross media effects in a rather limited way (Ricardo et al, 2020)
- BREF cycle of 10 years (i.e. 60 BREF reviews to be completed in a period of 20 years)
- Being of the same average duration (3 to 5 years) for new BAT Conclusions, although revisions to existing BAT Conclusions would be expected to be shorter
- Having administrative costs per BREF of around €8m per BREF (range: €3.6m to €20.6m) as estimated in (Ricardo et al, 2020). With the advent of the COVID pandemic, recently the TWG meetings have been online, which may continue to some degree following easing of travel restrictions and which could be expected to have had a minor impact on the administrative costs.
- With a focus on identifying BAT and less emphasis on identifying emerging techniques
- Not quantifying human health and environment benefits of implementing BAT for each BAT Conclusion

On permitting of IED installations:

The IED obligates the operational installations to be permitted. Based on information reported by Member States, the statistics reported on the **proportion of permits issued** were:

- Around 87% of the total installations were reported as having a permit; these data were available split by sector. The Commission is clarifying whether this reflects non-compliance or under-reporting and will take appropriate action;

- The key gaps in permitting were, at a country level, in Germany, and at a sector level, for IRPP. It would be expected that these gaps would diminish in the future baseline with further implementation of the IED.

The most recent analysis of permitting under the IED was limited in the conclusions that could be drawn on the **timeliness of permit reconsidering / updating** due to the data reported. Based on the evidence available, it would be expected that the majority of permits (perhaps around three quarters, although the evidence is not firm) would continue to be reconsidered and, if necessary, updated within the four-year implementation window following the adoption of the BATC.

The costs of permitting were estimated in the IED evaluation for large steelworks at €50 000 to €100 000 per installation (Ricardo et al, 2020, p. 135). The costs for permitting IRPP farm installations was estimated (uplifted to 2020 EUR) to be €8 000 to €9 000 per installation(Amec, 2012). The 2007 IED IA estimated total permit reconsideration costs of €11-40 million/year if reconsiderations occurred every 10 years.

Based on updated information received during the consultation for this impact assessment, the final assumptions on baseline costs for permitting are:

- One-off costs of issuing new permits -public authorities (2020 €):€3 250 - €35 000, with a central estimate of €23 400
- One-off costs of issuing new permits -operators (2020 €): €10 000 - €62 250, with a central estimate of €28 000
- One-off costs of permit reconsiderations and updates -public authorities (2020 €): €1 600 - €17 500, with a central estimate of €11 700
- One-off costs of permit reconsiderations and updates -operators (2020 €) : €1 500 - €31 250, with a central estimate of €14 000

The following already-identified implementation issues regarding the conditions set in permits would be assumed to continue leading to several instances of **BAT-AELs continuing to not being achieved:**

- The majority of permit ELVs will continue to be set at the upper end of the BAT-AEL range
- A negligible number of installations would have permit ELVs set to achieve greater emission reductions than those achievable by the use of BAT in the adopted BATC
- Permit ELVs are sometimes set above BAT-AELs (Ricardo et al, 2020)
- There is variation among Member States in how flexibilities offered by the IED are interpreted and taken up
- This includes derogations under Article 15(4). A proportion of installations would be granted **derogations under Article 15(4) -** For the year 2018, 133 Article 15(4) derogations were reported for 98 installations; this has increased in reporting year 2019 to 203 derogations for 130 installations. This increasing trend would continue as

BAT conclusions are implemented in permits. The following was observed for reporting year 2018**:**

- Derogation durations extend up to 10 years, and with some granted seemingly without end points
- The proportion of installations granted derogations will vary by BREF (e.g., 83% of derogations reported in 2018 as granted were for two BREFs)
- The proportion of installations granted derogations will vary by country: around half of Member States have granted derogations for selected cases, but 40% of derogations reported in 2018 as granted were for one Member State)
- The degree of public access to at least some information regarding derogations would continue to be available for two thirds of Member States granting derogations, and relatively limited number of Member States providing full justification of their reasons for granting derogations

Access to information on permitting would continue to vary by Member State. Whilst the evaluation of the IED concluded that central permit repositories have been developed and used at national level for 19 Member States, for the remaining Member States the coverage is either partial (e.g., provided at regional level for some regions) or missing. Where information is provided publicly about installations, the ease of access to permits would continue in the future to be hampered by (Ricardo, 2021):

- The format of the documentation sometimes being non-searchable scanned PDFs
- Having multiple permits and permit documents for each installation
- Being without standardised structure and content of the permit documentation, leading to variation not only by Member State but also by region within a Member State.

The costs assumed in the baseline are:

- Annual costs for managing information and systems -public authorities (2020 €) €100 - €3 000 with a central estimate of €2 000

On monitoring and reporting

All IED installations' permits must include suitable emission monitoring requirements (Article 14(1)c). All IED installation operators are obliged to supply the competent authority regularly, and at least annually, with emissions monitoring results (Article 14(1)d).

In the IED evaluation, estimates of the costs of monitoring for installations ranged from €15 000 to €50 000 per year per installation (Ricardo et al, 2020). Based on evidence provided by stakeholders engaged, lower costs than this are to be expected. The costs would be expected to continue going forward on an annual basis.

The current access to monitoring data would be expected to continue without further action. Based on 2018 reporting, around half of the Member States have made emissions monitoring data available online for at least some installations, and in varying formats. Only two Member States have, to date, used central permit repositories to publish emissions monitoring data to help facilitate access to the reports at installation level, and only one Member State

uses a common report template to facilitate access. Other variation in implementation among Member States that potentially hampers ease of access to monitoring data includes (Ricardo, 2021):

- Making data only available upon request (3 Member States)
- Publishing data on restricted webpages that are not publicly accessible (3 Member States)
- Using a database for emissions monitoring data that is independent from other installation documentation (2 Member States)
- Publishing reporting only for some regions in a Member State (2 Member States)
- Publishing annual reports on emissions monitoring data independently from other installation documentation (1 Member State).

The costs in the baseline for monitoring and reporting have been assumed to be:

- Annual monitoring and reporting costs-operators (2020 €): €150 - €12 000 with a central estimate of €8 000

On compliance and enforcement:

Regarding compliance assessment, there is variation among Member States in how compliance assessment is carried out, leading to variation in the stringency of compliance (e.g. if and how measurement uncertainty is accounted for when comparing monitoring results to permit limit values). Without action to harmonise this variation, it would be expected to continue.

Regarding inspections, on average, around half of installations receive an environmental inspection each year (Ricardo, 2021). This would be expected to continue without action. There is wide variation among Member States and among sectors as to the average frequency of inspections, with some Member States inspecting every installation every year, and others less frequently. (It isn't possible to conclude with the information already reported on whether the environmental risks posed by installations would require inspections more often than every 3 years.[26]). Inspection costs range from €15 000 to €30 000 each (Ricardo et al, 2020); lower costs were provided during this impact assessment study; the costs would be expected to continue.

As to making public the information related to compliance and enforcement, the information available online to the public regarding site visit reports would be expected to remain limited in its relevance, and varying by Member State, as per the current status (Ricardo, 2021). The information available online to the public regarding emission monitoring data will also remain limited in its relevance, and varying by Member State (Ricardo, 2021).

[26] IED Article 23(4): 'The period between two site visits shall be based on a systematic appraisal of the environmental risks of the installations concerned and shall not exceed 1 year for installations posing the highest risks and 3 years for installations posing the lowest risks. If an inspection has identified an important case of non-compliance with the permit conditions, an additional site visit shall be carried out within 6 months of that inspection.'

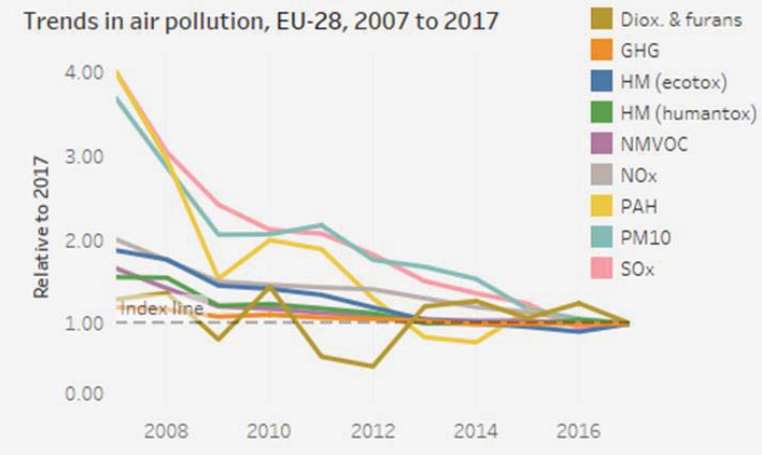
The costs in the baseline for inspections have been assumed to be:

- Inspection costs every two years -public authorities (2020 €): €500 - €12 000 with a central estimate of €9 600
- Inspection costs every two years -operators (2020 €): €125 - €5 000 with a central estimate of €4 000

On contribution to emissions

The evaluation of the IED (Ricardo et al, 2020) confirmed that, under the IED, industrial emissions to air and releases of water pollutants have generally decreased in recent years (Figure A5-9). Furthermore, these reductions of key pollutants have been shown to have occurred against a backdrop of economic growth (Ricardo et al, 2020).

Figure A5-9: Indexed emissions to air for industry (EU-28)



Note: The data emissions reported by NFR codes which do not include thresholds for reporting (whereas some IED activities do). Source: (Ricardo et al, 2020) *and originally from EEA* (2020) *[data source: CLRTAP]*

Despite these declines, industrial sectors remain key sources of air pollutants. Based on the UN-ECE's Convention on Long-Range Transboundary Air Pollution (CLRTAP), national emission inventory reporting (which doesn't align precisely with the IED Annex I sectoral scope), industrial sectors were responsible in 2017 for over half the emissions to air of CO_2, SOx, NMVOC and the heavy metals cadmium (Cd), mercury (Hg) and lead (Pb) and were key sources of NOx (32%) and PM_{10} (28%) (Ricardo et al, 2020). The IED currently regulates about 5% of the total methane emissions in the EU-27, a fraction which mainly originates from waste management (other than landfill sites), wastewater treatment and from rearing of pigs. Overall for the whole of the EU economy, methane represents about 10% of GHG emissions.

With the continued development of further BAT conclusions for IED sectors, and the continued implementation of the IED with permit ELVs based on BAT, and the decoupled nature between industrial sector gross value added and emissions, it would be expected for the sectoral emissions from IED industries to decline further over time.

To try to estimate at a very high level the typical (or possible) emission reductions for a sector as a whole associated with implementation of BATCs for key environmental issues (KEI), specific analysis on three sectors has been conducted. This has focussed on three sectors (pulp/paper, cement, glass) for which the sectors have completed the four year implementation period following BAT Conclusions publication. Emissions data for three pollutants identified as KEI for each of these sectors have been extracted from E-PRTR and benchmarked against the activity (production) statistics reported for these sectors. The findings of this analysis, shown in Figure A5-11, suggest that reductions in emissions intensity (emissions per unit of production) dropped following implementation of the BATC by 37% to 67% (average 47%), with annual average reductions of 7% to 14% (mean 10%).

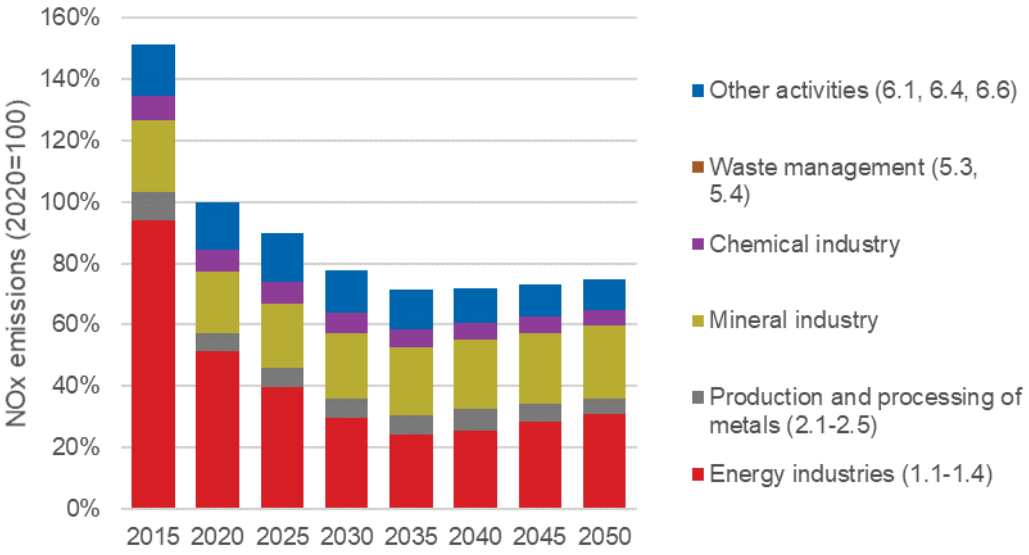
Specifically, Figure A5-11 shows for the pulp and paper sector that most or all of the emission reductions appeared to occur prior to the 4 year BATc implementation period concluded. In contrast, for the glass sector, the figures suggests that a large proportion of the emission reduction occurred after the 4 year implementation period concluded, which may be consistent with the larger than average number of derogations granted for the glass sector, which would have acted to delay the compliance date. For the cement sector, emission reductions occurred both before and after the 4 year implementation period.

A second version of a BREF (and BAT conclusions) for a sector would not be expected to have such significant impacts on emission reductions as the first BAT conclusions. Following BATc implementation, it would be expected for there to be less divergence among installations' emissions performance. Hence the percentage emission reductions identified as having occurred in the sector during the period of (first) BAT conclusions implementation (averaging 47%) would be unlikely to be achieved for a subsequent (second) BAT conclusions, unless transformational techniques (or processes) were identified as part of that BREF process.

The projected continued decline of carbon emissions in the baseline would be expected to be commensurate also with continued reductions in other key air pollutants, particularly for those processes involving combustion of carbonaceous fuel.

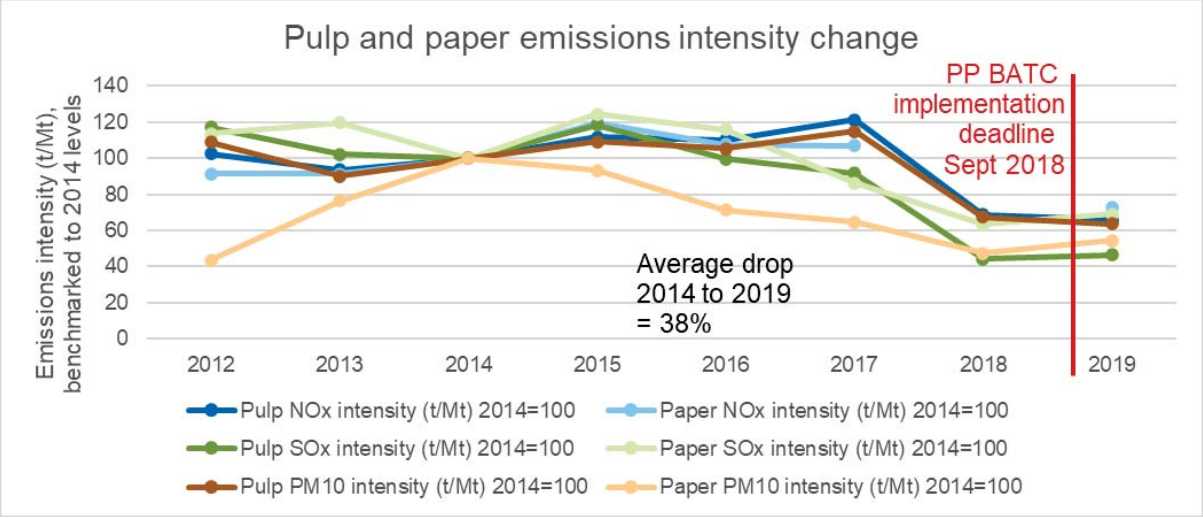
However, as part of the Commission's Fit for 55 policy package, NOx emission projections were undertaken by IIASA using the GAINS model. Mapping the sectoral split from those projections (reported against UNFCCC CRF sector) to the IED activity groups from Annex I (energy, metals, minerals etc.), and excluding the emissions from sectors outside the IED scope, has allowed the emissions projections shown in Figure A5-10 to be developed. It is important to note that not all the IED activities are directly represented by CRF sectors on a 1:1 basis, and some smaller activities under IED activity group 6 are excluded. The results nevertheless cover the majority of the larger polluting industries and show substantial declines forecast in the MIX scenario from 2020 through to 2035, after which the decline reverses and NOx emissions increase again, driven primarily by the energy industries, suggesting the need for further longer-term policy action to have effect from the 2030s.

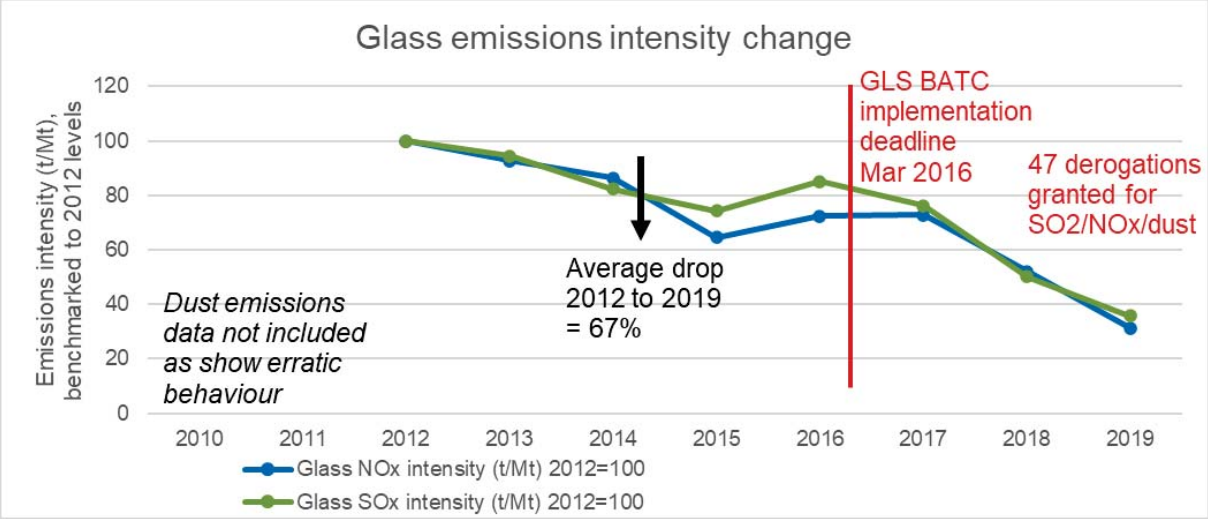
Figure A5-10: MIX scenario NOx emissions projected by the GAINS model to 2050 (2020=100)

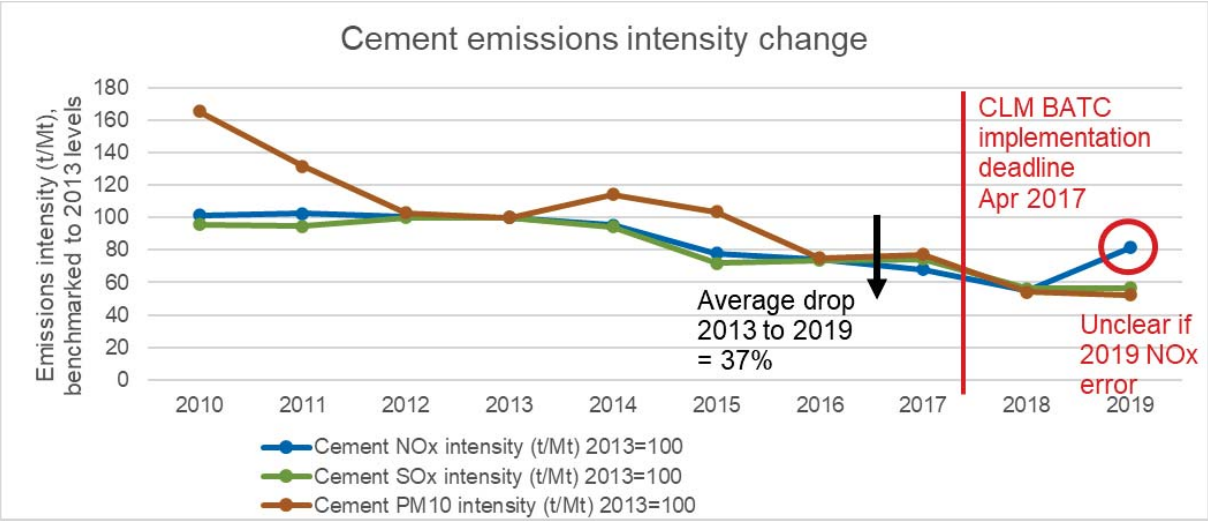


Source: GAINS

Figure A5-11: Analysis of emissions intensity of key environmental issues of SO2, NOx and PM10 emissions as (source: this report)







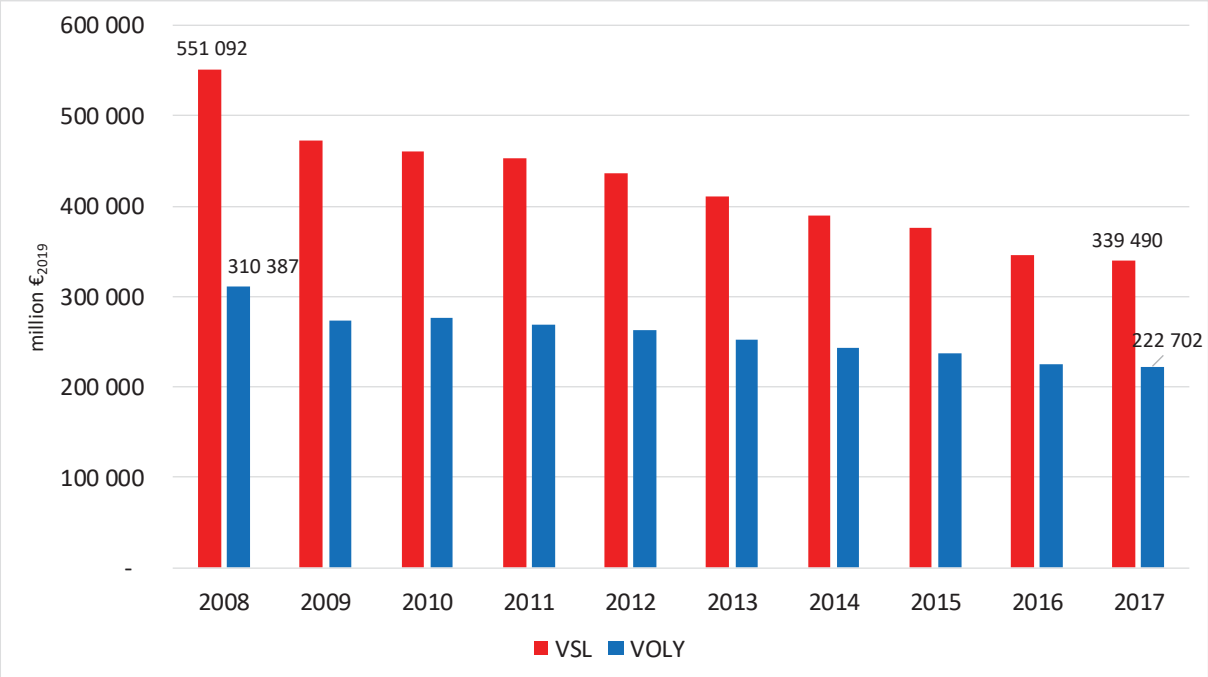
Estimating the future reductions in pollutant emissions has not been carried out, although the estimated carbon intensity reduction has been estimated.

On the costs of air pollution from industrial facilities

These trends in the reductions in emissions are reflected in analysis conducted of the aggregate damage costs of the air pollutants released from industrial facilities. Based on emissions data from E-PRTR, for a consistent set of ~5 000 facilities over the period 2008 to 2017[27], work by the EEA (Schucht, et al., 2021) has shown reductions in the total damage costs by around 30% over this period, when aggregating the damage costs for main air pollutants (NH_3, NOx, PM_{10}, SO_2, NMVOCs), greenhouse gases (CO_2, CH_4, N_2O), heavy metals (As, Cd, Cr, Hg, Ni, Pb) and organic pollutants (benzene, dioxins and furans, PAHs). This is shown in 12. Again, these trends would be expected to continue beyond 2017.

[27] Note that these costs are for only 5000 facilities for which consistent time series are available. The overall damage costs are higher when considering all installations reporting in one year.

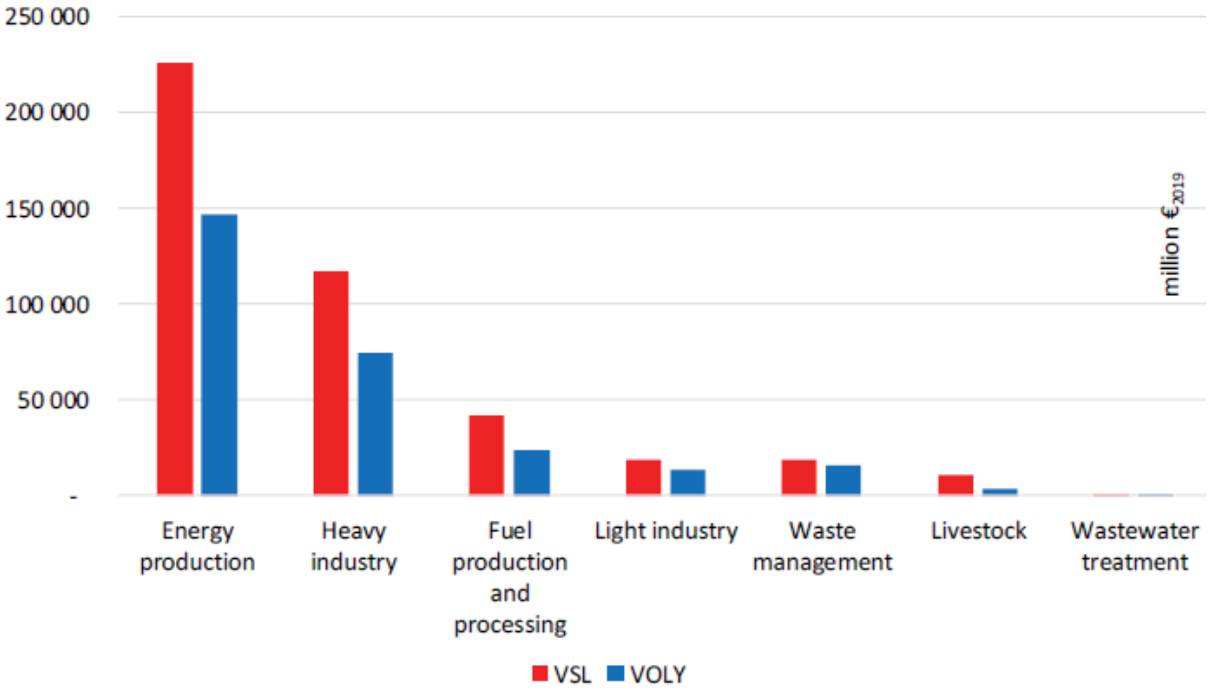
Figure A5-12: Damage costs aggregated over the four pollutant groups from 2008 to 2017 (million €2019) – identical facilities reporting over the whole period



Source: (Schucht, et al., 2021)

Figure A5-13 shows these damage costs presented split by EEA sector for year 2017. The largest contribution to damage costs arise from energy production, followed by heavy industry, then smaller contributions from other sectors.

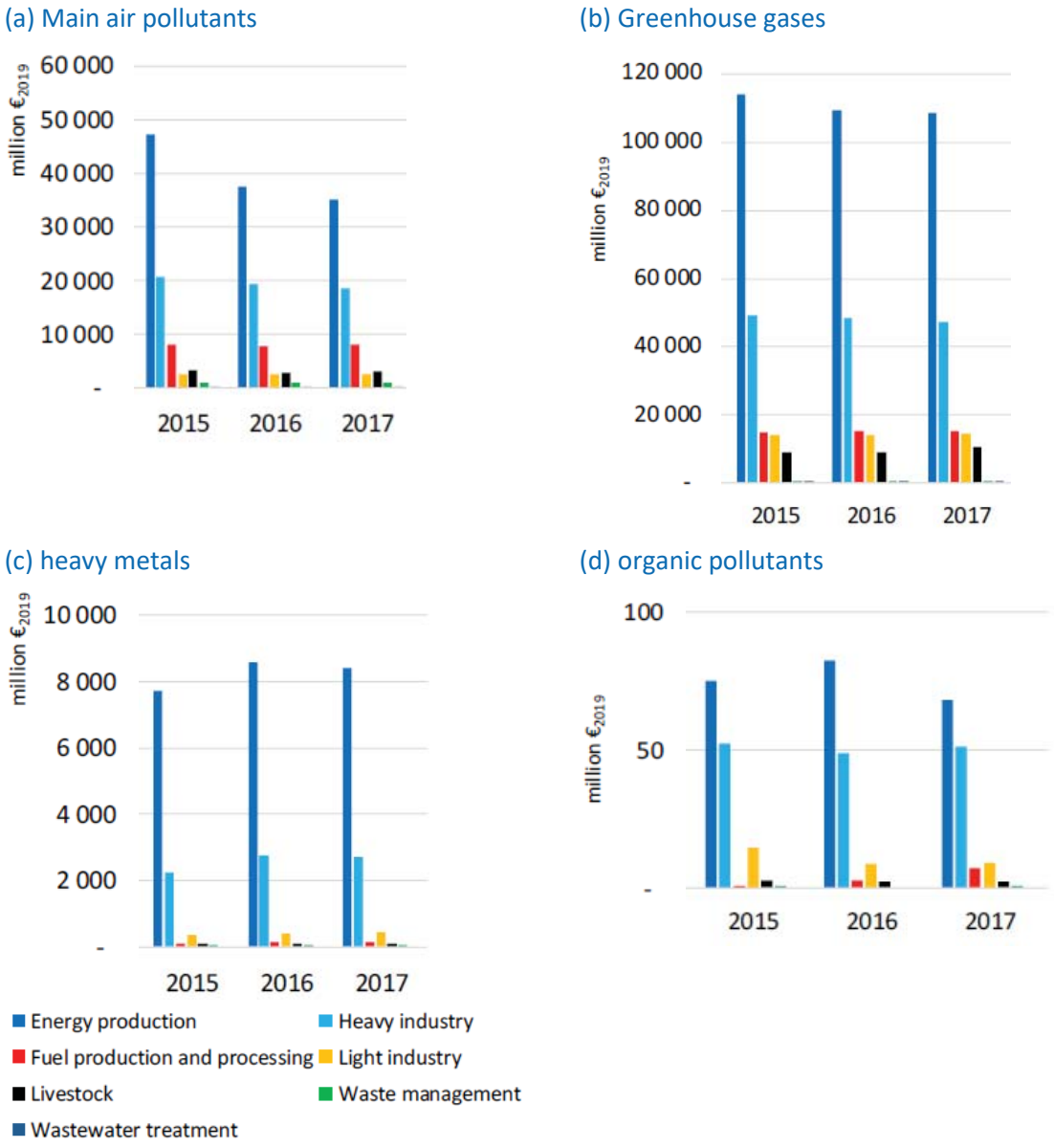
Figure A5-13: Damage costs by EEA sector aggregated over the four pollutant groups for 2017 (million €2019) – identical E-PRTR facilities reporting over the whole period



Source: (Schucht, et al., 2021)

Further information on the split of total damage costs from all sources, split by sector and by pollutant group are also presented in Schucht et al. (2021), and reproduced for years 2015-2017 in Figure A5-14. This information suggests that the majority of the total damage would appear to come from IED related activities, and that the dominant valuation comes from GHG impacts (total ~€190-200 bn/year), followed by the impact of the main air pollutants (~€65-70 bn/year), then heavy metals (~€11 bn/year) and finally from organic pollutants (~€0.1-0.2 bn/year).

Figure A5-14: Damage costs for each of four pollutant groups from 2015 to 2017 (million €2019) split by sector – note different scales for each panel chart



Source: (Schucht, et al., 2021)

Given that the largest component of the damage costs from industrial facilities is from GHG emissions, and that the baseline projection of carbon emissions (Figure A5-6) is estimated to fall significantly between 2020 and 2045, the overall damage costs from industrial facilities would be expected to drop considerably in the baseline from the 2017 figures presented

above up to 2045. In addition to the baseline projection of carbon emissions, downwards trends in main air pollutants would also be expected over this period.

3. EVOLUTION OF THE SECTORS NOT COVERED BY THE IED

Without action, the drivers behind the problems described would continue to be present. Further information is provided here for those sectors not currently under scope of the IED, but which are considered in problem area 5 as possible additional coverage.

Some agro-industrial activities that pollute the environment would remain outside the IED and not subject to pollution control. The agro-industrial activities that are polluting the environment, but which are not covered by the IED would continue with business as usual. Specifically, the factors affecting the baseline of these activities in the absence of change to the IED are listed in Table A5-4.

Table A5-4: Factors affecting future evolution of sectors considered for possible additional scope expansion of the IED

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
Cattle farming	• The number of cattle farms has been declining over time in most EU Member States[28] whilst cattle production has remained broadly static over the last 15 years[29].Hence an intensification of the farming practices has occurred over time and would be expected to continue. • The size of milk-cows rearing installations is increasingly growing with a large concentration of animals. The current and future CAP does not and will not have impact on those large animal rearing installations because they do not receive the direct payments (as they do not have agricultural land) and the conditionality cannot be applied to them. Whereas the Member States can address environmental, climate and animal welfare issues related to those installations through other EU and national legislation. • The variation across Member States in regulating cattle farming would continue (no level playing field). • Some Member States may need to implement additional measures addressing cattle farming emissions to meet NECD obligations, as well as to address methane emissions as part of climate targets and due to its contribution to air pollution as ozone precursor. • It may be more challenging (costly) to deliver the objectives of the Methane Strategy[30] at EU level without EU wide control of methane from cattle farms.	• 84 000 (>150 LSU) • 19 600 (>300 LSU) • 8 000 (>450 LSU) • 4 200 (>600 LSU)	• **Climate**: CH_4 emissions and to a lesser extent N_2O emissions. agriculture makes up 13% of EU27 GHG emissions; two major sources of methane, enteric fermentation (livestock) and manure management are the major components of this. Enteric fermentation of feed in the stomachs of livestock (particularly cattle) is the largest single source of CH_4 in the EU • **Air quality**: NH_3 emissions. Two thirds of EU27 total NH_3 emissions are from livestock. • **Water quality**: nutrient loading (nitrogen and phosphorus from animal excreta); organic matter (oxygen demanding substances such as livestock excreta); pathogens (E coli etc); metals (selenium etc) and emerging pollutants (drug residues, hormones and feed additives).

[28] Source: Eurostat table ef_olslsureg https://ec.europa.eu/eurostat/web/products-datasets/-/ef_olslsureg
[29] Source: Eurostat table apro_mt_lscatl http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=apro_mt_lscatl&lang=en
[30] COM(2020) 663 final

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
Aquaculture	• The EU supports developments in the sustainable aquaculture sector through structural funds, e.g. European Maritime and Fisheries Fund for the period 2014-2020. In this most recent period, public funding per value of farmed fish has doubled compared to 2000. • The EU supports a more sustainable and competitive aquaculture sector for the period 2021 to 2030 (EC Communication COM(2021) 236 final of 21 May 2021). This will be supported through the new European Maritime Fisheries and Aquaculture Fund (EMFAF). • EU production volume in 2016 was 8% lower than in 2008, yet the value of the farmed products rose by 39%. Also, the gross value added of the sector to the economy, number of enterprises and employment rose between 2008 and 2016 (Guillen et al., 2019)[31]. The demand for seafood is expected to increase and it is expected that European aquaculture can help to meet that demand. • At the same time, the sector contributes to nutrient emissions (N and P). The share of the sector's total releases of nitrogen and phosphorous compared to the total for sectors reporting under the E-PRTR is approximately 3% and 5%, respectively. Other environmental impacts from the sector relate to the introduction of non-indigenous species, organic matter, contaminants including pesticides and litter, the disturbance to wildlife, and the possibility for escape of farmed fish.	• 55 to 250 installations of production capacity >1 000 tonnes/year • Total of 15 000 installations	• **Water quality**: nutrient loading, caused by excessive release of Nitrogen and Phosphorus into the natural environment, leading to eutrophication • **Other**: Introduction of non-indigenous species
Mining / quarrying industries	• Waste from mining and quarrying is regulated by Directive 2006/21/EC on the management of waste from	• About 700-900 installations	• **Air quality**: dust emissions (c. 4.4% of total industrial emissions covered by the IED in 2019 (E-

[31] https://www.sciencedirect.com/science/article/pii/S0308597X18309400

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	the extractive industries • Demand for critical minerals and base metals is set to soar over the next two decades as the world pursues carbon neutrality goals; expected rise by as much as 6 times. It is the clean energy transition that drives mineral demand growth. Recycling will not be providing sufficient amount of the secondary raw materials in the short to mid-term to supply emerging applications that are needed for greening the economy, therefore the supply of primary materials will remain crucial, continuing to place demands on specific mining from installations in the EU, and from outside of the EU[32]. • Environmental pressures from mining and quarrying activities relate to air emissions (dust), surface water pollution, waste and emissions to soil and groundwater, notably with regard to heavy metals, noise and vibrations. Furthermore, the activities can have an impact on the structural stability and biodiversity. • Mining and quarrying installations may lead to substantial emissions of PM10 equivalent to around 4.4% of total industrial emissions covered by the IED (based on E-PRTR data).	(metallic and industrial minerals)	PRTR, 2019), and to a lesser extent combustion products (NOx and SOx, with a potential contribution of c. 0.85% to 1% depending on the year assessed (E-PRTR, 2017-2019).), • **Noise and vibration** • **Water quality**: suspended particles, metals, metalloids, other dissolved substances • **Soil quality**: releases to groundwater • **Resources**: water consumption • **Other**: Habitat degradation
Upstream oil and gas industries (extraction)	• EU Methane Strategy was adopted in October 2020; as part of fulfilling this strategy, an EC proposal is forthcoming in 2021 to address methane leaks in the energy sector. • Several offshore installations would remain within the scope of the E-PRTR, owing to the exceedance of capacity	• 1 000 to 2 000 installations	• **Climate**: source of CH_4 emissions (fugitive, venting) and CO_2 (flaring). OSPAR inventory provided details of 12.7kt CH_4 in 2017 from 133 installation, equivalent to ~1.6% of total CH4 reported to E-PRTR from IED sites. • **Air quality**: source of PM2.5, NOx, SO2, NMVOC.

[32] EU raw materials policy as expressed in COM (2020)474, COM (2021)350 final, SWD (2021) 352 final

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	thresholds for other activity definitions, such as thermal combustion. • The best practices in this largely international/multi-national industry that have environmental benefits, but which are driven by health and safety regulations, would continue. • Conventional offshore oil and gas extraction is contracting as a sector, although potential for unconventional gas to expand. • Baseline scenario projections (REF) suggest that, compared to 2020 levels, EU production of oil will be 10% lower in 2030 and accelerating to 40% decrease in 2040. For natural gas, the EU production is expected to drop by 20% by 2025 compared to 2020 levels, and then remain at this level to 2040 (source: PRIMES). • Emissions from the sector would drop in parallel to the contraction of the sector.		LRTAP reported data for EU27 for year 2019 from fugitive emissions as well as emissions from venting and flaring of 0.2 kt of $PM_{2.5}$, 8.1 kt of NOx, 18 kt of SOx, and 102 kt of NMVOCs. • **Water quality**: chemical and oil spills to water • **Soil quality**: metals and sulphates, and other chemical releases • **Resources**: chemical consumption • **Waste**: Extractive waste can contain chemical residues including nitrates, cyanides, xanthates and residues of caustic soda
Battery production	• The use of batteries will be a major contributor to reducing emissions in the mobility and energy storage sectors. • Battery manufacturing is expanding significantly due to increased demand from the electrification of road transport primarily, but also due to increased use of batteries in other transport modes, personal electronic devices and home energy storage. • The total production capacity in the EU ranges between 69.5 and 143.5 GWh. Plans have been revealed to build more than 20 large-scale battery factories in the EU in the coming years, with an expected production capacity of 600 GWh. • The main environmental pressures from the sector are	• 45-95 expected future installations of production capacity >1GWh/year by 2040	• Water quality • Soil quality • Water consumption • Waste generation

Activity currently outside IED scope	Factors affecting baseline of these sectors in the absence of IED policy action	Approximate number of installations	Key environmental issues
	energy consumption, use of hazardous substances, water pollution and waste management, use of raw materials / circularity of the materials used and re-manufacturing of products.		
Ship building (other than coating) and ship dismantling	• Most of the world's shipbuilding capacity is outside of the EU. The largest ships worldwide are typically constructed in shipyards in the Far East. Nevertheless, there are shipyards in the EU, and the decarbonisation pathway for the shipping industry is expecting to demand greater uptake of efficiency measures in new ships, and alternative designs to accommodate alternative fuels. This could provide an increase in the rate of ship building in the EU, but it is unclear whether this potential additional demand would be met outside of the EU..	• 175 to 325 installations (best estimate: 275)	• **Air quality:** metal working activities, which includes: thermal metal cutting (emissions of dust and hazardous air pollutants associated with the fumes); welding (emissions of GHG, toxic chemicals, O_3, dust, CO, NOx, SO_2 and Pb); and, grinding (emissions of harmful pollutants present in the abrasive tools/materials and substrates). • **Water quality:** from ship maintenance and repair activities, such as bilge and tank cleaning. Similarly for ship dismantling, as well as various pollutants entering the environment: oils; toxic paint chips and dust; and hazardous materials such as asbestos and heavy metals. • **Waste**: the management of waste water and waste and accidental releases.
Downstream ferrous metal processing activities of forging presses, cold rolling, and wire drawing	• No specific information on the potential underlying trends for demand in these specific processes • These activities would continue to have an impact on energy use, noise, emissions to air, GHG emissions, and resource consumption.	• 250-400 installations	• Air quality • Water quality • Water consumption • Waste generation

4. CURRENT STATUS, SCOPE, AND IMPLEMENTATION OF THE E-PRTR, AND EXPECTED EVOLUTION

1.

This section provides an overview of the information items required for the definition of the baseline.

4.1. NUMBER OF REPORTING INSTALLATIONS BROKEN DOWN BY SECTOR, MEDIA AND POLLUTANT

Figures 15 and 16 below present the current status of reporting to the E-PRTR. The baseline numbers were sourced from V4 of the EEA's industrial reporting database. The number of reporting facilities is based on data reported to the EU Registry, which is not impacted by pollutant thresholds, and where available, data reported for reporting year 2019 were used. However, 2019 data were not available for all countries, 2018 data were used for Italy and 2017 data were used for Lithuania, Portugal and Slovakia. The number of releases and transfers were based on data reported to the integrated E-PRTR/LCP reporting and, as with the number of facilities, data from reporting year 2019 were used where available. However, 2018 data were the latest available for Italy and 2017 data were used for Germany, Latvia, Lithuania, Portugal and Slovakia.

Figure A5-15: Facilities reporting to the EU Registry / E-PRTR

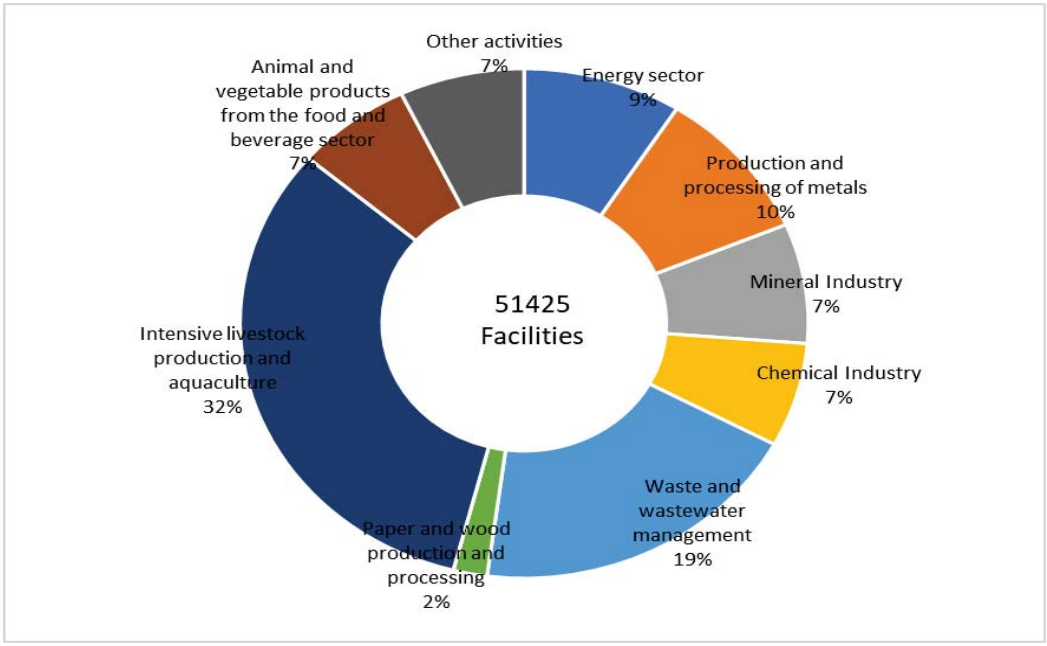
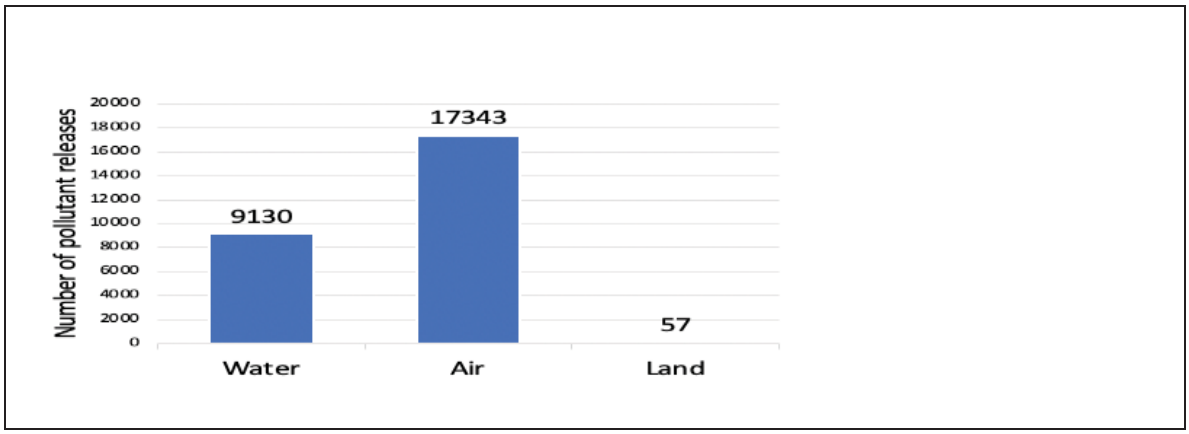


Figure A5-16: Number of pollutant releases reported by medium



4.2. ADMINISTRATIVE BURDENS

The administrative burdens associated with the requirements of the E-PRTR Regulation derive from the following activities: data collection and reporting for the operators, quality assurance and data management for Member States competent authorities and the EEA, with the later bearing the costs for website maintenance too.

The EU Standard Cost Model estimates the costs of these tasks as:

Administrative cost = Σ P x Q
where P (for Price) = Tariff x Time;
and where Q (for Quantity) = Number of businesses x Frequency

In relation to the reporting under the E-PRTR, the costs elements are:

- Tariff = hour salary for relevant staff
- Time = hours to perform the reporting activity
- Number of businesses = number of facilities that have to report
- Frequency: once per year expect for measures/options including more frequent reporting

At the generic level, reporting activities also comprise one-off costs, which relate to adapting the data collection, calculation and reporting systems, training, instruction and similar activities needed to enable the annual reporting. For one-off costs, the frequency is one, otherwise the costs are estimated with the same formula used for recurrent reporting costs.

Table A5-5 describes the assumptions and values used for the definition of the baseline and the options assessment.

Element	Value	Reference
Salary rate	40 EUR/hour	Rate for professionals - Eurostat data
Discount rate	4%	Better Regulation Guidelines
Lifetime of one-off activities	20 years (unless specified for a particular activity)	Expert assumption – used for annualising one-off costs.

The specific administrative costs include the following elements:

- Business: Reporting by facilities
- Member State CAs: Data checking and QA
- EEA
  - Data checking
  - Publishing new data or revising webpages by EEA

Reporting costs for business

To estimate the time required for reporting, results from the evaluation were used and this points to around 22 hours per operator (facility) per year. Findings from the targeted stakeholder survey (TSS) suggests resource use that is slightly higher than this estimate. There are specific data from the Netherlands that have estimated the total costs for all operators at €12m per year. As the Netherlands have about 3,400 facilities, the average annual costs per facility is in the order of €3,500. This is somewhat higher and corresponds on average to about 70 hours per facility per year.

It is therefore assumed that the average for an EU facility is somewhere between the 22 and 70 hours referenced above. Hence, 50 hours is assumed to be representative of a medium complexity facility, where complexity for a reporting facility is determined at a sector level, considering factors such as:

- Likely number of activities and processes per facility;
- Number of plants / installations;
- Number of stacks;
- Number of pollutants to be reported per environmental media; and
- Number of waste / waste water transfers.

It is assumed that a low level of complexity requires half the resources as the medium level, while high complexity is double the hours used for medium complexity reporting. The estimated hours per facility are therefore:

- Low complexity reporting: 0.5*50 hours = 25 hours
- Medium complexity reporting: 50 hours
- High complexity reporting: 2* 50 hours = 100 hours

Testing of cost assumption through stakeholder focus group

The estimated unit costs and supporting assumptions have been tested with a focus group. Stakeholders generally felt that the order of magnitude seemed right. There could be very complex installations where the reporting costs could be higher than that has been estimated. It was also noted in the focus group discussion that, in addition to the level of complexity of the facility, the degree of automated reporting IT infrastructure is important. Gathering data manually can be very time consuming so the presence of automated systems (often in the more complex facilities) reduces the reporting costs. There are no data on which type of facilities has, or is more likely to have, such automated reporting systems.

Data management by Member State CAs

Data from the TSS covers estimates from 12 Member States and provide a basis for assessing the average costs. Though not all Member States are represented, the data cover both small and large Member States, as well as the regions.

Based on these data, the average number of working days per facility has been calculated. The estimate is 0.4 working day per installation, which is equivalent to about 2.8 hours per installation. The resource use for CAs can be estimated using similar assumptions to those used for operators: low level of complexity implies half the number of hours than for the average facility and high level of complexity means twice the resource use.

Data management by EEA

The activities that the EEA performs in relation to the E-PRTR includes:

- Managing the IT systems
- Developing and maintaining the reporting tools
- QA/QC of the data reported by Member States
- Support to Member States
- Use of data and publication.

The estimates of resources and costs are presented in the table below.

Table A5-6: Unit costs for CAs for a new activity adding new facilities

Activity	Resource use in FTE	Costs in €
IT	1	100,000
Reporting tools	0.2	18,750
QA/QC	0.9	93,750
Support to MS	0.4	37,500
Use of data and publication	1.0	100,000
Total	3.5	350,000

4.3. DATA QUALITY BASED ON EEA VERIFICATION ACTIVITIES

ICF et al. (2020) assessed the quality of reported information and drew some recommendations for improvements. There are three method classes (Measurement, "M"; Calculation, "C"; or Estimation, "E") used to categorise reported data. The type of release quantification method used (method class) can have a significant impact on the quality of values reported to the E-PRTR. Measurement and Calculation are usually more accurate than Estimation. However, over 50% of Measurement and Calculation reports are not transparent. Incompatible combinations of method class and methodology used are also common. Variations in the methods used can also impact the quality of the E-PRTR data time series and comparability between facilities. For the most commonly reported pollutants, methods remain stable over time while for the least commonly reported pollutants, methods vary over time, sectors and facilities.

ICF et al. (2020) also recommends improvements to the E-PRTR Guidance document and reporting tools. Some of the recommended actions have been assumed to be part of the baseline, as they would be / are being implemented even in the absence of new EU-level action i.e.:

- Promote the use of sector-specific release factors for some activities;
- Provide guidance on methodology for calculating releases, especially indirect releases to water;
- Add completeness checks for the reporting of which methodology is used;
- Add a description field for accidental releases;

- Develop guidance on how to report M/C/E for multiple release sources;
- Add an indication of whether the facility is registered under the EMAS Regulation.

4.4. USER STATISTICS FOR THE E-PRTR WEBSITE

The supporting study to the evaluation of the E-PRTR Regulation (Amec and IEEP, 2016) analysed access to the E-PRTR website. Between July 2011 and January 2014, a total of 221,712 sessions[33] were recorded, corresponding to an average of 242 sessions per day. Over a quarter of these sessions were from new users, around 9% of sessions corresponded to second visits and only around 2.4% of sessions to users visiting the site more than 200 times. Direct acquisition (sessions accessing the website by typing the URL or from a previously saved bookmark) was the main acquisition channel, followed by referral from other websites and organic search (via search engines). Sessions reaching the website from social media were only a minimal fraction.

It should be noted that in June 2021, the EEA has launched a new Industrial Emissions Portal and this now provides access to E-PRTR data in conjunction with IED information. To date, there has been no assessment of user statistics for the Industrial Emissions Portal but an initial quantification, using a different analytical method, estimated 160 website visits per day.

4.5. E-PRTR POLLUTANTS

The E-PRTR's Annex II lists 91 pollutants and the associated annual thresholds that invoke a reporting obligation. The pollutant list reflects environmental concerns when the Regulation was adopted and is therefore now rather outdated since the list has not been updated in the intervening 15 years. Likewise, the Annex II reporting thresholds are outdated as there have been significant emission reductions since the thresholds were initially set to capture 90% of industrial arisings i.e. for some pollutants there is incomplete reporting.

The E-PRTR pollutants cover a substantial proportion of pollutants listed in other EU environmental protection initiatives. However, analysis of the IED and Best Available Techniques (BAT) conclusions, European environmental legislation and international recommendations, other PRTRs and the scientific literature identified a number of new pollutants for potential addition to the E-PRTR (ICF et al, 2020). E-PRTR may also have the potential to better align with controls set under the REACH Regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals, EC 1907/2006) and updates of the Environmental Quality Standards Directive (2008/105/EC). This would help ensure that the E-PRTR continues to be a relevant instrument that evolves to current needs such as collecting data on industrial emissions of new interest e.g. PFAS.

5. FURTHER COMMISSION ACTION AS PART OF THE BASELINE ADDRESSING THE PROBLEMS

The problems that have been identified with the implementation of the IED are assumed to remain, although their evolution would be subject to action taken by the Commission to try to limit the extent of the problems and their consequences. Such measures would be issuing of guidance and encouragement of voluntary improvements of the existing

[33] Amec and IEEP (2016): *Google defines a session as "a period time a user is actively engaged with the website" and as "the container for the actions a user takes on the site". In practical terms a session is equivalent to a user navigating the webpage until s/he leaves or becomes inactive.*

processes. Whilst this could lead to some degree of improvement, it is expected to remain marginal given the voluntary nature of the measures. Furthermore, it is likely that issuing guidance on unclear legal provisions would be a complicated, lengthy and burdensome process.

The Commission will look to implement a number of actions in collaboration with Member States under business-as-usual to address the identified problems. The measures that have been identified as existing activities that are already underway or planned by the Commission to address the problems identified are shown below in Table A5-7.

Table A5-7: Measures incorporated in the Baseline

Measure	Addresses problem				
	1	2	3	4	5
Provide guidance on the implementation of BAT conclusions in permits focussed on establishing a more consistent approach across the EU	X				
Provide guidance on the implementation of IED provisions concerning monitoring requirements specifically for indirect releases to water and emissions to soil (Articles 14, 15 and 16)	X				
Provide guidance on how environmental inspections shall be carried out across the EU (Article 23)	X				
Facilitate peer to peer support among Member States Competent Authorities for undertaking mutual/joint environmental inspections	X				
to link and share their installations' continuously monitored emissions data with Member State Competent Authorities and making such information available to the public on the Internet	X				
Produce guidance on the compliance assessment relating to "effective operating time" outlined in Annex VI, part 8, point 1.2 for installations subject to waste (co)-incineration provisions	X				
Produce guidance to address potential administrative overlaps between the IED, the ELD and Seveso Directive	X				
Produce guidance on the definitions of 'combustion installation', 'combustion plant', and 'co-incineration'	X				
Update guidance on information exchange to address issues associated with sharing potentially confidential business information when setting BAT-AEPLs			X		
Encourage the systematic inclusion of information on chemical substances of concern developed under other legislation related to IED and the availability of safer chemicals in the BREF process and BAT conclusions			X		
Undertake systematic data collection on GHG emissions at the IED installation level within the BREF process, for those installations and/or emissions covered by the EU-ETS at an EU level				X	
Develop BAT-AELs systematically for direct and indirect GHG emissions not covered by the ETS. This would include emissions of non-ETS GHG by ETS installations and emissions of any GHGs by non-ETS installations				X	

Problems represented by each number are:

1. *Insufficiently effective legislation: The IED is not as effective as it could be, in terms of ensuring reduced pollutant emissions from industry, public access to information and participation, and coherence in implementation.*
2. *Ineffective promotion of innovation: The IED is not dynamic enough and does not support the rapid deployment of innovative technologies*
3. *Insufficient contribution to resource efficiency and less toxic production: The IED has not been effective at addressing the use of hazardous chemicals, resource efficiency or the circular economy*
4. *Insufficient contribution to decarbonisation: The IED has not been effective at reducing greenhouse gas emissions*

5. *IED sectoral scope coverage is too limited: The IED does not regulate some highly polluting (agro-)industrial sectors.*

Annex 6: Problems and drivers

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1 THE PROBLEMS - IED

The EU's economy will undergo a major transformation to become climate neutral and circular. This evolution requires an appropriate legal framework. The recent evaluation of the IED has identified a number of broad areas where the operation of the legislative framework might be improved to better contribute to those goals. The problems to be addressed, the drivers of these problems and how these may evolve without any further policy intervention are considered in the following sub-sections.

The IED was evaluated in 2020 to check how it was functioning (Ricardo et al, 2020). Findings from this evaluation included:

- Pollution is still occurring across the EU from large (agro-)industrial plants (including emissions to air, water and soil; and use of harmful substances)
- Member States are implementing EU IED requirements in a heterogeneous manner, including the stricter BAT conclusions measures. The result is that the environmental ambition varies across the EU's Member States
- There is insufficient public access to information, participation in decision making and access to justice with regard to permitting decisions and revisions
- Greater coherence and synergies with other EU legislation (e.g., the Emissions Trading System, the Landfill Directive, the Urban Waste Water Treatment Directive and others) could be exploited
- The IED may be able to promote new production processes, technologies and innovation more proactively
- Large industrial and agricultural facilities could contribute more to a circular economy, and their exploitation of natural resources could be reduced
- Further efforts could be made to support the decarbonisation efforts of large-scale industries and agricultural activities as a whole
- Extending the IED to other sectors or activities could be appropriate, or thresholds at which plants become subject to the IED might be changed, in order to reduce significant pollution.

The problems and drivers are further analysed in more detail in the following sub-sections, with a focus on description of the problem, the relevant drivers and how the problem may evolve without any further policy intervention. Assumptions and the methodology underlying the latter are detailed in the Annex 5.

1.1 The IED has not been as effective as it could be

The IED has not been as effective as it could be in terms of:

- Ensuring reduced pollutant emissions from industry, which includes issues such as BAT-AELs not being achieved, inconsistencies in implementation, and transboundary pollution remaining ineffectively addressed;

- Public access to information and participation;
- Coherence in implementation.

These problems are further elaborated below.

1.1.1 BAT-AELs are not achieved

1.1.1.1 What is the problem?

The European Green Deal aims to protect Europe's citizens and ecosystems, by moving towards a zero-pollution ambition, to better prevent and remedy pollution. As part of the European Green Deal, the Commission has adopted an 'EU Action Plan Towards a Zero Pollution Ambition for air, water and soil' in 2021. The Action Plan seeks to move towards a zero-pollution ambition via:

- Focussing on measures to strengthen implementation and enforcement
- Considering the need to improve the existing health and environment legislation
- Seeking improvement to the governance of pollution policies.

The Action Plan Towards a Zero Pollution Ambition states that the Commission will consider a need for improvements to industrial emissions legislation. Industrial emissions continue to be a source of pollution, and therefore remain pertinent to the zero-pollution ambition to be adopted.

The evaluation of the IED found that the IED has supported Member States in implementing BAT-based permitting. It also noted that the tendency appears to have been for permit emission limit values to be set on the basis of upper BAT-AELs more commonly than lower BAT-AELs, which has been set out in national guidance in some Member States. There is some evidence available that indicates variation across the EU as to whether or not the BAT-AEPLs (i.e., other than BAT-AELs) from the BAT Conclusions are included within permits although this is only known for some Member States. Article 15(4) derogations allow more cost-effective implementation. A limited proportion of installations have been granted derogations, although there is some variability in approaches across the EU. There is also evidence that very few permits have been set with stricter conditions than those achievable by the use of BAT in order to achieve Environmental Quality Standards (EQS) under Article 18.

1.1.1.2 What are the problem drivers?

The problem driver is the flexibilities allowed in setting permit conditions and granting derogations.

(Agro-)industrial plants continue to pollute the environment. Whilst the IED has led to reductions of pollution from (agro-)industrial plants, BAT and their associated emission levels (BAT-AELs) may not always be achieved because:

- ELVs are often set in permits by default at the upper level of the BAT-AEL range, without consideration of whether BAT could lead to lower emissions closer to the lower end of the range
- Some industrial plants are granted Article 15(4) derogations from specific BAT-AELs, which leads to higher levels of emissions than required by BAT

Conclusions. The use and approach to granting these derogations varies between Member States.

- Varying interpretations of how to set permit conditions in accordance with:
    - IED Article 15(1) flexibilities (when setting permit conditions for indirect releases of polluting substances to water)
    - IED Article 15(3) flexibilities (when setting different ELVs in permit conditions in terms of values, periods of time and reference conditions)

In addition, regarding Article 18 of the IED, it is insufficiently clear what the 'stricter conditions' than those achievable by the use of BAT should be, including what the 'additional measures' should be added to the permits to comply with EQS. This has led to varying interpretation when setting permit conditions.

1.1.1.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-1: Development without policy intervention for the problem "BAT-AELs are not achieved"

(Sub) Problem	Development without policy intervention
BAT-AELs are not achieved	Ongoing use of Article 15(4) derogations and specific exemptions (and in some cases their potentially increased use) resulting in industrial processes which are exempt from certain requirements of BATC Ongoing risk of ELVs being set above the upper end of the BAT-AEL range and inconsistent implementation of the provisions across the EU Member States Ongoing risk that industrial releases continue to contribute to exceedances of EQS because permit conditions are not setting conditions stricter than BAT where needed

1.1.2 There are inconsistencies in the implementation of the IED across Member States

1.1.2.1 What is the problem?

The evaluation of the IED identified potential inconsistencies in how Member States were implementing the IED, more specifically with regards to the permitting process, monitoring and reporting, and enforcement.

The evaluation concluded that Member States draw on the BREFs and BAT Conclusions when setting monitoring requirements in permits. There is variation in implementation across the EU, in particular in relation to compliance assessment. The evaluation noted that more recent BAT Conclusions contain consistent approaches to specifying BAT for monitoring. Member State reporting shows that monitoring frequencies are respected in permit conditions. This has helped to improve transparency and consistency. There are

some data gaps in terms of whether the IED and BAT Conclusions monitoring and reporting requirements have improved compliance. Information is typically not publicly available via the internet in a lot of Member States, so it is unclear if it is being reported consistently and used for compliance assessment. Based on the evidence that is available, the differing application of compliance assessment rules risks creating distortions.

Although the evaluation also concluded that the IED has contributed to a more level playing field when compared to the IPPCD, it noted that there remain variations in implementation among Member States, particularly on compliance assessment, the granting of derogations, and on setting permit ELVs at upper BAT-AELs versus lower values within the AEL range. Some Member States appear to have granted a greater number of derogations than others and some don't allow them. Stricter permit conditions than the BAT Conclusions appear to be rarely applied. Differences in the levels at which permit conditions are set based on the BAT-AEL range can impact on company costs (and benefits). Differences between Member State approaches to conducting inspections have been improved under the IED with greater establishment of inspection plans.

Finally, the IED evaluation acknowledged that IED provisions are more explicit in relation to environmental inspections than under the Integrated Pollution Prevention and Control Directive (IPPCD), and that provisions relating to environmental permits have indeed been strengthened. However, it noted that it is unclear whether enforcement has really been strengthened in practice.

1.1.2.2 What are the problem drivers?

The driver for this problem is lack of clarity and guidance on the permitting process and monitoring and enforcement requirements. There are a number of sub-issues:

- Lack of clarity and guidance for permitting processes: Permitting practices differ across the Member States. While the binding nature of BAT Conclusions has led to an improved harmonisation in permitting across the EU compared to IPPC Directive, there remains scope for different interpretation and implementation of the requirements. Inconsistencies lead to a varying level of environmental protection achieved through implementation of BAT Conclusions across the EU Member States.
- Varied interpretation of enforcement and insufficient guidance: Practices related to inspection and enforcement of environmental permits vary across the EU Member States often owing to differing interpretation of the compliance assurance rules and insufficient guidance at EU level on how inspection and enforcement should be implemented.
- Varied interpretation and not using latest techniques for monitoring and reporting: The IED and the BREFs have contributed to a further harmonisation of monitoring provisions. However, practices related to monitoring of environmental permits continue to vary across the EU Member States. Added to this, while the use of latest available techniques to monitor emissions supports online reporting of real time continuous monitoring data, the extent to which this is integrated in Member State reporting is limited.

1.1.2.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-2: Development without policy intervention for sub problems of the problem "There are inconsistencies in the implementation of the IED across Member States"

(Sub) Problem	Development without policy intervention
Lack of clarity and guidance for permitting processes	The Commission would seek to provide clarity and guidance given the shortcomings identified as part of the evaluation of the IED. This guidance and clarifications would reduce significantly the scope for different interpretation and implementation of the requirements. Inconsistencies driven by this sub-problem would be likely reduced or addressed
Varied interpretation of enforcement and insufficient guidance	Ongoing challenges with non-compliance
Varied interpretation and not using latest techniques for monitoring and reporting	Heterogenous approaches to monitoring and reporting emissions data, and to site visits and checking compliance with permit condition.

1.1.3 Transboundary pollution that remains ineffectively addressed

1.1.3.1 What is the problem?

Long range transboundary pollution is an ongoing environmental concern. Under Article 26 of the IED, it is possible for Member State authorities to request information from a neighbouring state if they believe a given facility is creating emissions that cross over political borders. However, how effective Article 26 is in practice is debatable, particularly for air emissions. For water emissions, bi-lateral initiatives have been set up for some of Europe's biggest river systems, such as the Danube[34] and the Rhine (IPCR, 2021), but communication and collaboration is less comprehensive on a more local level, undermining the zero pollution aims. For instance, a number of inefficiencies with regards to dealing with transboundary pollution have been raised in the TSS. These include non-homogeneity of applications and permits, particularly where citizens of other Member States try to consult the information, as well as bureaucracy, administrative barriers and lack of established communication channels between the Members States. Moreover, a number of reasons have been mentioned that may contribute to delayed notification of transboundary pollution, including political, economic and conflict of interests as well as the diversity in the EU and the international laws.

1.1.3.2 What are the problem drivers?

The problem driver is the lack of application in practice of taking into account of transboundary effects during the permitting process, which may (but not necessarily) be contributed to by the flexibilities allowed in setting permit conditions and granting

[34] https://www.danubecommission.org/dc/en/

derogations. No evidence has been identified in IED implementation reporting by Member States (i.e., (Ricardo, 2021), (Ricardo, 2019), (Amec, 2016)) that transboundary pollution is taken into account in general when granting permits. That said, while no specific questions have been targeted on this particular topic either in prior implementation questionnaires, some evidence in (Amec, 2016) suggests some monitoring and modelling is carried out by some Member States to check / assure transboundary effects

Whilst the IED has led to reductions of transboundary pollution from (agro-)industrial plants, this continues to be relevant as Member States take limited action on IED Article 26.

1.1.3.3 How would the problem evolve?

The table below outlines the expected development without intervention.

Table A6-3: Development without policy intervention for sub the problem "Transboundary pollution that remains ineffectively addressed"

(Sub) Problem	Development without policy intervention
(Agro-)industrial activities continue to contribute to transboundary pollution	Transboundary emissions continue, failure to meet zero pollution targets Transboundary damage to ecosystems and biodiversity Knock-on consequences for other ecosystems and humans

1.1.4 The IED does not sufficiently provide for access to environmental information, participation in environmental decision-making and access to justice

1.1.4.1 What is the problem?

A core element of the IED relates to public access to information on industrial installations operating within each Member State, including details of permits and their environmental performance. This is to enable effective public participation in decision-making, whereby relevant opinions and concerns are factored into the decision-making process, leading to greater accountability and transparency in the permitting process and contributing to greater public awareness of environmental issues. Multiple provisions are set out in IED Article 24 to ensure early and effective opportunities for public participation in the permitting process (Article 24[1]) via information access (Article 24[2]).

Adding to this, IED Article 25 allows for public access to a review procedure before a court of law or another independent and impartial body to challenge the legality of decision-making. The IED specifically acknowledges environmental non-governmental organisations (NGOs) as meeting these conditions and therefore able to access to this review procedure. Article 25 constitutes the provisions of the IED concerned with access to justice.

Further IED provisions requiring public access to information are:

- Requirement for the public to be consulted when an installation has applied for a derogation from the BAT Conclusions under Article 15(4) of the Directive.
- Additional requirements for competent authorities to make available information on the measures taken by the operator when an installation is closed (with reference to Article 22 which covers site closure and soil and groundwater contamination).
- More specific requirements on the type of information that should be made available to the public when a decision on granting, reconsidering, or updating of a permit has been taken, including information on how permit conditions have been determined.

The IED evaluation found that overall public access to information has improved under the IED (compared to its predecessors). Most stakeholder groups consulted during the IED evaluation, including industry and Member State competent authorities, considered that access to information has improved with IED implementation. However, issues remain where some permits are not publicly available online, some information is available online but difficult to locate, or in some Member States authorities have requested fees for access to permits. A key document that brought the provisions on access to information to the attention of the Commission is the European Environmental Bureau (EEB)'s report, 'Burning: The Evidence', published in 2017 (EEB, 2017). The report focussed primarily on permit access, rating the online systems of individual Member States against set criteria, and identifying, in EEB's view, systems where permit access was inadequate.

There are three aspects to this problem.

- Public access to information: There are heterogeneous approaches between and within Member States when providing public access to information, with cases of restricted access, information being made available only upon request, or for a fee, appearing to go against the phrasing of Article 24(2) of the IED. In addition, information is presented in complex formats, which makes it potentially challenging to the public to identify relevant information, or to track changes in permit content over time.
- Public access to information on the environmental impact of derogations: There is a growing need to establish and understand the environmental impacts that the use of derogations is having. Currently, there is insufficient information made publicly available to monitor the impact of Art. 15(4) derogations.
- Public engagement: The current scope for public participation, as defined by IED Article 24(1), does not cover all permitting procedures (e.g., there is no requirement to invite the public to participate in cases where a permit is updated to reflect BAT conclusions).

1.1.4.2 What are the problem drivers?

In summary, the driver for this problem is that EU industrial emissions legislation does not sufficiently provide for access to environmental information, participation in environmental decision making and access to justice (Aarhus rights).

Since the IED evaluation, an assessment of Member State reporting to the EU Registry on Industrial Sites (hereafter the EU Registry) has been undertaken – including among other

things a review of Member State reporting on how information has been made available to the public with respect to permits, Article 15(4) derogation decisions, site visit inspection reports and emissions monitoring data. Initial findings from the assessment of Member State reporting to the EU Registry (Ricardo, 2021) show that:

- Public access to permit documentation (including decisions on Article 15(4) derogations) is widely provided via national permit repositories (19 Member States), but gaps remain where relevant URLs have not been reported and permit documentation is not available for IED permitted (agro-)industrial plants. Public access to site visit reports and emissions monitoring data is more limited, with relevant URLs reported by 15 Member States for the former and by 13 for the latter.
- Ease of access to permit documentation is limited by several factors, including format (particularly scanned permit documentation), publication of multiple permit documents for one (agro-)industrial plant without indicating how the permit conditions interact between the documents, and heterogenous approach between (and within) Member States to structuring permit documentation.

Ongoing reporting to the EU Registry is expected to help to resolve the limitations identified by the IED evaluation, although there are fundamental challenges at Member State level, particularly as regards public access to information on emissions monitoring data.

Regarding access to justice, the IED did not change the provisions on public access to justice compared to IPPCD. The IED evaluation findings were that public access to justice is working to some extent when new permits are considered, but limitations can occur in challenging revisions to existing permits and interpretation of what constitutes 'substantial change', and whether the public can challenge a decision that a change is determined as 'non-substantial'. Other issues relate to the ability of the public and environmental NGOs to challenge omissions to act by competent authorities, such as permits that have not been issued for an installation.

In its findings in a legal case between the NGO, the International Institute for Law and the Environment, and the EU (case ACCC/C/2014/121), the Aarhus Convention Compliance Committee has expressed a view that the IED provisions on public participation in permitting do not cover all cases where the Convention requires such participation, notably in relation to reconsiderations and updates to permits within 4 years of the publication of BAT Conclusions (ACCC, 2020). The IED is therefore not fully compliant with the provisions of the Aarhus Convention.

1.1.4.3 How would the problem evolve[35]?

Without revision to the IED, changes to the availability of information via information technologies (IT) could contribute to addressing aspects on availability of information. Otherwise, the following are expected:

- Public Access to information: Heterogenous approaches will likely continue. Ongoing efforts to expand access with the EU Registry will likely improve how the

[35] See also Annex 5.

information is made available to the public and ease of access over time. Ongoing assessment to clarify and simplify, where possible, Member State reporting will help to improve the relevance of the EU Registry as a mechanism for providing public access to information.

- Public access to information on the environmental impact of derogations: It is anticipated that there would be ongoing use of Article 15(4) derogations (and in some cases their potentially increased use) with limited information made available to the public as to the impact such derogations are having on the environment.
- Public engagement: A heterogenous approach will continue between Member States and within regions, which gives an issue with implementation and compliance with IED.

1.1.5 There is incoherence between industrial emissions policy and related environmental policies that has emerged over time, and some provisions may be obsolete, complicated or represent unnecessary burden

1.1.5.1 What is the problem?

The recent evaluation found that the IED framework is not completely coherent, which has led to differences in implementation within and between Member States (MS).

In the achievement of environmental objectives, the IED places burden on different aspects of industry, ranging from the BREF and permitting process, to Member State authorities and installation operators. One objective of the IED (compared to its predecessors) is to reduce, where possible, administrative burden through simplification and removal of unnecessary burden. However, the evaluation of the IED (Ricardo et al, 2020) found that, compared to the IPPCD, some additional administrative costs have been incurred for additional requirements under the IED. As part of the consultation activities undertaken for the IED evaluation, more than half the respondents indicated that administrative costs to Member States and operators have increased under the IED. The evaluation identified a number of opportunities for the streamlining of administrative burden without compromising the objectives of the Directive. These opportunities relate to a number of themes:

- Variation among Member States in assessing compliance
- Internally conflicting provisions within the IED
- Incoherence between Industrial Emissions policy and related environmental policies
- The definition of some activities is unclear
- Clarify thresholds for some (agro-)industrial activities.

These problems, therefore, relate to issues of efficiency and internal and external coherence.

Variation among Member States in assessing compliance

For large combustion plants (LCPs), prior work undertaken by the Commission has flagged that the current wording of IED Annex V Part 3 has not been implemented

consistently between Member States with regard to the subtraction of measurement uncertainty in compliance assessment. This means that different methodologies have been deployed by Member States for assessing compliance, with some interpretations/methods being less stringent and others being more stringent. Hence, for those instances which are interpreted less stringently, more could be done to reduce pollution if the more stringent interpretation was applied. In the case where one company has multiple installations operating in different countries, this variation in approaches may lead to a higher level of administrative cost than could be the case if a standardised method was followed.

This problem described for LCPs also applies for the compliance assessment of waste incineration plants. In this case, it is also due to variation in interpretation of the term 'effective operating time'.

For installations governed under chapter II of the IED, there are currently no rules provided in or related to chapter II for assessment of compliance with permit ELVs in the same way that, for example, LCPs have the rules provided in Annex V part 3. This means that there may be variation among Member States in the approaches adopted for assessing compliance, potentially limiting the effectiveness of emission reductions, as well as leading to an unlevel playing field.

Conflicting operating regimes internally within the IED leads to excessive burden

First, in addition to IED Annex II pollutants, relevant pollutants to an IED sector are identified in a systematic manner through the BREF information exchange process. Thus, BAT-AELs can be adopted by BAT Conclusions for additional pollutants to those set out in IED Annex II. This raises the question of whether Annex II is still needed or should be maintained as a comprehensive list of polluting substances. The existence of the Annex II list in addition to the pollutants mentioned in BAT conclusions (where they differ) may lead to excess administrative burden.

Second, the IED includes several requirements on combustion plants: chapter II of the IED and Annex I activity 1.1 comprises combustion installations of at least 50 MWth; the LCP BAT Conclusions set out BAT for LCPs under chapter II; and chapter III of the IED sets special provisions for combustion plants of at least 50 MWth whilst referring to Annex V. Due to this complicated set of rules, excess administrative burden may exist that could be minimised through further clarity and guidance distinguishing between the terminology used in the IED.

Similarly, the IED includes several requirements on waste incineration plants: chapter II of the IED and Annex I activity 5.2; the BAT Conclusions on waste incineration under chapter II; and dedicated special provisions for waste incineration plants in chapter IV and the Annex VI to the IED. Chapter IV applies to all waste incineration plants while Chapter II (BAT Conclusions) applies only above a capacity threshold.

It is further complicated for both LCPs and waste incineration plants because averaging periods set out in Annex V and Annex VI to the IED differ from those under the BAT Conclusions. In addition, some terminology is currently undefined at EU level related to normal operating conditions. This difference leads to additional administrative cost for operators and competent authorities.

Policy incoherence: Accidents Doctrine for the IED

In the event of any incident or accident significantly affecting the environment, IED Article 7 requires that the operator informs the competent authority, takes measures to limit the environmental impact, and prevents further incident or accident.

Under the Environmental Liability Directive, (agro-)industrial plants permitted under the IED are liable for environmental damage. Accordingly, where environmental damage has not yet occurred but there is an imminent threat of such damage occurring, the operator shall, without delay, take the necessary preventive measures. In addition, where environmental damage has occurred, the operator shall, without delay, inform the competent authority of all relevant aspects of the situation and take remedial action.

The Seveso Directive sets out measures to control and prevent major-accident hazards involving dangerous substances which might result from certain industrial activities, and the limitation of their consequences for human health and the environment.

The interface of IED Article 7 provisions with both the Environmental Liability Directive and the Seveso Directive is unclear, including with regard to land planning aspects, to align requirements and streamline where possible.

The definition of some activities is unclear

The definition for some activities is unclear and has led to ambiguity in some cases as to whether or not it is in scope of the IED. There is currently a lack of clarity regarding the inclusion in the IED of certain advanced thermal waste treatment activities. Whilst both gasification and pyrolysis plants are considered within the scope of Chapter IV (IED Article 42), pyrolysis is not explicitly listed under Annex I activities. This results in uncertainty regarding which activities are within the scope of the IED under different parts of the IED (chapter II versus chapter VI).

Clarifying thresholds for some (agro-)industrial activities

Certain sub-activities within activity 4 ‘Chemical industry’, such as e.g., pharmaceuticals, operate as relatively small capacity installations. The Annex I of the IED does not set capacity thresholds for all activities, and this is not included specifically for the chemical industry. Instead, a threshold for inclusion in Annex I is referred to as ‘industrial scale’. There is potential unclarity about what installations would be included as these activities, as well as the possible issue that the administrative costs and compliance costs of inclusion within the IED for small installations may not warrant the benefits that could accrue.

1.1.5.2 What are the problem drivers?

In summary, the drivers for this problem are that: some provisions of EU law applying to large (agro-)industrial plants may be obsolete, complicated or represent an unnecessary burden; and that, in some cases, there is incoherence between IE policy and related environmental policies (that have occurred as the policies have evolved).

In the waste incineration sector, it was found that there has been unnecessary burden for competent authorities and operators caused by overlaps between Chapter II, the LCP BAT Conclusions, and Chapter IV and the associated IED annexes, which require the calculation of ELVs for different regimes, effective operating time and normal operating conditions.

In the LCP sector, it was found that there has been unnecessary administrative burden owing to monitoring and reporting requirements on pollutant emissions for both ELVs and BAT-AELs that have led to a duplication of effort. In addition to this, these limits are based on different averaging periods leading to further increased burden. There are also issues relating to definition of scope of the Directive, namely with regard to combustion plants and incineration plants. Firstly, the definitions of combustion plants and combustion installations should be clarified to provide certainty for stakeholders. Additionally, gasification and pyrolysis plants are included in Chapter IV of the IED but not listed in Annex I activities.

Evidence available suggests that the IED has led to a high burden in the rearing of pigs and poultry (IRPP) sector, which could also potentially be the case for cattle farms being considered for inclusion in the Directive, especially due to the large number of installations that these sectors have.

In the consideration of bringing new sectors within scope of the IED (Section 1.4), assessing the additional burden will be important – particularly as regards interaction with existing legislation. For example, in the case of the mining sector, it will be important to consider interaction with the Extractive Waste Directive and how bringing this sector within the scope of the IED may help to modernise and reduce burden. Similarly, burden will be important when considering the interaction between the IED and the EU-ETS. In addition, the extent to which inconsistency between the definitions of combustion plants in the two Directives is a problem driver needs to be reviewed.

IED Article 7 sets out the need for operators in the event of incidents and accidents with environmental consequences, to limit consequences and prevent further incidents. In addition, under the Seveso Directive (Directive 2012/18/EU), installations carrying out operations involving dangerous substances are required to comply with a range of actions, including the deployment of major accident prevention policy and production of emergency plans for "upper tier" installations of higher risk. Furthermore, IED Article 7 interacts with the Environmental Liability Directive (ELD) (Directive 2004/35). Streamlining these provisions will be important for ensuring coherence and minimising administrative burden of the respective Directives.

An additional driver resulting in unnecessary administrative burden is the presence of obsolete provisions in the IED. An example of this is Transitional National Plans for LCPs. A list of obsolete provisions that have been identified for removal or amendment is outlined in Annex 12. Similarly, legal analysis of the Asbestos Directive has determined that certain aspects are obsolete, and the Commission has determined that the Directive could be repealed without creating regulatory gaps (European Commission, 2015). Consequently, production of asbestos (currently in IED Annex I as Activity 3.2) is now banned under REACH and should be removed as an IED activity.

1.1.5.3 How would the problem evolve?

Without the revision to the IED, it is anticipated that the following would be the case.

- Internally conflicting provisions within the IED: Pollutants listed in Annex II will continue to hold legal relevance despite conflicting with BAT Conclusions. LCP and waste incineration operators will continue to undergo duplication of effort and

administrative burden resulting from duplicated burden. The list in Annex II is creating confusion regarding the integrated nature of the IED. The IED by nature looks at all relevant pollutants. As Annex II is a closed list, readers sometimes think some substances are not covered, leading to suggestions to add substances.

- Policy incoherence: Any potential additional burden caused by the overlap of IED Article 7 and Seveso and ELD provisions will continue in the absence of change. It is, however, expected that the Commission will seek to address these issues in the baseline through the production of guidance.
- The definition of some activities is unclear: Ambiguity of the definition of some activities will continue, leading to continued uncertainty over whether or not some activities are in the scope of the IED. Some novel (emerging) applications of gasification, liquefaction and pyrolysis processes are providing new routes for the extraction of greater amounts of energy from our resources, including the greater utilisation of biomass and waste streams. The extraction of further value from our biomass or waste streams forms an important step to an increasingly circular economy. As such, further development of these processes, which may displace more conventional systems (e.g., the combustion of dedicated planted biomass), is to be expected. The trends towards the greater investigation and reliance on such techniques is driven by the increasing emphasis on decarbonisation and the related goal of achieving a more circular economy.

1.2 The IED is not dynamic enough and doesn't support the rapid deployment of innovative technologies

1.2.1 What is the problem?

Deployment of emerging and breakthrough technologies is needed to address the emission of pollutants and GHGs. It is expected that the same innovative techniques will contribute to reducing emissions of both pollutants and GHGs.

The evaluation of the IED concludes that the IED has not made a significant contribution to the uptake of innovative techniques. This is driven by a number of factors, including: the BREF review cycle is slow, i.e. 10 to 12 years; BAT-AELs are based on 'backward-looking' information and are static; scarce information on innovative techniques is included in BREFs and BAT Conclusions; there are few technology suppliers/developers in the BREF Technical Working Groups; there is no evidence of effective action taken by Member States under Art. 27 of the IED to promote development and application of emerging techniques and no Commission guidance has been published; and Art 15(5) derogation seems to be used in very limited occasions.

These lead to four fundamental sub-problems:

(i) The IED is not dynamic enough to support innovation or deployment of breakthrough techniques

(ii) Decarbonisation breakthrough technologies will often generate environmental co-benefits, e.g. reduced air emissions, and become BAT, and vice versa. If this requires deep transformation, more than the 4 years allowed under the IED may be needed for the entire sector to transform.

(iii) BREF reviews are slow, thus not compatible with quick turnarounds required to adopt innovations

(iv) The IED can prevent innovation, or at least inadvertently promote "lock-in" of existing good, but not best, practice.

The IED has to some degree stimulated innovation, in particular through provisions for identifying and deploying BAT, expansion of markets for BAT, and identification of emerging techniques. In this way, the main impact has been deployment of BAT. The market for relevant techniques is larger in the EU than it would otherwise have been, and the market outside the EU is also stimulated to the degree other jurisdictions copy aspects of the IED or BREFs. However, BAT are inherently 'backward-looking' and their ability to stimulate innovation has been limited. Emerging techniques are identified in the BREF process, and work is ongoing to better identify them through a pilot scale project (innovation observatory) as part of frontloading efforts for the BREF process. This is expected to stimulate innovation further.

It is also acknowledged that the scope of the BREF reviews may limit their impact: the BREFs focus on available techniques (the Sevilla process is backward-looking), leaving aside those which are currently under development and not commercially available (so called breakthroughs or cutting-edge techniques). The BAT-AELs effectively are backward-looking, not forward-looking, as they reflect what has already been achieved in industry to date (at least by some plants/installations).

However, some industrial sectors, such as cement, iron steel or oil and gas refineries, will need to transform and introduce novel primary techniques to decarbonise. Recent studies (Wood, 2021) show that the take-up of decarbonisation options could also deliver pollution reduction benefits. However, this is not always the case. Although some BAT Conclusions under the IED have derived BAT for primary techniques (conversion paths or options) in the past, the focus for TWGs has been mainly on setting BAT for secondary, less transformative techniques. The current IED framework however allows TWGs to address this challenge, as illustrated by the case of the BAT conclusions on chlor-alkali that concluded that the mercury-cell process was not BAT and thereby triggered the conversion of the whole sector to mercury-free processes. However, without a clear and common position across the EU and with diverging views across stakeholders, the implementation of the IED may not contribute as effectively as it could to required transformation of industry whilst pushing towards the EU's zero-pollution and other ambitions. For example, deriving BAT for primary techniques is perceived as not being technology neutral by certain stakeholders that would, therefore, oppose such practice; however, as sectors seek to transform over the coming decades some processes and technologies are likely to be more optimal than others from an environmental and climate perspective. Annex 12 summarises three sectoral case studies that further delve into some of these challenges.

IED Article 15(5) allows derogations from BAT-AELs for the testing and use of emerging techniques for a total period of time not exceeding 9 months. However, there are few cases of derogations being granted according to this provision, suggesting that more could be done to stimulate innovation through encouraging the testing of not-yet commercialised techniques. Some Member States stated that the timescales concerned (e.g., in the Sevilla process) were simply too long to be a driving force for innovation. On the other hand, this resulted in a more universal application of abatement techniques which could be seen as a

form of innovation. Some stakeholders considered that the length of the BAT Conclusions implementation period was often not long enough to test and implement emerging techniques. This typically resulted in resorting to implementing techniques that had previously been in place before instead.

The pilot innovation observatory (tested from 2018 to 2020) has delivered outputs identifying emerging techniques to the kick-off meetings of the BREF reviews for the textiles, and slaughterhouses and animals' by-products industries, as well as identifying potential candidates for BAT. Initial feedback suggests that the pilot observatory has improved the process for identifying emerging techniques. Whether this has also specifically stimulated innovation (i.e., encouraged additional innovative activity in the design and development of techniques that wouldn't have otherwise occurred) is unclear. The pilot observatory also identified synergies between IED with the EU Environmental Technology Verification (EU ETV) and the LIFE budget programme. The EU ETV is a tool to help innovative environmental technologies reach the market (EcoAP, 2021), providing cooperation opportunities to attract and secure funding, and signposting to EU funding opportunities as provided by the LIFE budget programme, which can support pilot projects to test and trial 'close-to-market' innovative demonstrative solutions expected to achieve environmental and/ or climate benefits (EASME , 2021). LIFE funding is available to projects launching solutions that could be implemented in close-to-market conditions (at industrial or commercial scale) during the course of the project or shortly after its completion.

1.2.2 What are the problem drivers?

The summary driver is that the static character (and backwards-looking nature) of the BREF process restricts innovation.

The drivers for this problem area are generally common and cross-cutting to this problem area (i.e. state of the art techniques cannot respond in a satisfactory manner to problems of environmental pollution, the climate crisis and resource depletion). In addition, overlaps with the drivers of other problem areas are identified (relevant to zero pollution ambition, Section 1.5.2; and the depletion of natural resources, Section 1.3.2.2). In sum, key drivers include:

- The BREF cycle is slow, very time-consuming (key driver preventing deep transformation of industrial sectors) (cross-cutting to Problem 2 – the climate crisis; and Problem 3 – the depletion of natural resources)
- BREFs primarily describe existing techniques already being used (key driver inadvertently locking in good but not best practices)
- BREFs do not use life cycle assessment (LCA) to analyse the overall impact (of each process), but focus mainly on abatement capabilities (key driver preventing quick turnaround to adopt innovations, and inadvertently locking in good, but not best practice, techniques) (cross-cutting to Problem 3 – the depletion of natural resources)
- Technical working groups involved in BREF development do not contain technology providers/ developers (cross-cutting to earlier problems).

The fact that the drivers are generally cross cutting means that the scale of the problem will generally be derived from the extent of emerging techniques in BREF documents (qualitative); and, where possible, from the emission reduction potential that could be achieved with the application of emerging techniques (quantitative). In three cases, the scale of the problem is simply based on the fact that there has been no evidence of activity: no Article 15(5) derogations have been granted; no dedicated financial instruments to support substantially emerging techniques (ETV and LIFE scheme are applicable but have low impact to date in ET development) under the IED; and no guidance to support Member States with the development and application of emerging techniques.

1.2.3 How would the problem evolve?

Without policy intervention, it is anticipated that the combined consequences of the drivers will be that:

- Emissions (pollutants to air/ water as well as GHG emissions) from industry will remain ongoing (limited improvement) if BAT conclusions focus mainly on secondary (abatement) techniques.
- Improvements to resource consumption from industry will be limited
- New decarbonisation processes will still need emission abatement devices. End of pipe systems (such as filters, scrubbers, etc) will be required to improve the overall performance of these cleaner (decarbonisation) processes.
- Uneven playing field for operators where industrial plants have adopted emerging techniques.
- The IED's contribution to decarbonisation may be slow and/or limited as the existing regulatory framework may only encourage the deployment of secondary techniques or measures. This may be further exacerbated by uncertainty and lack of clarity or common framework for TWGs to operate in a changing context where deep transformation is required to achieve the EU's decarbonisation objectives. TWGs may consider using a phase-out approach in BREF (e.g., making "it is not BAT" statements in the conclusions chapter) to accelerate the IED's contribution to decarbonisation. However, it is not clear whether, when and the extent to which this will happen across the EU.

1.3 The IED has not been effective at addressing the use of hazardous chemicals, resource efficiency or the circular economy

The IED has not been effective in addressing the use of hazardous chemicals, resource efficiency and the circular economy. These problems are considered below.

1.3.1 IED has not been effective in addressing the use of hazardous chemicals

1.3.1.1 What is the problem?

The advance of technology and society means that European citizens make use of more chemical substances within their daily lives than ever before. The European Chemicals Agency's (ECHA) classification and labelling (C&L) inventory has reported notifications covering some 130,000 unique substances (ECHA, 2021). The European Commission (2020) further commented that in 2018, Europe was the second biggest producer of

chemicals globally (accounting for 17% of all sales), with chemical manufacturing being the fourth largest industry in the EU, directly employing 1.2 million people.

Within the European Union, the safe manufacture and use of chemicals is managed by the chemicals' acquis, which spans approximately 45 pieces of legislation (European Commission, 2019). This includes both horizontal pieces of legislation that span thematic topics such as REACH (European Commission 1907/2006) (ECHA, 2021) and the Water Framework Directive (2000/60/European Commission), and vertical pieces of legislation covering a specific set of applications such as the Plant Protection Products Regulation (European Commission 1107/2009) and the Cosmetics Regulation (European Commission 1223/2009). The Industrial Emissions Directive (2010/75/EU) has a central role within this acquis to help manage and minimise the release of harmful chemicals to the environment. This remit is broader than chemical manufacturing alone, covering additional and unintentionally produced chemicals (such as dioxins and furans) and non-chemical industrial sectors which still produce harmful chemicals that can be emitted (e.g., energy production).

In October 2020, the Commission published its Chemicals Strategy for Sustainability towards a toxic-free environment (European Comission, 2021). This has been followed by the zero-pollution action plan, with the strategy and the action plan both underscoring the importance of sustainability and the circular economy, including the material flow of harmful chemicals. This includes the need for management of chemicals and chemical emissions to the environment from the industrial emissions, which again, underscores the role that the IED can play towards sustainability and the circular economy.

Based on the growing demand for chemicals, the evaluation of the IED identified some areas for improvement.

- The first key example is where the REACH Regulation has proactively identified 'substances of very high concern', which are added into Annex XIV of REACH, but have not necessarily translated into more environmental control and progress to safer alternatives through the implementation of the IED. For example, the recent IED ex-post evaluation highlights evidence to this effect, including that "some stakeholders (Member States and industry)…stated that the [BREF] review cycle is too long and the process is not dynamic enough to address emerging issues, particularly around the use of specific chemicals". In addition, an earlier report by Ricardo into the *IED's contribution to the circular economy* (also considered as part of the ex-post evaluation) found that BATs on the use of hazardous chemicals could be more systematically included across the BAT conclusions; and that greater reference to hazardous chemicals identified under REACH and other related chemicals legislation could be described within KEIs in the BREFs.
- The second example is the relationship between the implementation of the IED and the Water Framework Directive. The EEA's State of the Environment report (2018) comments that 45% of EU surface water bodies were in poor chemical status, primarily linked to a small handful of chemicals, particularly mercury and polyaromatic hydrocarbons (PAHs). The primary source of these emissions comes from deposition of atmospheric emissions linked to combustion of fossil fuels both from industrial facilities (covered by IED), but also from diffuse emissions from

transport. The EEA's 2020 signals report (2020) goes further highlighting the importance of releases to water from urban wastewater treatment works. This reflects the complex picture for material flows of a range of substances released to sewers that cannot effectively be treated at urban wastewater treatment works (i.e., Poly- and perfluoroalkyl substances (PFAS)). While these are issues managed by related legislation (environmental quality standards directive, and urban wastewater treatment directive), there is an important role for the IED to play and greater opportunity for the systematic inclusion of data from water policy into IED processes. The integrated assessment of river basin management plans (2019) commented that, while the IED and Water Framework Directive were well-aligned 'on paper', in practice the very different philosophical approaches and terminologies between industrial and water representatives created a gap, and more needs to be done to understand the downstream consequences for surface water.

- The final key example relates more widely towards the aims of the zero-pollution action plan. The EU's chemicals strategy for sustainability towards a toxic-free environment, published in October 2020 (European Commissin, 2020), highlighted the aims of the European Union to move away from use of hazardous chemicals through substitution to safer alternatives, or innovation leading to new processes that were less reliant upon hazardous chemicals. However, it is important to recognise that as the scientific and industrial processes evolve, the way that chemical substances are used becomes more complex, including supply chains that extend beyond the borders of the European Union. As an illustration, ECHA have provided direct support to the update of the BREF on ceramics (which commenced in Spring 2021), by identifying a list of potential substances of high concern for further review and possible substitution. Based on data submitted under REACH and a screening process, this identified a subset of 70 substances, with a further stakeholder engagement ongoing with industry parties to help refine things further. The high number of chemical substances in use and complex supply chains represents a challenge for identification of how substances are used and what the potential is for substitution. This is an element where the IED (through the BREF process) could add value to related legislation. A good example of this is the recent update of the textiles BREF (December 2019) which posed the idea of a chemical management system to help industry operators and national regulators better understand how and where chemicals are used in specific processes.

Alongside the identified challenges with the implementation of the IED in a way that is aligned with other closely related legislation, there are issues with reporting and monitoring of key emission and environmental data to track and minimise emissions to the environment. Given the goals of the chemical strategy published in October 2020, particularly on sustainability and circular economy, greater understanding of how chemicals are used within a wider circular economy and reporting of emissions data will be key to meet the objectives set out. Data produced under the European Pollutant Release and Transfer Register (E-PRTR) Regulation (European Commission 166/2006) illustrates a downward trend for emissions to air and water from a wide array of the 91 pollutants covered by E-PRTR. However, it should also be recognised that many emerging chemical concerns and substances of very high concern (SVHCs) are not covered by the E-PRTR,

and the fitness check of the E-PRTR (European Commission., 2018) identified (much like the IED evaluation) potentially missing key economic activities. It is worth noting that an impact assessment for options to amend the E-PRTR (following the E-PRTR evaluation) is also now in process.

1.3.1.2 What are the problem drivers?

The main drivers of this problem are:

- Market signals do not result in the use of safest chemicals by IED operators because the cost of chemicals does reflect the environmental impacts of chemicals' use.
- Coverage of chemicals of concern (such as substances of very high concern (SVHC), POPs, and priority substances) in a less systematic way within BREFs and BAT conclusions. The results of the Targeted Stakeholder Survey highlight that, in part, this issue is exacerbated by the lack of a common definition for 'hazardous chemicals', with different legislation using different terminology.
- Practical obstacles that impede the flow of data between different legislations. For example, REACH takes a substance-by-substance approach, while the IED is industry sector focussed. REACH does include consideration of uses and possible emissions and exposure from the use of chemicals; however, the industry sector indexing for REACH does not align or match the sectors defined by the IED. This means that identifying data related to the relevant sector is challenging and not transparent.
- The implementation of the IED could play a greater role in contributing to meeting the Water Framework Directive objectives for priority hazardous substances.
- The development of BREF documents provides valuable information on best practice for industry sectors covered by the IED, including detailed information on processes. However, use of this information to support the circular economy and transition to safer chemicals is limited due to the complexity of the topic. This could represent a missed opportunity where IED could play a greater role in supporting the EU's chemicals strategy for sustainability.

In particular, as highlighted above, the IED sits centrally within a wider chemical acquis of policy, which evolves around it and creates a pressure for the IED's implementation to keep up with policy developments in other areas.

The IED sets out the approach for prevention and control of pollution from industrial activities. This includes (under Article 4) the need for environmental permitting and identification of key chemical species that should be controlled. However, there are challenges in implementing this. For example, the selection of key chemical species is dictated, in part, by the understanding of the main chemical pressures under related legislation and Conventions, and this is complex and dynamic. The lists of substances of concern are long and complex, and new requirements emerge over time. For example,

- REACH (which contains 211 substances of very high concern)
- The priority substance list under the Water Framework Directive (45 substances)

- The POPs Regulation, which includes 30 regulated substances
- Other emerging issues that appear across these legislations and may be related with the implementation of the IED. For example, the increased need for destruction of brominated POPs leads to emissions of brominated dioxins and furans from IED plants, the increasing concerns for pharmaceutical emissions from wastewater treatment plants (leading to the proposed addition of pharmaceuticals in the list of priority substances by 2024). The regrettable substitution of perfluoro-octane sulfonate (PFOS) by ADONA[36] and GenX[37] chemicals with potential emissions from IED plants in the textile sector amongst others.

The publication of the zero-pollution action plan sets a clear and loud precedent and set of aims, with the IED having a clear role in supporting the transition to safer chemical alternatives. The implementation of the IED has not so far contributed as effectively as it potentially could. The challenge, therefore, is to maintain continuity and maximise the effectiveness of the IED to help support the sustainability goals of the EU Chemical Strategy.

Moreover, the Water Framework Directive (and its Daughter Directive on environmental quality standards (EQSD, 2008/105/European Commission)) requires widespread monitoring of surface water. This programme of monitoring within a receiving environment provides the key evidence base for how policy instruments are impacting the minimisation of emissions to the environment (or otherwise). This dataset, therefore, represents a key resource, particularly for the IED, to help adjust and improve the role of environmental permitting to limit emissions where needed. This is particularly true of emerging chemicals of concern covered by instruments such as the Watch List (European Commission, 2020) . However, it is far less clear how well these data sets are used, and what the general awareness levels are of these datasets by representatives working in different policy fields.

1.3.1.3 How would the problem evolve?

Both the IED and REACH set in place obligations for the safe management of chemicals and minimisation of emissions. However, there is potential for activities to become siloed and gaps to emerge between IED and REACH, particularly for SVHCs (211 substances, with additional substances being targeted).

ECHA has increased its participation and support of the most recent two BREF updates (textiles and ceramics). Based on discussions with ECHA, this engagement is still at a stage where collaboration is developing and the support is being provided on a case-by-case approach. This support provides an important step in sharing expertise and moving towards a more systematic inclusion of data into IED processes. However, this could still be strengthened further, especially as REACH continues to evolve at a rapid rate, with further addition of SVHCs. Without further intervention, policy and implementation gaps between REACH and the IED are likely to grow.

[36] ADONA is the trade name for ammonium 4,8-dioxa-3H-perfluorononanoate

[37] GenX chemicals are processing aids used in the production of fluoropolymers. Hexafluoro-propylene oxide dimer acid (HFPO-DA) and its ammonium salt are the major GenX chemicals.

The Water Framework Directive, and in particular the EQSD for priority chemicals to water, covers the aquatic environment as a receiving body. Failure to address these pollutants through the implementation of the IED is likely to continue to add pressure to EU water bodies.

Achieving the aims set out within the EU's 'Chemicals strategy for sustainability towards a toxic-free environment' are ambitious and will require significant efforts and input from all relevant parties. Without seeding the themes of the strategy into the relevant legislation, such as the IED, these aims may be more difficult to achieve.

1.3.2 The IED has not been effective in addressing resource efficiency and circular economy

1.3.2.1 What is the problem?

The existing production and consumption systems are, to a large extent, linear. Natural resources are used in industrial installations to manufacture products of which, at the end of their use phase, only a fraction is reused, repaired, remanufactured, refurbished or recycled. During production, a part of the natural resources is lost as waste or emissions to the environment. On the other hand, in a circular economy, the materials contained in a discarded product should be kept within the economy wherever possible, in order to be productively used again and again, thereby creating further value.

The problem with this linear use of natural resources is two-fold:

1. Waste and industrial emissions pollute the environment or cause climate change (covered by earlier problems)
2. Natural resources are being depleted

In order to address this, the Commission adopted, as part of the European Green Deal, a new EU Circular Economy (CE) Action Plan (COM/2020/98 final). On the topic of circularity in production processes, the CE Action Plan refers to (the review of) the IED and the BREFs:

"Circularity is an essential part of a wider transformation of industry towards climate-neutrality and long-term competitiveness. It can deliver substantial material savings throughout value chains and production processes, generate extra value, and unlock economic opportunities. In synergy with the objectives laid out in the Industrial Strategy, the Commission will enable greater circularity in industry by…assessing options for further promoting circularity in industrial processes in the context of the review of the Industrial Emissions Directive, including the integration of circular economy practices in upcoming Best Available Techniques reference documents;"

There are three aspects to this problem:

- The binding nature of resource efficiency BAT-AEPLs. In some BAT Conclusions, resource efficiency BATs (aiming for efficient use of energy, water, and materials, including the minimisation of waste generation) are expressed as quantitative BATs (i.e. BAT-AEPLs), or are merely contained in narrative BATs. There are indications of heterogeneous approaches between and within Member States when implementing BAT-AEPLs in permits. Some Member States consider that the

resource efficiency BAT-AEPLs do not have a binding value. A general challenge for the setting of environmental performance benchmarks and especially for deriving quantitative resource efficiency BATs is that certain information (e.g. production levels, process or product specifications, or the resource use per unit produced) is considered by industry to be confidential business information ('CBI').

- Obligations relating to resource efficiency and circular economy. According to the IED evaluation, the IED has not been very effective in addressing resource efficiency and circular economy aspects. Furthermore, BREFs & BAT Conclusions do not systematically take into account (upstream or downstream) value chain issues that could be addressed by the IED operator. Furthermore, BREFs currently contain little information that supports the setting of End-of-Waste criteria by European, national or regional bodies.
- Relation to industrial symbiosis. Industrial symbiosis (IS) refers to sharing resources between firms to achieve a mutually beneficial competitive advantage, involving physical exchange of materials, energy, water, and by-products. The exchange of production residues is, however, considered recycling (waste treatment) and not industrial symbiosis if a production residue that is categorised as waste is reprocessed into products, materials, or substances. Industrial symbiosis has clear advantages for resource efficiency and in promoting a more circular economy, but there are few measures at present that support a wider overall uptake. BREFs currently do not contain sufficient information to unlock the potential for generating mutual benefits from cross-sectoral and cross-value chain collaboration (thus fostering industrial symbiosis), which would create more resource efficient value chains.

1.3.2.2 What are the problem drivers?

The summary driver is that whilst market signals do not result in optimised use of resources by IED operators because the cost of chemicals does reflect the environmental impacts of resource use, IED design and implementation have not prioritised resource efficiency.

The contribution of the IED to the CE has been previously researched (Ricardo et al, 2019) on the topic areas of energy use, materials use, waste generation, use of hazardous chemicals and industrial symbiosis. The report looked at the contribution of IED sectors to each topic and their trends over time, and at the untapped potential for the IED to contribute further to the circular economy. A series of options to strengthen the IED's contribution to the circular economy was identified. An OECD report (OECD, 2019) addressed the effectiveness of BAT policies to reduce industrial emissions. Another report (European Commission., 2018) analysed the contribution of the IED to water policy.

Inversely, an unpublished report commissioned by the European Environment Agency (ETC/WMGE, n.d.) tried to associate the effects of policies, actions and measures that are proposed in CE strategies, with selected industrial sectors' emissions levels and resource use intensities. It was however found that most of the identified public initiatives are very generic in scope − with mostly economy-wide quantitative pollution reduction goals − and

rarely with targets for a specific industrial sector or pollutant. In contrast, industry practices on pollution control and reduction, as considered in the BREFs, refer to very specific processes of which the prevalence and scale of application are difficult to judge or quantify. Effective and successful circular economy strategies must identify the linkages between single process, installation and sectoral emissions and global emission reduction targets. In this context, it can be evidenced that macro-economic effects of CE initiatives might be strengthened, weakened, or cancelled out due to other changes elsewhere in the economy. For instance, the well-intended use in industrial activities of refurbished, remanufactured, repaired or upgraded parts or products, or of recycled material feedstocks, might negatively affect the sectoral emissions and waste generation figures, as a consequence of the processing or usage of less homogeneous, more impure or less reliable resources.

The above indicated reports and analyses allow the identification of particular problems regarding the potential for improvement of the environmental performance of industrial activities in the context of the IED and its current scope and objectives. The problems relate to the role of the IED in promoting: (i) installation-level resource efficiency; (ii) sector-specific strategies, and (iii) cross-sectoral cooperation.

- At the individual installation level, circular economy strategies primarily aim to lower the use of natural resources in absolute terms, to avoid their depletion. From an industry's perspective, however, this means that, assuming constant production capacity and added value generation, industrial activities must increase their resource efficiency by lowering the energy, water and raw material consumption per unit of industrial output, referring to either the total number of units produced, or to their economic value or weight. A common challenge in setting targets for industrial resource efficiency, is the difficulty of gathering and exchanging data and contextual information, which is in some cases considered to be confidential business information. The competitiveness concern is most often expressed about data related to production processes and products, more than about emissions data. It has been suggested that the requirement of throughput data could place an unfair burden on facilities in terms of resources and their ability to remain competitive (UNITAR, 2020). Furthermore, there are specific challenges for different types of natural resources:
    - Energy efficiency (specific energy consumption). The IED allows Member States to choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site (IED Article 9(2) of the IED).
    - Material efficiency (specific materials consumption and specific waste generation). BAT Conclusions focus primarily and highly on end-of-pipe emissions and, to a lesser extent, waste generation, and not on resource consumption per unit of output. Furthermore, heterogenous approaches between and within Member States are observed on the implementation of precisely those BAT-AEPL and indicative levels that refer to resource consumption and waste generation levels. Some Member States consider

that such BAT-AEPLs are not binding, similar to the 'indicative' levels sometimes included in the BAT conclusions.

- Water efficiency (specific water consumption and specific waste water generation). Here, the considerations are analogous to those mentioned for material efficiency.

- At the sector level, successful implementation of circular economy practices will need '*more than traditional R&D or a piecemeal approach to technologies: it needs changes in entire systems and joint efforts by researchers, technology centres, industry and SMEs, the primary sector, entrepreneurs, users, governments and civil society*' (European Commission, 2017). However, according to responses by some stakeholders in the IED evaluation, the IED has not been very effective in addressing resource efficiency and circular economy aspects. BREFs & BAT Conclusions do not systematically take into account value chain issues that could be addressed by the IED operator. One of the possible reasons for this might be a lack of monitoring and reporting of the results of in-house measures that contribute to improved resource efficiency (see bullet above). On the other hand, knowledge of and insights about the environmental effects that occur beyond the installation boundaries as a consequence of the choices made by a plant's operator might be very limited. Choices in this context can refer to: (i) operator's procurement requirements, aiming at renewable, recycled or low-carbon feedstocks, (ii) specific measures that avoid or limit the content of hazardous substances in the plant's waste or by-products to be treated or used by third parties, or (iii) measures such as waste sorting or by-product pre-treatment. This lack of monitoring or knowledge then leads to limited available information from and to operators on the range of choices that might improve resource efficiency in-house or elsewhere in the plant's value chain.

- Finally, the realisation of net environmental benefits as a result of cross-sectoral cooperation beyond installation boundaries, through collaboration with upstream (secondary) material resource suppliers and downstream stakeholders, is not in the scope of the IED. Although currently, there is a poor and fragmented evidence base regarding the environmental and economic gains that can be realised by industrial symbiosis (Technopolis Group, UCL et al., 2018), it is likely that there is an untapped resource efficiency & CE potential that could originate from industrial symbiosis initiatives.

1.3.2.3 How would the problem evolve?

Without policy intervention, the current variation in interpretation by Member States of whether BAT-AEPL values are binding and thus included in permits will continue. On exchange of information, limited change is expected by other policy frameworks. More information could be made available through E-PRTR (e.g., on solid waste generation), but this is often not at the necessary level of detail to be useful for BREFs. Currently, art 13.2 of the IED requires exchange of information on consumption and nature of natural resources and generation of waste to be addressed.

On resource efficiency and circular economy, along with economic risks of short- or medium-term scarcity (e.g., critical raw materials), policy instruments other than IED will be main driver for improved resource efficiency and circular economy. At the EU level, these include EU ETS legislation; waste and product legislation; European Green Deal policy instruments; Chemical Strategy for Sustainability; REACH; E-PRTR; and UWWTD.

On industrial symbiosis, sectoral, national or other initiatives could still function, but would be less supported by a large-scale information exchange at EU level. The current abundance and diversity of national End-of-Waste criteria would continue to hinder the exchange of waste-based feedstocks between installations in different countries.

1.4 The contribution of the IED to reducing greenhouse gas emissions has been limited

1.4.1 What is the problem?

(Agro-)industrial plants under the scope of the IED include energy-intensive plants that are responsible for a significant share of EU greenhouse gas (GHG) emissions and will therefore be important in view of the European Green Deal and the Zero Pollution ambition. In 2017, the industry and energy sectors (EU-28) accounted for a total of 2,195 Mt CO_2e (EEA, 2020a), the majority of which will need to be cut by 2050 to meet the targets of the Paris Agreement. The European Environment Agency (EEA) annual GHG inventory report (EEA, 2020b), indicates that GHG emissions in the EU decreased in the majority of sectors between 1990 and 2018.

Emission reductions for manufacturing industries, electricity, and heat production (as well as for construction and residential combustion) are amongst the largest at aggregate level. However, the current reduction rate will not be sufficient to deliver the savings needed to achieve the EU's 2030 reduction target (40% compared with 1990 levels) (European Commission, 2021b). Achieving the 2030 targets will require a focused effort across the EU; and achieving the long-term goals of even greater levels of decarbonisation will require faster rates of reduction than those currently projected.

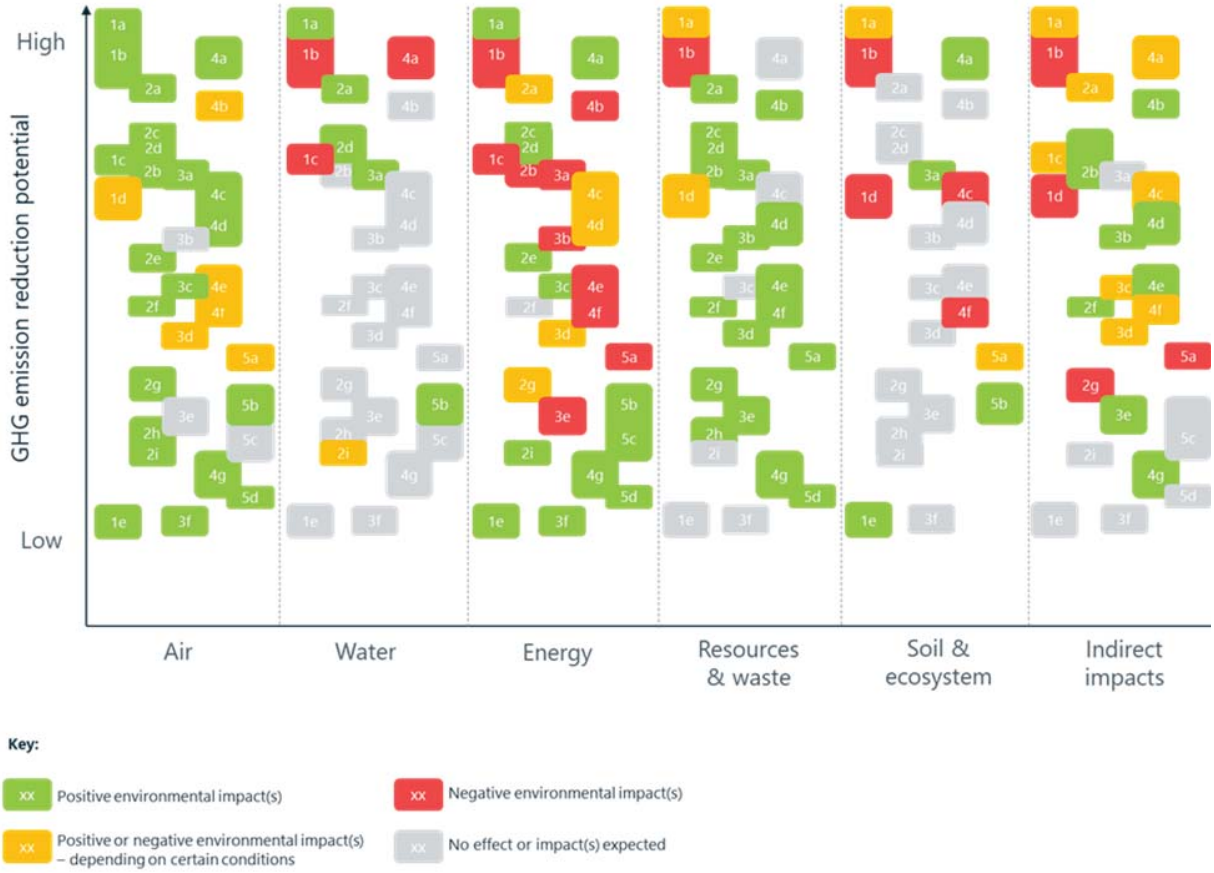
Although industry is expected to continue the current trend of emissions reduction and energy savings exhibited in the past few decades, to reduce its emissions further, especially in line with Europe’s ambition for 2050 (European Commission, 2021c), major changes need to be made in the way industry consumes energy and produces its products.

According to data from the European Pollutant Release and Transfer Register (E-PRTR) (EIEP, 2021) IED installations account for approximately 40% of total EU GHG emissions. Their CO_2 emissions are mainly regulated under the EU Emissions Trading System (ETS) and, as stipulated by the IED itself, their IED permit shall not include an emission limit value for that gas. Nevertheless, there are a number of IED sectors that do not fall within the scope of the ETS and, furthermore, there are other GHG not addressed by the ETS that are emitted by IED installations. Altogether, it is estimated that around 10% of GHG emissions of IED plants are not covered by the ETS, representing around 4% of total EU GHG emissions.

The Commission’s in-depth analysis (2018) in support of the long-term vision for a prosperous, modern, competitive and climate neutral economy indicates that there is a

plethora of deep decarbonisation options for industry, but no single silver bullet for all subsectors. In a recently completed report for the Commission (DG Environment) (European Commission, 2021e), the main decarbonisation options for sectors covered by the IED were identified. In particular, this report provides an overview of the wider environmental impacts of these identified decarbonisation options. This is important as one of the problems identified relates to potential knock-on impacts of decarbonisation options on the environment (and vice versa, i.e. impacts of pollution abatement on energy efficiency and GHG emissions), including resource use - both material and energy - emissions to air, emissions to water and soil pollution. A key takeaway from this report is shown in Figure A6-1below.

Figure A6-1: Assessment of the wider environmental impacts for the main decarbonisation options and their potential for GHG emissions reductions across all sectors



1a	Energy – Renewables	2g	Metals – Low carbon fuels	4a	Chemicals - Green H_2 (ammonia production)
1b	Energy – Carbon Capture	2h	Metals – Smelting reduction	4b	Chemicals – CO_2 valorisation
1c	Energy – Power-to-liquids	2i	Metals – Energy and process efficiency	4c	Chemicals - Electrification of heat and processes
1d	Energy – Biomass as feedstock			4d	Chemicals – Power-to-X
1e	Energy – Process efficiency	3a	Minerals – CCU	4e	Chemicals – Chemicals and plastics recycling
		3b	Minerals – Material recovery and recycling	4f	Chemicals – Low carbon fuels
2a	Metals - H-DRI (I&S)	3c	Minerals – Electric melting	4g	Chemicals – System optimisation
2b	Metals – Secondary production	3d	Minerals – Raw material and clinker substitution		
2c	Metals – Anode replacement	3e	Minerals - Low carbon fuels / waste material as fuel	5a	Waste & Other - Biomass / low carbon fuels
2d	Metals – Iron ore electrolysis	3f	Minerals – System optimisation	5b	Waste & Other – Electrification of heat
2e	Metals – CCU – top gas recycling			5c	Waste & Other – Process innovations
2f	Metals – Recycling of by-products			5d	Waste & Other – Process efficiency

Source: Service Request 21 under Framework Contract ENV.C4/FRA/2015/0042: https://circabc.europa.eu/w/browse/39928fd6-dcea-4fbc-b798-70e816bdecb0

The significant proportion of the green items in this figure reflects the fact that, frequently, the techniques applied drive improvements in respect to GHG and other pollutants.

The IED aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of BAT. The IED also applies to major GHG emitting installations, thus making it relevant to energy and climate policy. The IED governs installations that contribute to energy production or use energy for production purposes, and information on the energy used in, or generated by, the installation must be included in applications for permits (Article 12(1)(b)). Energy efficiency is also one of the general principles governing the basic obligations of the operator (Article 11) and one of the criteria for determining BAT (Annex III). Whilst ELVs are very rarely set for IED installations for GHGs, due to the ETS, (non-binding), BAT-AEPLs are often set for energy efficiency.

The problem defined here mainly relates to the coherence of the IED with energy and climate policy (including EU ETS) as well as to the Directive's role in contributing to the GHG emissions reduction of the activities under its scope. The EU ETS is expected to remain a key policy instrument for the reduction of industry's GHG emissions through its cap-and-trade system. Limitations to the existing cap and trade scheme are highlighted in the "Masterplan for a Competitive Transformation of EU Energy-intensive Industries Enabling a Climate-neutral, Circular Economy by 2050", a report published by the High-Level Group on Energy-intensive Industries (European Commission, 2019). This report furthermore states that, in order to accelerate the uptake of disruptive solutions, there is a need to consider complementary and/or alternative policy options to carbon pricing (including potential alternative and complementary regulatory mechanisms).

By 2050, the EU will achieve net zero GHG emissions, with any remaining GHG emissions compensated by an equivalent amount of removals (European Commission, 2020b). The IED could have the potential to complement the already existing policy efforts and measures to reduce GHG emissions and increase energy efficiency through its integrated permit and BAT approach. As part of the IED evaluation (Ricardo et al, 2020), the issue of coherence between the IED and the EU ETS was analysed. A number of important observations from the IED evaluation, illustrating the IED vs EU ETS coherence issue as well as their (potential) contribution to GHG emission reductions, are as follows:

- Although some industry stakeholders viewed the IED and the EU ETS as coherent, they emphasised the importance of avoiding "double regulation" and considered the EU ETS to remain the most appropriate tool to control GHG emissions (until 2030). The contribution to a zero-carbon economy as such is not the primary objective of the IED. Concerns were also raised regarding additional administrative burdens for reporting on GHGs.
- A number of stakeholders indicated that climate and energy actions need to be dealt with in an integrated way with other environmental issues which emphasises the relevance of the IED in view of the need for industry to rapidly adapt to a zero-carbon economy by 2050 (in combination with a range of other policies such as EU ETS, circular economy policy, eco-design policy, energy policy etc.).

- Regarding the potential knock-on impacts of decarbonisation options on other environmental media and vice versa, there is evidence that the IED requires certain abatement measures and/or process changes, which can increase energy consumption, countering the objectives of EU climate and energy efficiency policies. In some circumstances, compliance with BAT-AELs may conflict with techniques, which are more climate or energy efficiency friendly, such e.g. perpetuating the use of coke together with pollutant emission abatement, rather than move to using hydrogen, as a reducing agent to make steel. A better understanding of such potential impacts of decarbonisation options and of pollution abatement options can inform an assessment of the role of the IED in contributing to a zero-carbon economy.

In summary, therefore, there are two main elements that need to be considered in this assessment:

- For GHG emissions resulting from the operation of IED installations that are addressed under the EU ETS, ways in which the present provisions of the IED may be preventing the implementation of the Directive from contributing to the climate objectives of the EU; and
- For GHG emissions resulting from the operation of IED installations that are not addressed by the EU ETS, ways in which the present provisions of the IED as not as effective as they could be in spurring further reductions of these emissions.

There is a fundamental need, therefore, to consider the integrated nature of the IED and the wider impacts of decarbonisation whilst defining possible future policy measures. Furthermore, the energy efficiency of IED installations plays a key role in addressing GHG emissions and policy measures should not only concentrate on direct emissions of GHG to the atmosphere.

To achieve the EU's climate ambitions, IED installations will need to take action to decarbonise, which will require a change in the way that BREF TWGs consider those changes alongside the other key environmental issues addressed in BREF documents. For example, the iron and steel sector has developed a roadmap that envisages a transformation that require wholescale installation changes to their feedstocks and energy sources, including replacement of coke with hydrogen and electrification of metal production processes. In addition, the use of hydrogen direct reduction of iron has the potential to reduce sectoral GHG emissions by over 70% and the electrification for the sector has the potential to significantly reduce and, in some cases, eliminate emissions to air. However, the costs involved in the application of such techniques is potentially very high (€900-€1 210/t for hydrogen reduction and a seven-fold increase in electricity use in the sector for electrification).

Existing TWGs under the IED have limited experience of dealing with transformation plans of the type that are now required. Alongside the urgent timescales for developing and implementing these transformation plans, maintaining the BREF process in its current form runs the risk of producing BREFs that quickly become outdated or even a barrier to the transformations that are required.

Furthermore, there remains uncertainty with regard to the techniques that will be available and thus employed to achieve the EU's climate targets. In fact, generally, existing transformation plans rely on techniques that currently have low Technology Readiness Levels (TRL) and may reach TRL level 9 in the 2030s. A key challenge to address is, therefore, to ensure that the BREF process can reflect on these uncertainties, can be updated when the uncertainties are resolved and can be a positive tool to assist IED operators and public authorities in enabling the transformation of industries whilst ensuring the protection of the environment.

1.4.2 What are the problem drivers?

The summary driver is that the interactions between GHG emission reduction possibilities and overall pollution emissions minimisation in the IED have, to date, not been sufficiently taken into account. This is partly because Article 9(1) of the IED prevents the setting of ELVs in IED permits for those GHG emissions that are covered by the EU ETS[38].

Article 9(1) of the IED states the following in relation to GHG: "*Where emissions of a greenhouse gas from an installation are specified in Annex I to Directive 2003/87/European Commission in relation to an activity carried out in that installation, the permit shall not include an emission limit value for direct emissions of that gas, unless necessary to ensure that no significant local pollution is caused.*"

This means that in practice (i) almost no BAT-AELs are defined for GHG emissions in BAT conclusions and (ii) the majority of IED installations do not have emission limits for GHGs covered under the EU ETS due to the overlap in scope between the two instruments. Emission limit values for GHGs within the scope of the EU ETS shall not be set in permits under the IED unless to ensure that no significant local pollution is caused or where an installation is excluded from the ETS. Nevertheless, IED implementation has, to some extent, addressed GHG emissions, for example, through the setting of BAT and associated performance levels (BAT-AEPLs) on energy efficiency or through BAT on the substitution of fluorinated GHGs. In a few cases, BAT-AELs have been set for GHGs not covered by Annex I of the ETS Directive.

The stated purpose of the provision is "to avoid duplication of regulation" (recital 9). Though, in recital 10, it is stated that the IED does not prevent Member States from maintaining or introducing more stringent protective measures, for example greenhouse gas emission requirements (in accordance with Article 193 of the Treaty on the Functioning of the European Union (TFEU)).

Furthermore, Article 9(2) of the IED states "*For activities listed in Annex I to Directive 2003/87/European Commission, Member States may choose not to impose requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site.*"

Added to this, some (agro-)industrial activities generating GHG emissions fall outside the current scope of the IED or fall below the IED's current production capacity thresholds. Examples include farming (e.g. cattle farms), mining / quarrying industries and landfills. These activities may also not be covered by the ETS.

The rationale behind this separation of tasks has, to date, mainly been the avoidance of double regulation and a risk that 'command and control' under the IED may interfere with, and damage, the working of the ETS carbon trading mechanism. However, these frameworks operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, has the disadvantageous effect that any

[38] Carbon dioxide (CO2), nitrous oxide (N2O) and perfluorocarbons (PFCs)

decarbonisation and depollution interactions are not coherently taken into account, and, as a result, synergistic optimising possibilities and investments are to date not being identified.

However, it is increasingly clear that, in the EGD context and the wider, EU and indeed global efforts towards tackling the climate and environmental degradation, deployment of emerging techniques by energy-intensive industry sectors, e.g. using hydrogen rather than coal to produce steel, will create an unprecedented interaction between decarbonisation and depollution[39], which may result in new policy coherence challenges in the near to mid-term future. Whilst climate-related interventions will remain the main driver of transforming industrial techniques, principally via the ETS mechanism, the IED has to accompany and optimise this process by taking fully into account the co-benefits and trade-offs of decarbonisation and depollution. This has two aspects:

1. Where decarbonisation techniques have strong co-benefits in terms in reducing emission of pollutants, it may become impossible to avoid the IED impacting more the carbon market in the future. When such techniques will become economically viable and practicable, they will qualify as BAT within the meaning of the IED and become the reference for establishing mandatory environmental performance levels for all relevant IED plants. Consequently, command and control under IED would drive investment in the techniques and affect the carbon market, whilst also contributing to the decarbonisation efforts. This is likely to increasingly occur in the run-up to the 2030 decarbonisation milestone, as emerging cleaner techniques become available in a number of sectors;
2. There is a need to avoid that investment cycles triggered separately by the IED and the ETS may increase costs for society in respect of pollution and climate objectives:
    a. Obligations to implement existing (backward-looking) BAT may hinder deployment of emerging decarbonisation techniques;
    b. The deployment of decarbonisation techniques may entail a need for a later and costly retrofitting to abate pollutant emissions if maximum synergies between decarbonisation and depollution are not stimulated at innovation technologies level, and through BREFs.

The IED and ETS frameworks operating in parallel, on many of the same activities and sectors, but by definition almost completely separately, has the disadvantageous effect that any decarbonisation and depollution interactions are not coherently taken into account, and, as a result, synergistic optimising possibilities and investments are to date not being identified.

Two specific examples of this dissonance between the two instruments, rather than mutual reinforcement, are the current optional nature of energy efficiency performance benchmarks in the IED, and the current IED provision not to set emission limit values for GHGs covered by the ETS. Both of these provisions are elements that currently limit the IED's contribution to decarbonisation objectives.

1.4.3 How would the problem evolve?

Without any policy intervention, IED installations will continue to be confronted with potential trade-offs and impacts of investment (and timing thereof) in decarbonisation vs pollution abatement options. In addition, the IED will continue to have a limited, direct contribution to the reduction of GHG emissions from IED installations and, therefore, the decarbonisation objectives underpinning the European Green Deal.

[39] Wood, Deloitte, IEEP (2021). Wider environmental impacts of industry decarbonisation. https://circabc.europa.eu/w/browse/39928fd6-dcea-4fbc-b798-70e816bdecb0

Furthermore, in the longer term between 2030 and 2050, and as a result of both legislative and policy action at EU and national level, it is likely that a large proportion of EU-based industrial operators will have already converted to low-carbon or carbon-neutral techniques. This will require increasing attention on the question of whether and how a level playing field should be established through the IED, so that the use of such cleaner techniques is generalised across the EU. The interaction between depollution and decarbonisation may have mutually-supporting or dissonant effects.

1.5 The IED does not regulate some highly polluting (agro-) industrial sectors

1.5.1 What is the problem?

The IED evaluation found that the IED has been effective at reducing emissions from industrial installations covered within its scope, and their related impacts on human health and the environment. This contribution is most notable for emissions to air, with reductions in several key pollutants since implementation. Implementation progress is ongoing with the continuous adoption of BAT Conclusions and updating of permit conditions to account for this.

Nevertheless, an earlier report by Amec (2014) concluded that agro-industrial activities not regulated under the IED can have a considerable share of the total EU emissions to air and water, although the exact shares vary depending on the pollutant. While emissions from installations that have been regulated under the IED to date have reduced over time, there is no information to suggest a similar trend for installations outside the scope of the IED. Any reductions in emissions from these installations depend on the national and/or regional level measures and legislative framework in each Member State.

The impact of emissions to water from agro-industrial activities not regulated by the IED is also apparent in the 2nd round of Member State reporting on the River Basin Management Plans (EEA, 2018). The Water Framework Directive (2000/60/European Commission) requires Member States to identify significant pressures on surface water bodies from point and diffuse sources of pollution. Out of all surface water bodies under pressure from point source pollution, 15% were reported to be under pressure due to pollution from IED plants and 14% due to pollution from non-IED plants. The largest source of pressure on water bodies from point sources continues to be urban waste water treatment plants (UWWTP) (67% of surface water bodies have been reported under pressure from UWWTPs). On the basis of that evidence, a report by the EEA (EEA, 2018b) found that industrial point sources not regulated by the IED may exert greater pressure on the quality of water than the IED installations themselves (e.g. in Belgium, Bulgaria, Croatia, Czechia, Portugal, Slovenia and Spain). Although this may suggest that the IED regulatory process has been effective in controlling industrial pollution, it also suggests that measures to control pollution from smaller industry (often introduced at national level) may have been less effective.

Emissions to air from agro-industrial activities not regulated by the IED can also be significant as illustrated by data on key environmental issues assembled for the baseline. Examples of emissions to air from sectors not regulated by the IED include for cattle farming and for upstream oil and gas. Enteric fermentation of feed in the stomachs of livestock (particularly cattle) is the largest single source of CH_4 in the EU and two thirds of

EU27 total NH_3 emissions are from livestock. Upstream oil and gas activities are a source of CH_4 and CO_2. The OSPAR inventory provided details of 12.7kt CH_4 in 2017, equivalent to ~1.6% of total CH4 reported to E-PRTR from IED sites. Further emissions from upstream oil and gas are of $PM_{2.5}$, NO_x, SO_x and NMVOC.

1.5.2 What are the problem drivers?

The problem driver is that the scope of the IED excludes polluting (agro-)industrial activities.

There are two aspects to this driver:

1.5.2.1 Potentially highly polluting sectors not within the scope of the IED

While the IED evaluation found that the IED addresses the most polluting sectors, there remain several potentially highly polluting activities not within the scope of the IED, including:

- Farming (cattle farms and mixed livestock farms, aquaculture)
- Mining / quarrying industries (currently regulated by the Directive 2006/21/European Commission of the European Parliament and of the Council on the management of waste from the extractive industries and within the scope of the E-PRTR Regulation (European Commission) No 166/2006 (activity 3a))
- Upstream oil and gas industries (extraction) (currently subject of BAT Guidance Document on upstream hydrocarbon exploration and production, voluntary).

In addition, there are other (agro-)industrial activities (not identified by the IED evaluation or set out in the inception impact assessment) that are polluting and that could be considered for inclusion under the IED:

- Battery production (including manufacturing of industrial, automotive, electric vehicle and portable batteries regardless of their shape, volume, weight, design, material composition, use or purpose), while also recognising battery compound production (i.e. chemicals) is already covered within the IED's present scope, and battery disposal and recovery (to the extent not already covered by activity 5.1). The rapidly changing scale of battery production, disposal and recovery is a key driver in determining whether this sector should be regulated under the IED or not
- Ship building (other than coating) and ship dismantling – shipyards are partly covered under IED Activity 6.7 (for the coating activity) but ship building processes (other than coating) and dismantling activities are not covered
- Certain downstream ferrous metal processing activities: to consider inclusion under IED (e.g. under activity 2.3) of forging presses, cold rolling and wire drawing (above certain thresholds).

1.5.2.2 Some activities polluting the environment fall below current production capacity thresholds set in the IED

There remain several industrial activities polluting the environment which are currently outside the scope of the IED owing to production capacity thresholds defined in Annex I of the IED. These include:

- Recovery of non-hazardous waste from biological treatment (IED activity 5.3 (b)(i)) (to include certain activities with a capacity of less than 75 tonnes per day with increased risk for emissions to soils, such as biogas production or manure processing plants). The ongoing Commission report 'Impact of the biogas plants and of gasification, liquefaction and pyrolysis of wastes on the environment' has estimated that between 35% and 98% of biogas plants fall under the threshold, varying between Member States, and that plants falling under the threshold contribute approximately 27% of emissions to air of the sector, with ammonia and NOx, and greenhouse gas methane being the most important impacts.
- Textiles: Pre-treatment or dyeing of textile fibres or textiles (IED activity 6.2), to include textile finishing as well as activities below the current limit of treatment capacity (10 tonnes per day) to encompass a larger proportion of the sector's emissions and impacts, particularly from waste water impacts. Limited data is currently available regarding the environmental performance of functional finishing processes. However, these processes account for 8% of the total EU textile manufacturing and are considered to be the most polluting aspect of textiles. The amount of polluted water discharged, and the hazardous properties of the chemicals released, as well as the high rates of energy, water and chemical consumption are the main environmental concerns for this sector[40].
- Smitheries: Reduction of IED capacity threshold for smitheries (IED activity 2.3b) from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW. This will encompass a larger proportion of the sector's emissions and impacts, particularly for releases to air. Limited data is currently available with regard to the environmental performance of smitheries and particularly hammers with capacities of lower than those stated in the IED. However, given the proportion of the production of forged materials that are produced by hammering (estimated to be 1.2 million tonnes across the EU for 2019[41]), it is estimated that only 25 out of 400-500 plants are currently being regulated under the IED.
- Medium Combustion Plants: Examine the scope of Chapter III - Large Combustion Plants (LCP), detailed under IED Article 28 and consider moving the 20-50 MWth capacity band from the Medium Combustion Plant Directive (MCPD) (Directive (EU) 2015/2193) to LCP. The main driver for this revision is to align with the EU ETS scope threshold. There are more than 140 000 MCPs operating in the EU compared with around 3 500 LCPs. Emission factors (concentration at flue gas streams) for MCPs and LCPs are similar. MCPs are important sources of emissions of SO_2, NOx and PM. Latest estimates[42] suggest circa 550 kt/y of NOx, 300 kt/y SOx and 100 kt/y PM.
- Landfills - to allow adoption of BAT conclusions for landfills covered by the IED (IED Annex I activity 5.4) - BAT conclusions would cover the key environmental

[40] From ongoing study 'Gathering of complementary evidence for assessing the impacts of extending the scope of the IED to additional sectors' draft report for the Commission.
[41] ibid.
[42] http://ec.europa.eu/environment/air/pdf/Revised%20Final%20Report.pdf

issues for which BAT has evolved since the 1990s, including with regard to methane capture – and to reduce the threshold for inclusion of landfills within the IED scope. Landfill remains an important source of environmental pressures in the EU, not least as a key source of methane emissions: in 2019, the waste sector comprised 20%-26% of all EU anthropogenic methane emissions (104 $MtCO_2e$)[43], with landfill sites covered by the E-PRTR registering around 11.9 $MtCO_2e$ of emissions in 2019 (down from 16.1 $MtCO_2e$ in 2017).

1.5.3 How would the problem evolve[44]?

Development without policy intervention is in Table A6-4.

Table A6-4: Development without policy intervention for sub problems of the problem "There are agro-industrial activities that are polluting and yet are not covered by IED"

(Sub) Problem	Development without policy intervention
Not all agro-industrial activities that are polluting the environment are covered by the IED	Continued potential for pollution from (agro-) industrial installations not covered by the IED to reduce more slowly than for those covered by the IED

2 THE PROBLEMS – E-PRTR

Evaluation of the E-PRTR Regulation

In 2016-2017 the E-PRTR Regulation was evaluated as part of the Regulatory Fitness and Performance (REFIT) programme[45, 46, 47]. The E-PRTR was determined to be an effective instrument for providing a comprehensive and detailed dataset on industrial releases and transfers. Information beyond the requirements of the Kyiv Protocol was determined to be efficiently collected. Concerns were raised about coherence of the E-PRTR with data reported under related environmental legislation, such as the IED and waste legislation. The E-PRTR has particular relevance by providing a publicly available dataset that aids transparency and public participation in setting environmental policy. Finally, the evaluation determined that the E-PRTR provides added value for the public, operators and policymakers as it ensures consistent implementation of the Kyiv Protocol, enabling comparative assessments between Member States.

The E-PRTR evaluation identified the following areas for refinement:

- Updating the existing EU-level guidance to aid consistent interpretation of reporting requirements.

[43] https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer
[44] See details in Annex 3, Chapter 3
45 https://circabc.europa.eu/ui/group/f80de80b-a5bc-4c2b-b0fc-9c597dde0e42/library/f2f2de66-2d30-453a-adaf-0a0c51a67ffe?p=1&n=10&sort=modified_DESC
46 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513176768325&uri=SWD:2017:710:FIN and https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513176822493&uri=SWD:2017:711:FIN
47 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1513173747248&uri=COM:2017:810:FIN

- Further harmonisation with closely related environmental reporting.
- Addressing areas of weakness in reporting such as waste transfers, diffuse emissions and releases in products
- Simplifying the triennial obligation for Member States to report on E-PRTR implementation.
- Providing more contextual data to improve the E-PRTR's effectiveness as a comprehensive source of environmental information, including on environmental performance.
- Raising awareness of the E-PRTR and increasing user numbers.

Review of E-PRTR implementation and related guidance

A subsequent Commission study '*Review of E-PRTR implementation and related guidance*'[48] reviewed the completeness of the E-PRTR activities, pollutants and thresholds compared with the IED, with the needs of other European environmental legislation, with recent work by the OECD to harmonise international PRTR definitions of sectors and pollutant lists, and with emerging evidence on new activities and pollutants of concern. The work identified and suggested the inclusion of additional activities and pollutants to improve the E-PRTR's alignment with the IED, other European Union medium-specific legislation and emerging environmental concerns.

Suggested revisions to the list of E-PRTR activities included adding magnesium oxide production, carbon capture and storage and a new metal-working activity; revising E-PRTR sub-activity definitions to align with the IED for cement and lime production and hazardous waste management; lowering the capacity threshold for combustion plants to 20 MW to include larger facilities covered by the Medium Combustion Plant Directive (MCPD); and lowering the capacity threshold from 100,000 population equivalents (p.e.) to 15,000 p.e. to capture 90% of releases from plants covered by the Urban Waste Water Treatment Directive (UWWTD). A top-down approach to estimating releases to air and water from cattle rearing was also elaborated.

Relevant pollutants not currently in the E-PRTR but which are covered by a number of initiatives focussed on environmental protection were identified by reviewing:

- Annex II of the IED;
- Pollutants with associated emission levels in BAT conclusions;
- The Water Framework Directive (WFD) priority substances and watch lists;
- The Stockholm Convention and Gothenburg Protocol;
- The OECD short list of PRTR pollutants; and
- Substances of concern in other scientific literature.

A total of 38 pollutants were suggested for addition to the E-PRTR pollutant list to enable more comprehensive tracking of environmental initiatives. Twenty-four of the pollutants listed in the E-PRTR Regulation Annex II have been banned or severely restricted and have been reported in low quantities in recent years. However, their retention was advised

48 https://circabc.europa.eu/ui/group/f80de80b-a5bc-4c2b-b0fc-9c597dde0e42/library/b4eacd6d-4425-479a-a225-77306de6b060?p=1&n=10&sort=modified_DESC

since their removal would impact historical time series as well as international comparisons of environmental pressures.

The degree of capture of industrial releases by the current E-PRTR lists of activities and pollutant reporting thresholds was also evaluated to assess whether the target 90% capture of all industrial releases was being achieved by the E-PRTR. The work concluded that for some pollutants less than 90% of releases were being captured. Lowering the reporting threshold for 11 pollutants to air and 14 pollutants to water would enable 90% capture of all industrial releases of these pollutants. The work also concluded that reducing activity capacity thresholds to capture smaller facilities would not necessarily increase the amount of release reported. Numerous smaller facilities individually release smaller amounts of substances and may therefore be below the pollutant reporting thresholds. The current E-PRTR annexes (I and II) do not set activity-pollutant reporting thresholds that would enable the E-PRTR reporting to be more targeted and complete.

The project also proposed possible revisions to the E-PRTR Guidance document that aim at improving the consistency, coherence and quality of data reported to the E-PRTR by Member States. This work was based on reviews of national facility reporting guidance and consultation with industry trade associations. The recommendations were designed to help operators and competent authorities to allocate resources to quantifying and reviewing releases more effectively and included a sector-specific approach to E-PRTR reporting requirements (e.g. prescribing or permitting different quantification methods such as use of continuous monitoring or top-down versus bottom-up approach, defining pollutants that should be present in significant quantities and different release thresholds).

Problems to be tackled

Based on this evaluation and wider implementation feedback, six overarching problem areas, and an additional seven sub-problem areas, have been identified, namely:

1) Activities and activity thresholds:
   a) Updating activity thresholds to capture 90% of releases and transfers for existing activities,
   b) Adding additional activities and or sub activities (and thresholds to be defined) to be consistent with IED and other media-specific issue monitoring
2) Pollutants and their thresholds
   a) Updating pollutant thresholds to capture 90% of releases and transfers for existing and newly identified activities
   b) Adding additional pollutants (and thresholds to be defined) to be consistent with IED and other media specific issue monitoring
3) Adding detail to reports to support the tracking progress of industry towards circular economy
4) Reporting modalities and data flow:
   a) Efficiency and interoperability of reporting
   b) Reporting timeframes and the time lag of reported data
   c) Quality of reporting
5) Quality of reports and the accessibility of the E-PRTR data for the public

6) Releases from diffuse sources and products.

These problems are outlined in more detail below, with a focus on description of the problem, the relevant drivers, how the problem may evolve without any further policy intervention and who is impacted.

2.1 Problem 1a: Current activity thresholds and definitions

Summary

There is a lack of completeness in the reporting under identified activities in the E-PRTR. The E-PRTR is not capturing the targeted percentage (90%) of releases from industrial activities currently defined in the reporting requirements (Section 2.1.2). The original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. In addition, the definitions and thresholds of some activities are inconsistent with the IED and other legislation such as the MCPD and UWWTD. Industrial activities operating in Europe have evolved since the E-PRTR came into force and therefore the thresholds for the activity list in Annex I needs to be reviewed and updated to ensure 90% data capture today. The reporting thresholds do not guarantee capture of 90% of releases and transfers from industrial facilities.

Is there a problem?

Some activity thresholds do not guarantee capture of 90% of releases and transfers from industrial activities within Europe (Section 2.1.2). There are also inconsistencies in thresholds and activity descriptions between the IED and E-PRTR activity lists. Additionally, medium combustion plants, and the majority of urban waste water treatment plants within scope of the UWWTD legislation, are not within the scope of the E-PRTR activity list. There is currently limited data collection under the UWWTD and MCPD. This will create under reporting and an incomplete picture of industrial impacts for existing activities across Europe.

Why is it a problem and what are the main drivers?

Under-reporting, resulting from thresholds for reporting being too high, will result in poor understanding of the releases from industrial activities. Under-reporting along with misalignment with related EU legislation, e.g. IED, MCPD, UWWTD, results in an inability to monitor progress for these policies, or inform decision making effectively. The current E-PRTR does not provide flexibility for ensuring thresholds capture sufficient reported transfers and releases.

What is the scale and trend of the problem?

Six activities, 5(a), 5(b), 5(c), 3(c), 1(b) and 5(g), are misaligned with the IED activity list, either in capacity threshold or activity description. The IED Impact Assessment is additionally proposing the lowering of thresholds for further activities that could potentially increase the misalignment between the E-PRTR and IED activity lists. Additionally, activities 1(c) and 5(f) have capacity thresholds that could be lowered to

capture releases and transfers from sites under the MCPD or a higher proportion of those under the UWWTD legislation. For example, lowering the capacity threshold for combustion plants to 20 MW to include larger facilities covered by the MCPD. This would add approximately 9% of additional NO_x releases to air through adding around 6,300 facilities but would also require lowering of the pollutant reporting threshold (see Section 2.2.3).

Who is impacted by the problem and how?

All stakeholders are impacted by an incomplete capture of releases and transfers from industrial sectors due to outdated activity thresholds and descriptions. The incomplete dataset could lead to a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.2 Problem 1b: Missing activities and sub activities

Summary

As previously stated the original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. Industry in Europe has changed since the E-PRTR came into force in 2006 with new activities becoming more widespread. Therefore, the activity list in Annex I needs to be updated. Missing activities mean that the E-PRTR does not provide a complete picture of releases and transfers and cannot be used as a tool to fully understand impacts and ensure coherent environmental policy.

Is there a problem?

The E-PRTR provides an incomplete picture of the important European industrial activities. There are a range of emerging sectors with significant releases of pollutants, which are not yet included in the E-PRTR Annex I activity list. Importantly, there are inconsistencies between the IED and E-PRTR activity lists meaning that some IED activities that are not reported in the E-PRTR. This will be providing an incomplete picture of industrial impacts across Europe.

Why is it a problem and what are the main drivers?

New and emerging sources with increasingly significant impacts are not in the list of reporting activities and therefore not reporting to E-PRTR. Several new industrial sources, that were not producing a significant amount of pollution when the legislation was originally introduced, could be important now because of changes in processes (e.g. CO_2 storage), increased activity (e.g. battery production) and/or identification of new pollutants of interest. Additionally, there are some activities not included in the E-PRTR that are included in the IED, and therefore an inability to monitor progress for this policy completely. Another driver is changes in industrial process, development and importation of new products and/or increasing intensity of production.

What is the scale and trend of the problem?

Fourteen new activities and sub activities have been so far identified for inclusion (Section 3.2.2). Some examples are:

1) Adding magnesium oxide production to the E-PRTR activity list would enhance coherence with the IED and add some 14 facilities. Likewise, adding carbon capture and storage to the E-PRTR would also increase IED coherence although the additional number of facilities is uncertain as only pilot-scale plants currently operate in the EU.
2) Adding a new metal-working activity would ensure a more complete E-PRTR coverage of the manufacture of motor vehicles, computer, electrical, transport and other equipment. Comparison with international PRTRs shows high releases of metals to air and water from these sectors, for which further investigation of source processes is needed.

- ***Who is impacted by the problem and how?***

All stakeholders are impacted through an incomplete and skewed perspective of the important releases and transfers from industrial activities due to missing activities of importance. The incomplete dataset could lead to a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.3 Problem 2a: Existing pollutants and thresholds

Summary

The Annex II pollutant list is out of date. Reporting thresholds require adjusting for existing pollutants or groups of pollutants to improve the capture of industrial releases, as some reporting thresholds do not guarantee capture of 90% of releases from industrial facilities.

Is there a problem?

The E-PRTR dataset is incomplete as some pollutant reporting thresholds do not guarantee capture of 90% of releases from industrial activities (Section 2.1.2). There are also no provisions for updating the thresholds when new evidence emerges. .

Why is it a problem and what are the main drivers?

The incomplete capture for some important pollutant releases in the E-PRTR (through inadequate thresholds) leads to a partial and skewed perspective of the most important pollutants and industrial activities. This results in poorly focused policies to reduce releases and undermines the credibility of the E-PRTR dataset for decision making. There is currently no provision for dynamic adaptation or updating of annexes to respond to recent scientific findings on new or existing pollutant impacts. The current E-PRTR

Regulation also does not provide flexibility for ensuring thresholds capture sufficient reported transfers and releases.

What is the scale and trend of the problem?

Previous analysis identified that lowering the reporting threshold for 11 pollutants to air and 14 pollutants to water would enable 90% capture of all industrial releases of these pollutants. Analysis indicated that there is already 90% capture of all industrial releases for 30 pollutants to air and 35 pollutants to water.

Who is impacted by the problem and how?

All stakeholders are impacted through an incomplete and skewed perspective of the important releases and transfers from industrial activities due to inappropriate pollutant thresholds. The incomplete dataset could result in a lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policy options and or private sector investment that do not effectively address the problem.

2.4 Problem 2b: Additional pollutants

Summary

Resent analysis of science and emerging environmental and health issues (including media specific policies and legislation) have identified new pollutants of concern emitted by industrial activities that are not in the E-PRTR Annex II list. It is important that industry reports on these pollutants and the pollutants are assigned appropriate thresholds.

Is there a problem?

Yes, the E-PRTR does not include some emerging pollutants considered important and does not include some pollutants of concern that are covered by other EU legislation.

Why is it a problem and what are the main drivers?

The current E-PRTR reflects 2006 understanding of the main environmental issues associated with Annex I activities and related processes and pollutants. New pollutants and environmental issues have risen in prominence since then. Additionally, there is currently no provision for dynamic adaptation or updating of annexes to respond to recent scientific findings on new pollutant impacts.

What is the scale and trend of the problem?

Adding the 38 pollutants identified in previous analysis to the E-PRTR pollutant list would improve alignment with the IED, European media-specific legislation, and other PRTRs, enabling more comprehensive tracking of environmental initiatives.

Who is impacted by the problem and how?

All stakeholders are impacted by lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.5 Problem 3: Information to track progress towards the circular economy and decarbonisation of industry

Summary

The European Green Deal commits the Commission to revise EU measures to address industrial pollution to make them more consistent with climate, energy and circular economy policies. This will contribute towards the zero-pollution agenda. The Green Deal commits, inter alia:

- Adopting an action plan towards a zero pollution ambition.
- Revising EU measures to address pollution from large industrial plants, including both the IED and the E-PRTR.

The E-PRTR, in combination with related legislation such as the IED, has untapped potential for contributing to the EU's circular economy objectives by providing transparency on industrial performance:

- There is a benefit in the reporting of additional data on resource consumption, e.g. use of energy, water, raw materials. This also has linkages with options under consideration in the IED revision, e.g. mandatory application of BAT-AEPLs related to resource consumption.
- There is also no transparency around the transfer of pollutants in the data reported to the E-PRTR. The E-PRTR needs proper tracking of pollutants in transfers and their storage, export or final release (particularly waste and waste water).

Additionally, the European Union has committed to reach net GHG emissions of 55% of 1990 levels by 2030. The E-PRTR offers a mechanism to efficiently track progress with the reduction of GHG emissions from a range of GHG intensive activities. Transparent integration between E-PRTR and EU-ETS reporting is needed to provide stakeholders with sufficiently transparent information for decision making. Although the verified emissions under EU ETS are publicly available, any underlying background information on activity levels is not. Such information forms part of the confidential verification reports and is not available for public scrutiny. With suitable provisions the E-PRTR could provide relevant background data for benchmarking and assessing industrial environmental performance within and across sectors.

Is there a problem?

The E-PRTR does not currently provide information that would help stakeholders (citizens, NGOs, competent authorities, Member States, the Commission) track the performance of

industry in contributing to the Green Deal, energy or circular economy commitments. Data on the composition of waste transfers and data on resource consumption (e.g. energy, raw materials and water) are currently not included or only partly included. It is important to note however, production volume will be a mandatory field under the integrated E-PRTR/LCP reporting from the 2021 reporting year (to be reported in 2022), although individual data points won't be made publicly available. This additional information could be an important contribution to realising the circular economy objectives, although this will be limited for the public and external data users. Additionally, evaluation of this information and releases reported under the E-PRTR and EU-ETS, can inform the IED's BAT information exchange process and the identification of installations with good environmental performance and energy efficiency. There are however gaps and difficulties in linking the datasets.

The current E-PRTR reporting requirements also do not facilitate transparency around releases of GHGs and other pollutants from EU-ETS facilities by linking EU ETS installations to E-PRTR facilities. The EU Registry collects installation EU-ETS IDs, thus potentially allowing correlation with IED installations and their parent E-PRTR facilities. This will allow comparison with emissions reported under the EU-ETS with those reported to the E-PRTR.

Why is it a problem and what are the main drivers?

Industry plays a critical role in delivering commitments to the Green Deal, climate, energy and circular economy policies. However, the E-PRTR does not provide sufficiently transparent information (resource use and production data and activity (e.g. technologies/practices used/waste compositions etc.). Neither does it provide pollutant breakdown (e.g. hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) which have different global warming potentials (GWPs)) for decision making around priorities, potential synergies and conflicts for GHG emission reductions and other environmental issues and impacts (e.g. circular economy; air, water and soil pollution). It also does not provide transparency on the role played by EU-ETS as a targeted policy on large industrial activities responsible for significant greenhouse gases that can also have an impact on air pollutant emissions as well as other pressures on health and the environment (e.g. water and resource use and soil and water contamination). . Reporting already exists for the EU-ETS but it is not consistent with E-PRTR reporting. There are differences in scope (e.g. reporting on biomass burning is excluded from EU ETS and EU ETS is focussed on a much narrower range of industries) and detail (e.g. EU ETS reports at a more granular installation level rather than E-PRTR facility level) of reporting, reporting frequencies (where updates on EU ETS and E-PRTR are not in sync) and modalities (where datasets are difficult to align with missing linking IDs) which increase burden and reduce transparency.

What is the scale and trend of the problem?

There is poor transparency in the E-PRTR data with the majority of reports lacking in relevant voluntary activity data reporting. In addition, the composition of waste transfers and data on resource consumption (e.g. energy, raw materials and water) are currently not

included or only partly included in the E-PRTR. There is no noticeable trend in improvement to the voluntary reporting. The lack of completeness and poor detail (in activity and pollutant breakdown) means that environmental performance benchmarking cannot be done for any groups of activity or for the E-PRTR dataset as a whole. The E-PRTR is therefore not able to contribute to driving the circular economy objectives or assessing the carbon or resource efficiency of different industrial activities.

Who is impacted by the problem and how?

Industry, competent authorities and government policy makers are impacted by a lack of ability to benchmark performance of facilities for individual and groups of activities in the E-PRTR. If industry and policy makers do not have access to information that can highlight good and bad performers there is more limited scope to understand and drive environmental performance in support of Green Deal, climate, energy and circular economy objectives. Ultimately, the public are impacted through ineffective action to improve the quality of the air, water and soil. Industry also risk poorly formed investment strategies and government policies risk unforeseen negative impacts, poor public engagement and levels of trust.

2.6 Problem 4a: Reporting modalities

Summary

For some categories of activity, in particular farming, reporting releases can be a significant burden on reporters due to the number of facilities and difficulties in quantifying releases accurately. Estimates using a top-down approach for some diffuse industrial sectors (where there is a large number of smaller operators such as in farming or in gas distribution) may reduce the reporting burden and improve data quality.

Is there a problem?

Yes. A large number of small diffuse facilities (e.g. farming) face a disproportionally higher burden of reporting (effort per unit of release reported) and consequently there is a risk to data quality.

Why is it a problem and what are the main drivers?

Activities with a large number of diffuse facilities with relatively low releases per facility and little or no trained expertise in estimating releases face a disproportionate burden on their reporting. These industries consist of relatively few personnel with the time or training to engage in accurate reporting. Facilities are often unable to dedicate the time needed to develop and generate accurate estimates for the relatively complex activities.

What is the scale and trend of the problem?

For accurate reporting across a large number of small facilities the burden (person days) of reporting is considerable per data point provided in reports. As an example, in 2017, 8,157 (20%) of the E-PRTR facilities reported were farms. For each of these facilities to be able

to collect data and manage reporting is a burden on the sector. The possibility of including cattle farms in the E-PRTR activity list would increase the number of diffuse small facilities further, increasing the burden on operators of reporting per data point reported. If the E-PRTR is to capture more diffuse facilities with a large number of operators, then the burden of reporting will continue to increase disproportionately.

Who is impacted by the problem and how?

Small operators e.g. livestock farms through time needed to compile reports. Awareness raising, data gathering, verification and processing along with basic training for reporting of this number of small and transient entities is also an added challenge for competent authorities.

2.7 Problem 4b: Time lag and data flows in reporting

Summary

The time lag (reporting every in reporting means decision making is based on data that are over two years old once it has been compiled, reported verified by competent authorities and submitted to the EEA. The current data flow could be modernised, making use of advances in CEMs, tele-monitoring technology and automated verification and machine learning approaches to improve the speed and quality of reporting and availability of data for decision making.

Is there a problem?

Yes: The time lag in reporting inhibits timely flows of information to citizens and decision makers.

Why is it a problem and what are the main drivers?

Current data reporting and collection approaches and tools create significant time lags in data becoming available to inform the public and do not optimise opportunities for the capture of good quality data. Drivers for this problem include out-dated non-automated reporting systems in some Member States and a significant manual burden and therefore time-lag in submitting reports by facility operators, processing, aggregating, checking and submitting data by competent authorities to EEA and verification of data by the EEA.

What is the scale and trend of the problem?

The scale relates to the whole E-PRTR dataset and creates a lack of transparency on releases and transfers that have occurred in the most recent year. The E-PRTR dataset is less useful for modelling pollution releases due to this time lag. The problem could get worse if more data from many more facilities are included in the E-PRTR and conventional data collection and verification methods continue to be used. If the data flow can be more standardised and automated with automatic verification and rejection procedures, then the time-lag could be reduced to just over a year (because facilities reports for the years operation previous will be processes quickly).

Who is impacted by the problem and how?

All users of the E-PRTR data are impacted by slow visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

2.8 Problem 4c: Inconsistent and incorrect reporting

Summary

There are inconsistencies and potential issues with the reported E-PRTR data resulting in poor accuracy, incomplete and in-transparent data, including:

Inconsistent pollutant reporting and quantification methods used by facilities in the same sector.

A lack of clarity on whether data is absent due to incomplete reporting or non-applicability or below threshold for a particular facility.

Poor administrative information on location, methodology used and tagging of release or transfer.

Is there a problem?

Yes. Problems include:

- Reporting in incorrect units or with typos in the numerical information creating.
- Incorrect co-ordinates (located outside of Europe).
- Incorrect methodology reporting applied.
- Potential missing releases and transfers.
- Pollutant releases to water being reported as pollutant transfers and vice versa.
- Inconsistencies in measurement or calculation methodologies between reporters.

Why is it a problem and what are the main drivers?

This problem affects the accuracy, completeness and transparency of the E-PRTR and undermines its credibility and usefulness to decision makers and the public. It is hard for competent authorities and users to distinguish if data are missing or just below threshold. Drivers include a lack of clarity in the E-PRTR guidance and poorly trained and under resourced operator reporting functions at facilities.
These issues also restrict the use of the data, often when using the data in analyses then erroneous data must be removed or corrected[49].

49 https://www.eea.europa.eu/publications/costs-of-air-pollution-2008-2012

What is the scale and trend of the problem?

A range of studies and reports about the E-PRTR points to discrepancies between countries and sectors for many data fields. The new EU Registry and Integrated E-PRTR/LCP reporting flows, with more vigorous online QA, has to some extent improved the data quality. However, a number of issues such as potential missing releases and transfers and incorrect methodology reporting have not been improved by the new reporting flows. The problem will continue with added facilities and pollutants.

Who is impacted by the problem and how?

All stakeholders are impacted by the quality of the data. Poor quality data being used by decision makers could lead to policies and or private sector investment that do not effectively address environmental problems from industrial activities.

2.9 Problem 5: Access to E-PRTR information

Summary

Public awareness and usage of the E-PRTR could be improved to increase participation in decision making and understanding of the environmental impacts of large industrial installations. The E-PRTR is currently a complicated dataset that requires explanation of its structure to most data users, such as members of the public, academics and NGOs, and is only available in English. There is a lack of contextual information for comparing environmental performance and relationship to regulatory requirements for researchers. It does not allow engagement with interested groups in seeking options for improving the environment.

Is there a problem?

While the evaluation concluded that many different stakeholders use the E-PRTR, there is always a possibility to increase its use. In particular, the E-PRTR website is only available in English. This may be reducing engagement and/or interest in the E-PRTR data.

Why is it a problem and what are the main drivers?

If the E-PRTR is not accessible and relevant to the public, it is not serving its core purpose. Lack of contextual information has been suggested as one factor limiting the usefulness for the public, e.g. data on production volumes to enable some degree of benchmarking of facilities.

What is the scale and trend of the problem?

The scale of the problem is partially defined by the number of times the E-PRTR is accessed and then information is used by the public and other stakeholders to engage with environmental decision-making processes. The scale of the problem is additionally defined by how, and how often, E-PRTR data are used in analysis and studies on environmental concerns within Europe by academia and NGOs.

Who is impacted by the problem and how?

Citizens and NGOs by lack of visibility of current, new and emerging environmental problems resulting from industrialised activity and inability to plan for and/or address future problems.

2.10 Problem 6: Releases from diffuse sources and releases from products

Summary

Citizens, NGOs, competent authorities and the Commission need information on releases from smaller installations within (agro-)industrial activities that are collectively significant (small farms, diffuse energy extraction) but individually below current capacity thresholds. Additionally, many new and emerging products contain pollutants that are released once these products have left the factory and are then used or disposed of. The Aarhus Convention also includes that releases from diffuse sources such as transport and residential combustion should be incorporated.

Is there a problem?

Yes: As there are activity thresholds, small installations do not report to the E-PRTR. While releases from these smaller installations are low, collectively these could be significant for some sectors. Excluding these will give an incomplete picture of releases from industrial activities within Europe. Additionally, releases from products can affect the environment after they have left the factory. In addition, to note, the Aarhus Convention also requires releases from diffuse sources such as transport and domestic combustion to be calculated.

Why is it a problem and what are the main drivers?

As well as a pollutant and release transfer register the E-PRTR is seen as an inventory of releases and transfers from industrial sectors within Europe. Omitting smaller installations below the activity thresholds and products that release pollutants would provide an underestimate of releases from the industrial sector within Europe. Additionally, a significant driver is the Aarhus Convention, which includes a requirement to calculate releases from diffuse sources such as transport and domestic combustion.

What is the scale and trend of the problem?

The scale of the problem is currently unknown.

Who is impacted by the problem and how?

All stakeholders are impacted by lack of visibility of new and emerging environmental problems resulting from industrialised activity and inability to plan for or head off future problems, e.g. policies and or private sector investment that do not effectively address the problem.

Annex 7: Definition of options

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1. POLICY OPTION 1 – MORE EFFECTIVE LEGISLATION

Twenty-four measures have been retained after screening as relevant for addressing the general effectiveness of the current legal acts.

PO1 groups the **24 individual measures** (IED#1-16 and E-PRTR#1-6 and #8-#9), into the following **4 policy sub-options** addressing the action needed to resolve a variety of issues across the two pieces of legislation.

PO1- More effective legislation
PO1-a-achieving BAT-AELs (IED#1-#5): Alternative 1 **clarify flexibilities: (IED#1#-#4).** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water quality Alternative 2 **full BAT potential: (IED#1-#4 AND IED#5).** Clarify the rules on derogations, indirect releases of pollutants to water and on taking environmental quality standards into account, and ensure transparent monitoring of related impacts on air and water quality **AND** require consideration of the full BAT-AEL range when setting ELVs in permits**.** **PO1-b-implementation and enforcement (IED#6-#9):** Empower competent authorities to suspend the operation of non-compliant plants, harmonise the rules to assess plants' compliance with their permits, make the provisions on penalties more stringent and improve transboundary cooperation in permitting. **PO1-c-rights of the public (IED#10-#13 and E-PRTR#1-#4):** Alternative 1 **public rights: (IED#10-#13 and E-PRTR#1, 3 & 4).** Improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available and requiring systematic public participation in permit reviews. Alternative 2 **enhanced public rights: (IED#10-#13, E-PRTR#1, 3 & 4 AND E-PRTR#2)** improve and expand the public's access to information, participation and access to justice (including effective redress) by making clear permit summaries publicly and digitally available, requiring systematic public participation in permit reviews **AND** more granular reporting of emissions to E-PRTR in an INSPIRE-compliant manner**.** **PO1-d- simplification (IED #14-#16 and E-PRTR #5-#6 and #8-#9):** clarify certain definitions and activity descriptions, delete the indicative list of pollutants in Annex II, compliance assessment rules under Chapter II of IED to take precedence over rules in other chapters and top-down reporting for livestock farms and aquaculture.

Measures included in Option PO1 sub-options are outlined in the table below.

Ensuring that BAT-AELs are achieved
IED #1 Introduce a time limit for derogations granted under Article 15(4). *Article 15(4) of the IED allows derogations from paragraph 3 of Article 15 of the IED, allowing competent authorities to issue less stringent permit limit values than BAT-AELs for operators meeting certain criteria. The IED does not indicate whether derogations can be provided indefinitely nor does it indicate if there is an upper limit on a derogation period. Evidence has been identified suggesting that some derogations have been granted without specifying an end date of the derogation, and thus the date from which BAT-AELs would apply. This measure would seek to address this.*
IED#2 Mandate the application of a standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits for assessing applications for derogations under Article 15(4). *Article 15(4) of the IED permits a derogation from where achievement of emission levels associated with BAT would lead to disproportionately higher costs compared to the environmental benefits due to (a) the geographical location or the local environmental conditions of the installation, or (b) the technical characteristics of the installation. The measure will aim to standardise the approach to assessing disproportionality between costs and benefits for derogations under the IED, raising standards in the Member States where this is currently underdeveloped.*
IED#3 Amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to

an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases. *Article 15(1) states that emission limit values apply at the point when the pollution leaves the installation and clarifies that the effect of any processes which dilute the final emission should be disregarded. There is an exception for indirect releases to water. This measure would adjust the exception for indirect water pollution to ensure that it is clear that, at a minimum, any indirect release to water (i.e. from a waste water treatment plant) would be no more polluting than if treated at the installation employing BAT.*
IED#4 Amend Article 18 to require that stricter ELVs are set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions. *As part of the IED evaluation, some stakeholders suggested that the current wording of Article 18 is not specific enough with regard to concrete actions that must be carried out (the Article 18 currently refers to 'additional measures').*
IED#5 Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the starting point is the lower limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT conclusions only allows meeting a higher ELV within the BAT-AEL range. *The measure would seek to encourage a tightening of the emission limit values in permit conditions for installations across the EU employing a relatively harmonised approach. It is not foreseen as a means to make lower BAT-AELs mandatory. Competent Authorities will be able to make decisions on a case-by-case basis, continuing to account for local environmental conditions and the technical characteristics of the installation, i.e. allowing for the possibility to set ELVs higher in the BAT-AEL range. The emphasis however is to begin the considerations at the lower end of the BAT-AEL range.*
Homogenizing and enhancing enforcement
IED#6 Allow Member State Competent Authorities to suspend non-compliant installations in cases where non-compliance (Article 8) causes significant environmental degradation until compliance is restored.
IED#7 Introduce common rules for assessing compliance with emission limit values under Chapter II of the IED. *The measure intends to improve legal certainty and eliminate varied interpretation of compliance. Some areas where a common approach to the assessment rules would be beneficial have been identified in previous studies* (Ricardo, 2020). *These include the clarification on the role of measurement uncertainties in determining compliance with ELVs and a more structured approach towards compliance with ELVs for combined waste water streams from different processes or installations.*
IED#8 Require Member States, in determining the penalties under Article 79, to give due regard to the nature, gravity, extent and duration of the infringement as well as the impact of the infringement on achieving a high level of protection of the environment. *There is currently no monitoring or register of penalties imposed on non-compliant installations. Therefore, a system for monitoring the penalties/new requirements would need to be set up by the EC as part of implementing this measure. The monitoring and enforcement responsibilities would also be on the EC.*
Tackling transboundary pollution
IED#9 Add a new provision in, or linked to, Article 26 for requiring effective multidisciplinary cooperation among competent national administrative, law enforcement and judicial authorities in cases of transboundary pollution, and for Member States receiving a request for cooperation to respond within three months of receipt. *The measure aims to increase the cooperation between the relevant competent authorities in order to limit the impact of transboundary emissions.*
Improving and expanding the public's access to information
IED#10 Require that information from Member States' monitoring of the impact of Article 15(4) derogations is made publicly available. *Currently, the IED does not require public authorities to publish the environmental impact of granted derogations. Therefore, this measure would address this to ensure that the public has access to information related to the impact that these derogations have on the environment.*
IED#11 Widen scope of public participation under the permitting procedures based on the recommendations by the Aarhus Convention Compliance Committee. *This measure would align public participation in permitting procedures with the recommendations by the Aarhus Convention Compliance Committee (ACCC), made under case ACCC/C/2014/121.*

IED#12 Introduce a requirement for a uniform permit summary to be made public. The 'uniform permit summary' shall include an overview of the ELVs regulated and monitoring frequency and the timings for permit reconsideration or reviews. Add a template of the 'uniform permit summary' to the IED provision covering at least the format and content requirements. *This measure would improve the accessibility of information for the purposes of public engagement activities under Article 24(2) of the IED.*
IED#13 Amend the legislation to state that 'the competent authority shall make available to the public by publishing open-access on the internet' the information requirements listed in Article 24 (2) free of charge and without restricting access to registered users. *The existing legislation requires competent authorities to publish information when a decision on granting, reconsideration or updating of a permit has been taken, but does not specify how the public should be able to access the information. Public access to information across Member States is, therefore, inconsistent at present. This measure would clarify that information should be open access, for example, removing the possibility that competent authorities require some form of payment to access the data.*
E-PRTR#1 Reduce reporting thresholds for some existing pollutants to better meet the aim of 90% capture. *As a result of better environmental controls, mainly under the IED, the releases of some pollutants have reduced to such an extent that the Annex II reporting thresholds no longer fulfil the original aim of capturing 90% of releases from industrial facilities. For these pollutants, there is an incomplete picture of where the main releases occur. This measure would re-calibrate reporting thresholds to, once again, ensure 90% capture of industrial releases.*
E-PRTR#2 Introduce sub-facility reporting. *Whilst E-PRTR reporting is at the level of 'facility', the IED sets regulatory controls at sub-facility level i.e. for 'installations'. Since there may be several IED installations in an E-PRTR facility, this restricts the extent to which E-PRTR data can support the IED. This measure would entail reporting releases/transfers on an installation basis rather than aggregating to the facility level. The benefits of reporting at this level would be greater data granularity thus enabling better matching to individual activities.*
E-PRTR#3 Add active operator confirmation that releases are below the reporting threshold. *Currently, operators submit release data when the release of a pollutant exceeds a reporting threshold. In the absence of an operator return, it is presumed that releases are below the threshold but this is not always the case. This measure would require positive operator confirmation that releases are below reporting thresholds and therefore avoid the ambiguity of missing values. This would improve the overall clarity and quality of E-PRTR data.*
E-PRTR#4 Mandate the monitoring/calculation/estimation (M/C/E) hierarchy. *E-PRTR currently allows for releases/transfers to be quantified by either measurement, calculation or estimation (M/C/E). Measurement is preferable as it usually provides the most accurate data but it also costs more. Data comparisons are difficult where different facilities have used different approaches. This measure would mandate the M/C/E hierarchy for reporting i.e. releases/transfers should be measured where possible and calculation should take precedent over estimation. This will improve overall data quality and comparability.*
Clarifying and simplifying existing legal requirements
IED#14 Amend the legislation to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants as well as to biogas plants.
IED#15 Delete Annex II of the IED "List of polluting substances". *The list of polluting substances in Annex II of the IED can be limiting and become outdated in the consideration of key environmental issues (KEI) addressed in the BREF review process. This measure would delete Annex II because it is already the requirement for the BREF process to consider all KEIs, including any new and emerging, environmental issues and pollutants.*
IED#16 Introduce a provision in Chapter II of the IED setting out that the compliance assessment rules for Chapter II installations take precedent over other compliance assessment provisions for those installations. *There are currently issues caused by discrepancies in emission limit values set out for combustion plants and waste incineration plants in the IED under Annex V and VI, and requirements set out in the LCP BATC. This includes differences in averaging periods, leading to operators and competent authorities needing to assess compliance for the same pollutants and processes multiple times, which causes unnecessary administrative burden. However, Annex V ELVs can be an important environmental backstop for combustion plants that*

have received an Article 15(4) derogation and as would not be required to comply with BAT-AELs. The measure would, therefore, introduce a new provision in Chapter II for compliance assessment that takes precedence over other provisions for those installations and is linked directly to the BAT conclusions, whilst Annex V ELVs are retained as a safety net.
E-PRTR#5 Establish a 'sunset list' to remove pollutants that are no longer of concern. *The E-PRTR's list of pollutants was established in 2006 and includes substances that are banned and are therefore not released from EU facilities. This measure would create a more dynamic mechanism to identify a list of pollutants for future removal due to them being no longer relevant (a 'sunset list').*
E-PRTR#6 Clarify that activity 3(a) covers upstream oil and gas facilities. *Whilst activity 3(a) ('underground mining and related operations') was always intended to cover the extraction of crude oil and natural gas, there has been inconsistent MS reporting despite Commission guidance. This measure would explicitly mention upstream oil and gas industries in the Annex I activity list. This will reflect current interpretation.*
E-PRTR#8 Reword 5(d) landfills activity description to include flaring of vent gas. *This measure would clarify the current interpretation that activity 5(d) includes pollutant releases arising from the flaring of landfill vent gases.*
E-PRTR#9 Add an option for top-down reporting for activity 7 (livestock production and aquaculture). *For some categories of activity, in particular farming, reporting releases can be a significant burden on operators due to the number of facilities and difficulties in quantifying releases accurately. This measure would introduce the option for using a top-down approach to estimating releases for sectors where there is a large number of smaller operators. This would reduce the reporting burden and improve data quality.*

2. POLICY OPTION 2: ACCELERATING INNOVATION

2- Accelerating innovation
Measures IED #17-#22 are structured into **three policy sub-options** that would seek to improve the IED's dynamism and support the uptake of innovative technologies and techniques. **PO2-a-frontrunners:** Facilitate the development and testing of emerging techniques *AND* allow more time for implementing these more innovative technologies and techniques **PO2-b-stimulate innovation:** Establish shorter BREF revision cycles ***(shorter BREFs cycle***) *OR* an INnovation Centre for Industrial Transformation & Emissions documenting innovation and recommending BREF revisions (***INCITE)*** **PO2-c-supporting transformation:** Allow more time to implement BATC if deep industrial transformation is required (***time***) *OR* establish a permit review obligation and require transformation plans (***plans***)

2.1. PO2-a: frontrunners

Policy option PO2-a focuses on facilitating the development and testing of more innovative and emerging technologies and techniques. PO2-a comprises two policy measures as outlined in the table below.

IED#17 Introduce legislative amendments to facilitate the development and testing of emerging techniques over a longer period. *In particular, this measure would seek to introduce a longer period, e.g. 24-36 months, during which operators are exempt from meeting BAT-AELs for pertinent sources of emissions whilst testing and/or developing emerging techniques. This would be an amendment of the 9 months currently referred to in Article 15(5).*
IED#18 Amend requirements to allow more time (6 to 8 years) for operators to implement emerging techniques with Technology Readiness Level (TRL) 8-9 or to enable the setting of stricter long-term Emerging Techniques Associated Emission Levels (ET-AELs), reflecting the expected environmental performance of emerging techniques, instead of just complying with BAT-AELs. Applicable to Key Environmental Issues only. *The measure will aim to promote [operationally] disruptive or significant achievements on environmental protection (rather than marginal improvements). This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of emerging techniques and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.*

2.2. PO2-b: stimulate innovation

Policy option PO2-b focusses on improving the flexibility of the BREF process to keep up with the latest technological advances, whilst maintaining the robustness and standards of the existing processes. PO2-b comprises two policy measure alternatives as outlined below.

IED#19 Establish shorter, up to 5-year, BREF cycles focused on defining stricter BAT-AELs based on recent innovations. *The measure would target innovations that could apply to new installations and major refurbishments but would not trigger a mandatory permit review for existing installations.*
IED#20 Establish the INnovation Centre for Industrial Transformation & Emissions (INCITE) to monitor the Technology Readiness Level (TRL) and environmental performance) of emerging and breakthrough techniques. Recognition by INCITE of advanced techniques with TRL 8-9 (or improved environmental protection) would suggest to trigger an update of BAT conclusions. *This means that INCITE would consider advanced techniques with TRL 8-9 (or improved environmental protection) and suggest to trigger, where pertinent, an update (e.g. for specific sections) of BAT conclusions. The measure would also provide INCITE with some powers to recommend a BREF review or update of BAT conclusions as pertinent.*

2.3. PO2-c: Supporting transformation

Policy option PO2-c focusses on facilitating sectoral transformation that is aligned with longer-term EU objectives. PO2-c comprises three policy measure alternatives as outlined below, the aims of which is that operators should retain their focus on contributing to the EU's long-term objectives, even if this may mean that they cannot keep up with short-term BAT conclusions.

IED#21 Amend requirements to allow operators to have more time to implement BAT conclusions where deep transformation of industrial sectors is required. 'Deep transformation' would refer to the adoption of completely different process routes and/or primary process techniques that facilitate a significant reduction in pollutant emissions and/or the use of energy, raw materials (i.e. secondary, or 'end-of-pipe' techniques would not qualify as 'deep transformation').
IED#22A Establish a permit review obligation by 2030 that focusses on the capacity of the installations to operate in accordance with the EU's general zero-pollution, circular economy and climate objectives. This measure comprises a requirement for installations to produce 'Transformation Plans' for review as part of this process and write results into the permit. Contents of Transformation Plans would be clarified in a Commission Decision at a future date.
IED#22B Requirement for installations to produce 'Transformation Plans' and integrate them in the environmental Management System. Contents of Transformation Plans would be clarified in a Commission Decision at a future date.

3. POLICY OPTION 3: CONTRIBUTING TO A NON-TOXIC AND RESOURCE EFFICIENT CIRCULAR ECONOMY

3- Contributing to a non-toxic and resource efficient circular economy
Measures IED #23-#26 (PO3-a, b and c below) and E-PRTR #10-#17 (PO3-d to g below) are structured into **seven policy sub-options** that would seek to contribute towards the use of safer chemicals, improved resource efficiency and the circular economy. **PO3-a-performance levels (IED #23, 24):** Introduce option for BREF Technical Working Groups (TWGs) to set binding environmental performance levels (so-called BAT-AEPLs) including for resource efficiency, water use efficiency and reuse, and waste generation) (***binding***), OR introduce both binding BAT-AEPLs AND performance benchmarks to be used in the Environmental Management System (EMS) (***binding and benchmarks***) **PO3-b-EMS (IED #25):** Require operators to address Resource Efficiency, Circular Economy and Chemicals Management in their EMS **PO3-c-symbiosis plans (IED #26):** Require Member States to produce national plans to promote industrial symbiosis **PO3-d-pollutants list (E-PRTR #10):** Dynamically updating the list of pollutants to be reported **PO3-e-report resource use (E-PRTR #11, 12, 13):** Require information to track progress in resource efficiency (including energy, materials and water) **PO3-f-tracking waste transfers (E-PRTR #14, 15, 16):** Require information to better track the nature and destination of waste transfers between installations (mainly concerns transfers between installations located within a Member State) **PO3-g-report on products (E-PRTR #17):** Require reporting releases from products

The following sub-sections provide a more detailed outline of the measures.

3.1. PO3-a-performance levels

This policy option (PO3-a) focuses on updating the status of BAT-AEPLs, to improve their effectiveness in encouraging energy, water and materials efficiency and the substitution of primary or fossil materials or fuels by secondary materials and renewables. PO3-a comprises two, alternative policy measures as outlined in the table below.

IED#23 Introduce the possibility to set binding resource efficiency and circular economy BAT-AEPLs. *This measure would intend to bring the status of BAT-AEPLs in line with that of BAT-AELs. Existing BAT-AEPLs would not become binding. Only a new, or review of a, BREF and its BAT conclusions would render the BAT-AEPL binding, where applicable.*
IED#24 Introduce an option to set either: • Resource efficiency and circular economy BAT-AEPLs, which would be binding through permit conditions or general binding rules; • Benchmark levels (associated with BAT), for which the inclusion in the EMS is obligatory. These can be chosen e.g. when there is large variability in the data due to important differences in products manufactured, or when one KEI is much more important than another. *The introduction of benchmark levels creates an opportunity to improve implementation of past BAT-AEPLs derived under the IED, or possibly even under the IPPCD. They can, retroactively, be assigned the status of benchmark levels, meaning it would become obligatory to address them in the EMS. Any review of a BREF and its BAT conclusions could then either review and update the benchmark levels or convert them into*

binding BAT-AEPLs if this is deemed preferable by the TWG.

3.2. PO3-b: EMS

IED#25 Require operators to incorporate a 'Resource Efficiency and Circular Economy Plan' and a 'Chemical Management System' at the installation level as separate sections of their Environmental Management System (EMS). Expand the scope of monitoring and reporting to cover resource efficiency techniques, indicators and performance levels, as well as the use of hazardous chemicals and the level of substitution for safer alternatives.

3.3. PO3-c: Symbiosis plans

IED#26 Require Member States' national authorities (or delegated competent authorities) to establish a national plan to promote industrial symbiosis. *This option acknowledges that industrial symbiosis is a cross-cutting, cross-sectoral activity and may require interactions and collaboration between actors beyond those regulated by the IED.*

3.4. PO3-d: Pollutant list

E-PRTR#10 Dynamically updating the list of pollutants to be reported. *Some pollutants of concern emitted by industrial activities are not in the E-PRTR Annex II pollutant list. It is important that industry reports on these pollutants. This measure would include a more dynamic mechanism to identify and include emerging pollutants of concern ("sunrise list") within the E-PRTR Regulation e.g. enabling the Commission to identify and include new pollutants in the future via delegated acts. This could include pollutants which have the potential to become important for environmental issues in Europe.*

3.5. PO3-e: Report on resource use

E-PRTR#11 Require the reporting of energy use. *This measure would require operators to report energy use in their facilities. This would allow the assessment of energy efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*
E-PRTR#12 Require the reporting of water use. *This measure would require the reporting of water use to allow for better assessment of the impacts of industry on the environment beyond pollution. This would allow the assessment of water use efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*
E-PRTR#13 Require the reporting of raw material use. *This measure would require the reporting of raw material use to better assess energy and carbon efficiencies. This would allow the assessment of resource efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR.*

3.6. PO3-f: Tracking waste transfers

E-PRTR#14 Reporting waste composition of waste transfers. *This measure would require reporting of the composition of waste transfers using the Waste Framework Directive waste codes (EWC waste code). This would improve transparency on waste transfers and facilitate the reuse of waste streams.*
E-PRTR#15 Improve tracking of waste transfers. *This measure would require the reporting of waste receivers for all waste transfers (as currently done for transboundary hazardous waste transfers). This would improve transparency on waste transfers and facilitate the reuse of waste streams.*
E-PRTR#16 Improve tracking of waste water transfers. *This measure would require the reporting of the*

receivers of waste water transfers (as currently done for transboundary hazardous waste transfers). This would improve transparency on waste water transfers and facilitate the reuse of waste streams.

3.7. PO3-g: Report on products

E-PRTR#17 Require the reporting of releases from products. *Many new and emerging products contain pollutants that are released once these products have left the factory and are then used or disposed of. Article 5(9) of the Aarhus Convention suggests that such releases should be incorporated in a PRTR. This measure is to provide data on product releases by making use of other reporting streams and/or carry out a specific Commission study for the calculation of releases from products during consumer use.*

4. POLICY OPTION 4: ADDRESSING DECARBONISATION OF INDUSTRY

4- Addressing decarbonisation of industry
Measures IED #27-#30 (PO4-a and b below) and E-PRTR #18 and#19 (PO4-c and d below) are structured into **four policy sub-options**, which could contribute towards the decarbonisation of the agro-industrial activities. **PO4-a-energy efficiency (IED #27):** Delete Article 9(2) with exemptions from setting energy efficiency requirements in IED permits **PO4-b-IED/ETS interface (IED #28, 29, 30):** Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation (***review***), <u>OR</u> introduce a sunset date on Article 9(1) (***sunset***), <u>OR</u> immediately delete Article 9(1) (***delete***) **PO4-c-disaggregated reporting (E-PRTR #18):** Require more granular reporting for some GHG, in particular refrigerants **PO4-d- CO_2 eq. reporting (E-PRTR #19):** Require GHG releases to be also reported as CO_2 equivalent

4.1. PO4-a: Energy efficiency

IED#27 Delete Article 9(2) that exempts agro-industrial installations from setting requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site. *This measure widen to all IED operators the requirements of BAT conclusions containing energy efficiency requirements.*

4.2. PO4-b: IED/ETS interface

IED#28 Plan a future review by 2028 to maximise coherence and synergies between the IED and the ETS in light of the dynamics of innovation. *This measure would ensure that the functioning of the IED, including the exemption from setting GHG emission or concentration limits within the IED, would be reviewed, in light of the dynamics of innovation, with a view to maximise coherence and synergies between the concerned instruments. Such review should take place prior by 2028, which is both prior to a the major FF55 milestone and the approximate time by which breakthrough decarbonisation techniques are expected to start becoming available.*
IED#29 Introduce a limit of 2035 ('sunset date') beyond which the exemption for agro-industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS will not apply. *This measure would allow the introduction of ELVs for GHG into permit conditions for IED installations from 2035. Consequently, BREFs and BATC would set BAT-AELs for GHG emissions from this date. 2035 was chosen as a milestone between the 2030 target of 55% emissions reduction and 2050 carbon neutrality goal. This would provide industry with time to review and adjust their course of action so they can contribute to the EU's journey towards climate neutrality.*
IED#30 Delete Article 9(1) that exempts agro-industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS. *This measure would allow IED permits to contain GHG ELVs. Consequently, BREFs and BATC would set BAT-AELs for GHG emissions covered by the ETS.*

4.3. PO4-c: Disaggregated reporting

E-PRTR#18 Disaggregation of some currently reported GHGs. *This measure would require the reporting of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) as individual pollutants instead of the current*

aggregated groups. This would provide a better understanding of the GHG contributions since HFC and PFC species have different GWPs.

4.4. PO4-d: CO_2 equivalent reporting

E-PRTR#19 Require GHG releases to be also reported as CO_2 equivalent. *This measure would require the reporting of HFCs and PFCs in mass of CO_2 thus giving a more accurate picture of their GHG contribution.*

5. POLICY OPTION 5: SECTORAL SCOPE

5- Industrial scope
Measures IED #31-#44 (PO5-a to f, and i below) and E-PRTR #20-#31 (PO5-g and h below) are structured into nine policy sub-options, which would contribute towards addressing, as efficiently as possible, the environmental impacts of agro-industry installations currently not regulated. **PO5-a-cattle and tailored permitting (IED #31, 32, 33; E-PRTR #20, 21)** : Broaden current sectoral coverage of the IED and E-PRTR Regulation in rearing of animals (include cattle farming, expand coverage of rearing of pigs and poultry *AND* a tailored permitting process for the rearing of animals) **PO5-b-expand existing IED activities (IED #34, 36, 37, 38; E-PRTR # 22, 24, 25, 26)**: Extension of IED and E-PRTR current sectoral scope by closing loopholes for smaller smitheries, regulating the associated activities of textiles finishing, forging presses, cold rolling and wiredrawing; and better coverage of the battery value chain by including the rapidly growing batteries gigafactories **PO5-c-landfills (IED #39, 40; E-PRTR # 27)**: Landfills: Adoption of BAT conclusions for landfills *OR* adoption of BAT conclusions for activity 5.4 landfills *AND* revise the capacity threshold **PO5-d-mining (IED #41)**: Include non-energy minerals extraction industry in the IED scope **PO5-e-aquaculture (IED #42)**: Include acquaculture in the IED scope **PO5-f-oil and gas (IED #43)**: Include upstream oil and gas extraction in the IED scope **PO5-g-align E-PRTR to IED (E-PRTR #28)**: Align E-PRTR activity descriptions to IED activity descriptions **PO5-h- align E-PRTR to other EU laws (E-PRTR #29,#30)**: Revise E-PRTR activity descriptions by aligning to the Medium Combustion Plants Directive (MCPD) *AND* the Urban Waste Water Treatment Directive (UWWTD) (***fully***) *OR* expand the E-PRTR scope to cover (MCPs between 20 and 50 MW *AND* UWWTPs between 20 000 and 100 000 person equivalents (***partially***) **PO5-i-watch mechanism (IED #44; E-PRTR #31)**: Establish a dynamic system to identify and include emerging activities/sectors of concern, according to significance of production and attendant (already occurring, or risk of) pollutant emissions, and the IED's potential to address these issues

5.1. PO5-a: Cattle and tailored permitting

This policy option (PO5-a) focusses on further addressing pollution associated with the rearing of certain animals by expanding the scope whilst limiting additional administrative burden. PO5-a comprises five complementary policy measures as outlined in the table below.

IED#31 and E-PRTR#20 - Include cattle farming within the scope of the IED and the E-PRTR. *This measure identifies the need to address the environmental significance of cattle farming. The measure defines a capacity threshold, of 100 livestock units (LSUs) for cattle, a reference unit that facilitates the aggregation of livestock from various species and age.*
IED#32 and E-PRTR#21 - Amend the capacity thresholds for the rearing of pigs and poultry (IRPP). *This measure seeks to consider lowering the current capacity thresholds to include the environmental impacts of*

slightly smaller farms. The thresholds could be set at 125 LSUs.
IED#33 Introduce a tailored regulatory framework for installations carrying out rearing of animals. *Around 40% of all existing IED installations are related to rearing of animals. The IED's scope expansion would include cattle farming and more poultry and pig farms, leading to more than tripling of the number of installations that would be regulated by the IED. This would translate into significant additional administrative and operational burden for businesses and public authorities and, therefore, a lighter administrative process is proposed for all installations rearing animals with this tailored regulatory framework.*

5.2. PO5-b: Expand existing IED activities

This policy option (PO5-b) focusses on extending coverage for specific sectors already partly regulated by the IED and E-PRTR. As a general principle, activities will be added to the E-PRTR's scope if added to the IED. PO5-b comprises five complementary policy measures as outlined in the table below.

IED#34 and E-PRTR#22 - Extend the current IED and E-PRTR sectoral coverage to also include battery production. *The legislation currently regulates a number of activities related to battery production. Battery production (specifically of lithium-ion batteries) is expected to grow in the EU.*
IED#36 and E-PRTR#24 - Extend the current sectoral coverage to also include forging presses, cold rolling, with capacity exceeding 10 t/h, and wire drawing, with capacity exceeding 2 t/h.
IED#37 and E-PRTR#25 - Extend the current sectoral coverage to also include textile finishing activities with the existing capacity thresholds in activity 6.2 (pre-treatment or dyeing of textile fibres or textiles)..
IED#38 and E-PRTR#26 - Extend the current sectoral coverage to also include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW).

5.3. PO5-c: Landfills

IED#39 Facilitate the adoption of BAT conclusions for activity 5.4 landfills. *No BAT conclusions exist for landfills owing to the coverage of this activity under the Landfill Directive. An updated BREF and BAT conclusions would lead to the implementation of more up to date techniques for protecting the environment.*
IED#40 and E-PRTR#27 - Revise the capacity threshold for landfills. *Landfills with smaller capacity would be brought under the scope although the number is uncertain.*

5.4. PO5-d: Minerals extraction activities

IED#41 Include non-energy minerals extraction activities, i.e., extraction and treatment of metallic and industrial minerals (E-PRTR Annex I activities 3a and 3b) within the scope of the IED. *Revised scope: following the assessment of impacts, the scope of the measure was revised to 'include minerals extraction activities within the scope of the IED'. The revised measure covers the extraction and treatment of metallic and industrial minerals (but excludes the extraction of construction materials and aggregates). The environmental issues linked to the extractive activities within scope are significant, with higher pollution potentials. Furthermore, the revised scope of the measure ensures that IED/BAT requirements and their implementation in permits focus on the most significant sources of emission of pollutants.*

5.5. PO5-e: Aquaculture

IED#42 Include aquaculture within the scope of the IED (E-PRTR Annex I activity 7b).

5.6. PO5-f: Oil & gas

IED#43 Include upstream oil and gas extraction within the scope of the IED.

5.7. PO5-g: Align E-PRTR to IED

E-PRTR#28 Align E-PRTR activity descriptions to IED activity descriptions. *This concerns the following E-PRTR activities: 1(b) installations for gasification and liquefaction; 1(c) thermal power stations; 5(a) & 5(b) waste treatments; 5(g) independently operated industrial waste water treatment plants; 8(b) production of food and beverage products; AND including an additional activity capture of CO_2 streams for geological storage with no threshold (IED activity 6.9).*

5.8. PO5-h: Align E-PRTR to other law

E-PRTR#29 Revise E-PRTR activity descriptions by fully aligning to the scopes of the MCPD ***AND*** the UWWTPD.
E-PRTR#30 expand the E-PRTR scope to cover MCPs between 20 and 50 MW ***AND*** UWWTP between 20 000 and 100 000 p.e.

5.9. PO5-i: Watch mechanism

IED#44 and E-PRTR#31 - Establish a dynamic system to identify and include emerging activities of concern. *This option seeks to recognise that over time other existing activities or new activities may become relevant for regulating by the IED and reporting under the E-PRTR. This would be when such activities become a significant source of emissions of pollutants of concern, there is a significant potential for improvement of environmental performance, the IED's BAT approach is suitable for regulating those activities in a proportionate manner, and there is a range of environmental performance within the activity or between Member States.*

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PART 3/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
{SWD(2022) 112 final}

Annex 8: Impact of Shortlisted Measures – Industrial Emissions Directive

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Overview

The retained external consultants' project team collected evidence and analysed the impacts of 43 measures that were retained for a more in-depth assessment (together with an additional 30 measures related to the E-PRTR – analysed separately).

The key economic, environmental, and social impacts of the policy measures across the core stakeholders – public authorities, industry (large and smaller businesses), citizens and workers, third countries – were identified, mapped, and screened. A rapid assessment of the expected absolute and relative magnitude of these impacts and their likelihood was carried out in line with Tool 19 of the EU's Better Regulation (EC, 2021). This process is described in more detail in Annex 4.

As a result of this screening of impacts, thirteen economic, environmental, and social impact categories were selected for an in-depth impact assessment. These categories are outlined in the Table below. A brief description of the specific impacts and proxy indicators considered in this assessment of options for the revision of the IED are also provided for clarity.

Table A8-1: Significant impacts for in-depth assessment and core indicators

Broad impact category	Specific impact category	Description
Economic impacts	Administrative burdens on businesses	Any administrative costs, enforcement costs and/or direct regulatory charges, including but not only through the permit application, derogation and BREF processes, monitoring and reporting, hosting inspections, etc.
	Operating costs and conduct of businesses	Substantive compliance costs, that is, the additional capital expenditure and/or operating expenditure (excluding administrative burden) that are required to comply with the policy measures' requirements. This may include upgrading installations and equipment, using alternative inputs of production, etc.
	Competitiveness of businesses	Comparative advantage of the industry in an international context and how this may be affected by changes to the costs of doing business in the EU; and any impacts on the level playing field in the EU.
	Position of SMEs	Overall costs of the measures on the industry across differences in business size; that is, whether the average administrative and compliance costs per employee are comparable across larger and smaller businesses or there is a significant difference in the impacts by size.
	Innovation and research	Level of investment in Research and Development and expected innovation outcomes that may result from the implementation of proposed measures.
	Public authority	Administrative, compliance and enforcement activity by public authorities

Broad impact category	Specific impact category	Description
	impacts	and other costs related to the BREF, permit-setting and derogation-granting processes; compliance assessments and inspections; and/or ensuring public access to permit procedures, among others.
Environmental impacts	Climate	Emissions of Greenhouse Gases into the atmosphere (tonnes of CO_2 equivalent)
	Air quality	Emissions of pollutants to air, which may include NOx/SOx, NMVOC, dust, NH_3, Hg, or any other pertinent pollutant.
	Water quality and resources	Releases of heavy metals (Cd, Hg, Pb, and Ni), N and P or any other pertinent pollutant to water.
	Soil quality or resources	Emissions of pollutants to soil, which may include Arsenic, Cadmium, Chlorides, Chromium, Copper, Halogenated Organic compounds, Lead, Mercury, Nickel, Polychlorinated Biphenyls, Total Phosphorus and Zinc.
	Waste production, generation and recycling	Volume of waste generated (tonnes) and recycled (tonnes).
	Efficient use of resources	Amount of energy consumed (TWh), volume of "virgin" water consumed (m^3) and volume of "re-cycled" water consumed (m^3).
Social impacts	Employment	Number of employees, in full-time equivalent, in industry and/or public authorities.

Across each of these specific categories, a diverse set of costs and benefits over a period of 20 years were considered, assessed and, where possible, quantified. These include administrative and enforcement costs, compliance costs and regulatory charges and other direct and indirect costs and benefits, in line with Tool 58 of the EU's Better Regulation Guidelines (EC, 2021), which may emerge as a result of the implementation of the shortlisted policy measures, when compared against the baseline.

In general, colour coding is used to summarise the qualitative assessment of impacts referring to the direction (positive or negative) and magnitude (small or large) of any expected impacts (see Table A8-2). A more detailed description of the qualitative assessment methodology and other analytical methods employed can be found in Annex 4.

Table A8-2: Coding used to present expected impacts

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Extremely negative	Strongly Negative	Weakly negative	"Zero": i.e. no or limited impact	Weakly positive	Strongly Positive	Extremely positive	"U": Unclear

The focus of the quantitative analysis has been to support the assessment of the proposed sectoral scope extensions for the IED (Problem Area #5). Further, the quantification of administrative burden on businesses and public authorities has also been prioritised. The table below outlines key and cross-cutting assumptions employed in the quantification of administrative burden based on the available evidence.

Table A8-3: Cross-cutting evidence-based assumptions employed in this report

Specific indicator	Evidence-based assumptions	Comments and sources
Number of existing IED installations in the baseline	**52 000**	Average of the latest three years of data available via the EU Registry
Number of new IED installations expected each year in the baseline, on average	**500**	Average based on baseline data analysis carried out for this report
Number of permit reconsiderations (and updates) every year in the baseline, on average	**5 200**	Average based on the assumption that permit reconsiderations and updates may take place at least once every 10 years, in line with the BREF cycle
Number of BREF reviews completed in a period of 20 years	**60**	Based on the assumption that a BREF occurs at least once every 10 years, thus each of 30 sectors will be reviewed at least twice in the 20-year period
BREF review costs for one sector-operators (2020 €)	**€1 million - €7 million**, with a central estimate of €2 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
BREF review costs for one sector-public authorities (2020 €)	**€3 million - €14 million**, with a central estimate of €5 million	Based on the recent IED Evaluation (Ricardo et al, 2020)
One-off costs of issuing new permits -public authorities (2020 €)	**€3 250 - €35 000**, with a central estimate of €23 400	Based on evidence from the IED IA 2007 (EC, 2007), adjusted for inflation over the period (GDP Deflator sourced from the World Bank and Eurostat), and contrasted with evidence gathered through the recent IED Evaluation (Ricardo et al, 2020)

Specific indicator	Evidence-based assumptions	Comments and sources
One-off costs of issuing new permits -operators (2020 €)	**€10 000 - €62 250**, with a central estimate of €28 000	Based on data collected through stakeholder engagement for this report, the IED Evaluation in 2020 (Ricardo et al, 2020), and a study to analyse differences in costs of implementing EU policy (EC, 2015)
One-off costs of permit reconsiderations and updates - public authorities (2020 €)	**€1 600 - €17 500**, with a central estimate of €11 700	Based on an assumption employed in the IED IA 2007 (EC, 2007) that permit reconsiderations and updates costed around 50% of the permit issuance costs
One-off costs of permit reconsiderations and updates - operators (2020 €)	**€1 500 - €31 250**, with a central estimate of €14 000	Based on evidence provided by stakeholders engaged for this report, and complemented by evidence from the IED IA 2007 (EC, 2007).
Annual costs for managing information and systems - public authorities (2020 €)	**€100 - €3 000** with a central estimate of €2 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Annual monitoring and reporting costs-operators (2020 €)	**€150 - €12 000** with a central estimate of €8 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Inspection costs every two years -public authorities (2020 €)	**€500 - €12 000** with a central estimate of €9 600	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
Inspection costs every two years -operators (2020 €)	**€125 - €5 000** with a central estimate of €4 000	Based on evidence provided by stakeholders engaged for this report and the recent IED Evaluation (Ricardo et al, 2020)
One-off applications for derogations or exemptions - public authorities (2020 €)	**€550 - €4 250**, with a central estimate of €850	Although the burden is primarily on operators to develop and submit the application, it is assumed that public authorities spend half as much effort reviewing and engaging in the process
One-off applications for derogations or exemptions - operators (2020 €)	**€1 100 - €8 550**, with a central estimate of €1 700	Based on evidence from IED IA 2007 (EC, 2007), suggesting applications for derogations could require between 40 to 300 worker hours
One-off baseline reports - public authorities (2020 €)	**€4 000 - €20 000**, with a central estimate of €10 000	Based on an assumption public authorities would engage with baseline reports provided by operators and spend around 20% of the effort
One-off baseline reports - operators (2020 €)	**€20 000 - €100 000**, with a central estimate of €50 000	Based on the recent IED Evaluation (Ricardo et al, 2020)
Average hourly labour costs in EU-27 (2020 €/h)	**€29/h**	Latest Eurostat statistics for EU-27 (Eurostat, 2021)

Other, more specific evidence-based assumptions were also employed in the assessment of impacts. These are captured, as relevant, in the following sections.

There are, however, limitations to the level of quantitative analysis that could be carried out in this report, primarily due to the nature of the IED. The BREF process results in BAT Conclusions that are to be considered through the IED permitting process across a wide range of sectors and industrial installations. Evidence on the techniques that may be selected as BAT is a very resource-intensive process and attempting to pre-empt these conclusions is complex and error prone. Quantifying substantive compliance costs and environmental impacts is, therefore, very challenging and potentially not proportionate. Nevertheless, the study team, working with the EC, has considered approaches to illustrate these impacts as quantitatively as possible, e.g. using a typical installation approach, where we consider how core aspects of each policy option could result in key changes in capital and operating requirements as well as environmental performance.

In addition, the assessment of social impacts and associated ratings focus on how the measures may affect employment levels across the EU. Public health and public health system impacts are linked to environmental impacts and, therefore, are captured within this category. Similarly, reductions in polluting emissions, especially by affecting public health, may also have impacts on labour productivity and other economic impact categories. These impacts, generally benefits, where directly related to the environment and captured as part of the monetisation of these environmental benefits through the use of damage cost functions, have been captured in the environmental impacts category and not considered in any other categories, primarily to avoid confusion with the qualitative analysis and the interpretation of the qualitative ratings.

The measures are structured into five problem areas. Each section ends with a summary table that provides a qualitative overview of the emerging conclusions from this analysis.

The abbreviations used in the report are listed below:

BATc	Best available technique conclusions
BAT-AELs	Best available technique associated emission levels
BREF	BAT reference document
EC	European Commission
ELV	(permit) emission limit value
GHG	Greenhouse gas(es)
GLS	Glass manufacturing (BREF)
LCP	Large Combustion Plant (BREF)
MS	Member State
NOx	Nitrogen oxides
WWTP	Waste water treatment plant

Problem area 1: The IED has not been as effective as it could be

There are sixteen measures shortlisted to address that the IED has not been as effective as it could be in terms of:

- Ensuring reduced pollutant emissions from industry, which includes issues such as BAT-AELs not being achieved, inconsistencies in implementation, and transboundary pollution remaining ineffectively addressed;
- Public access to information and participation;
- Coherence in implementation.

In particular, the policy measures were shortlisted to address these problems and shortcomings and to achieve a set of objectives. The objectives are:

1. Prevent or, when impractical, minimise emission of pollutants by large industrial and agro-industrial plants (including transboundary pollution between Member States)
2. Ensure access of private individuals and civil society organisations concerned to environmental information, participation in environmental decision making and access to justice, in relation to permitting, operation and control of large industrial and agro-industrial plants
3. Clarify and simplify the legislation and reduce unnecessary burden whilst establishing a level playing field across the EU for pollution prevention and control.

Each measure will be assessed individually, covering a more in-depth description of the measure, an outline of the requirements for implementation and an assessment of their Economic, environmental, and social impacts supported by evidence.

Measure 1: Introduce a time limit for derogations granted under Article 15(4).

Description of the measure and requirements for implementation

The proposed measure would introduce a time limit for derogations granted under Article 15(4).

Article 15(4) of the IED allows derogation from paragraph 3 of Article 15 of the IED, allowing competent authorities to issue less stringent permit limit values than BAT-AELs according to the following criteria:

"*Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to:*

(a) the geographical location or the local environmental conditions of the installation concerned

(b) *the technical characteristics of the installation concerned*."

The IED does not indicate whether derogations can be provided indefinitely nor does it indicate if there is an upper limit on a derogation period. No additional guidance on when a derogation can be applied has been provided. There are no mandatory time limits stipulated on the duration of the derogations. Consequently, this crucial aspect of the IED is open to interpretation to MS. Evidence has been identified of a wide range of durations of derogations granted by some Member States to operators. Evidence has also been identified suggesting that some derogations have been granted without specifying an end date of the derogation, and thus the date from which BAT-AELs would apply. Based on 2016 IED implementation reporting, at least two Member States have addressed this issue of time-limiting derogations in their national guidance for implementing the IED (Italy, Slovakia) (Ricardo, 2021).

As well as the reported information on derogations included in the EU Registry, information made publicly available by Member States on Article 15(4) derogations is generally reported at installation level and relate to permit documentation (Ricardo, 2021). Individual derogations are granted for individual BAT-AELs, such that there can be multiple derogations per installation.

Objectives:

The measure will aim to improve the effectiveness of the IED through accelerating compliance with BAT-AELs and levelling the playing field.

This measure will, therefore, contribute to the general ambition of zero-pollution in the EU and, more specifically, contributing towards preventing or minimising the emission of pollutants by large industrial and agro-industrial plants and levelling the playing field across the EU.

Implementation needs:

- The EU would amend the IED to introduce wording that provides a time limit in Article 15(4).
- Member States will need to transpose the new time limits into national legislation.
- EU (and/or public authorities) would develop guidance on the implementation of the proposed changes, including whether the rule change will apply retrospEUtively to derogations already granted or whether it would apply only to newly issued derogations. Depending on the date when the new rules would come into force, the number of derogations already granted and which remain in force and which have longer remaining durations than the suggested cut-off value would vary.

Assessing impacts

Economic impacts

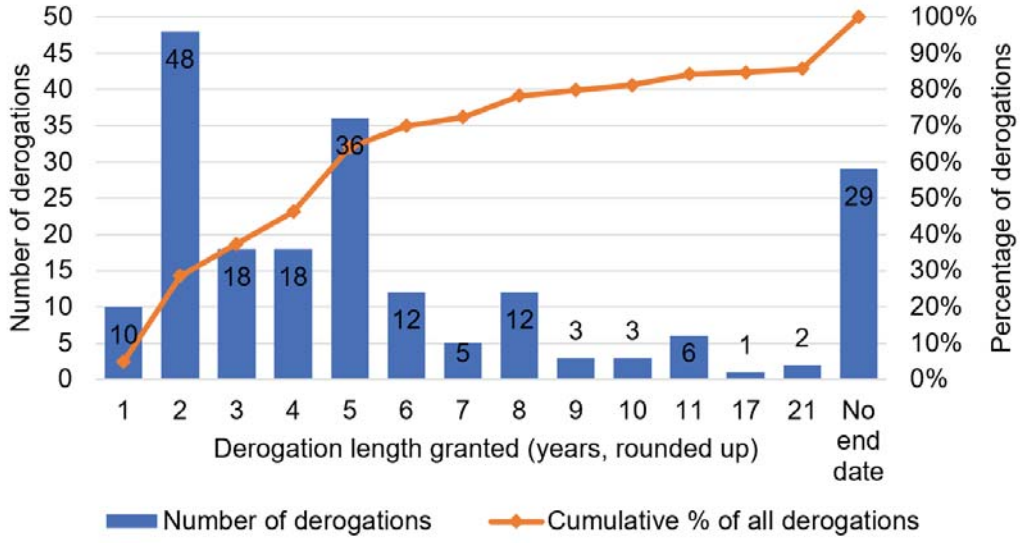
In summary, this measure is likely to have **limited to weakly negative Economic impacts**, characterised by highly localised financial implications for a small proportion of IED installations.

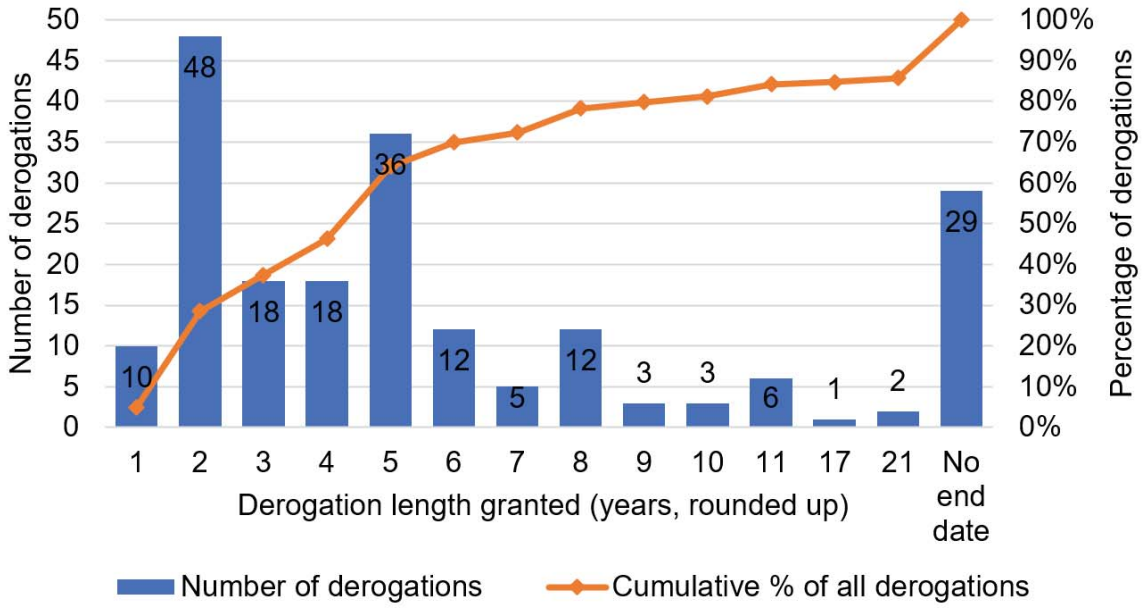
There are around 52 000 installations in the IED, and up to and including reporting for year 2019, 203 derogations were reported as having been granted to 130 installations. Therefore, 0.2 % of all IED installations received derogations.

After filtering these derogations for the derogations that could remain in place when this measure could take effect (assumed to be 2024), 38 installations (<0.1% of all installations) are reported in the EU Registry to have either unending derogations (29 derogations granted to 20 installations) or derogations with end dates beyond 2023 or longer than four years (27 derogations granted to 18 installations). The longest two derogations have been granted for 20 years.

The 2019 reported EU Registry data (without filtering for derogations that will cease by 2023) is illustrated in the figure below.

Figure A8-1: Distribution of derogations by length (2019 data).





It can be seen from this figure that, of the existing derogations granted: around one third (37%) were granted for periods of 3 years or less; around half (46%) were granted for periods of 4 years or less; and around two thirds (64%) were granted for five years or less. This distribution could be used by the EU to inform a view on what number of years could be an appropriate maximum duration.

Installations which currently hold unending or lengthy derogations are likely to require deep transformation to reach compliance with BAT conclusions, or are used for specific purposes(e.g., seasonally), which may make upgrading to BAT economically difficult. A small portion of installations which do not currently hold a lengthy or unending derogation may rely on issuance of a lengthy or unending derogation in the future. These installations may also require a deep transformation to maintain economically feasible operations. Deep transformation, particularly if it is not scheduled by an operator, may have significant economic impacts on installation operators (see measures 21 and 22 for more details on this). The number of derogations which will be affected by the measure depends on the time limit set for derogation, as outlined in Table 4. As the time limit rises, more derogations and installations will be affected.

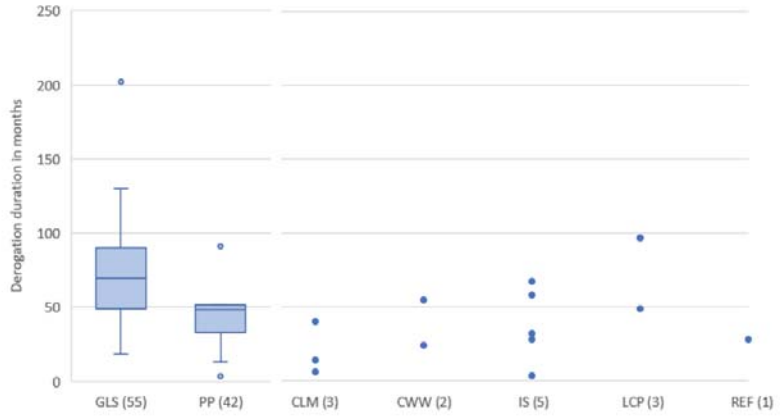
Table A8-4: Derogation time limit (between 1 and 6 years) and corresponding number of derogations affected based on 2019 derogations.

Derogation time limit (years)	Derogations affected
1	193
2	145
3	127
4	109
5	73
6	61

The measure's economic impacts are likely to be unevenly distributed between Member States. According to analysis of the EU Registry , a significant portion, 40%, of derogations were issued to installations in Sweden, while Czech Republic and Italy both accounted for 16% and the remaining 20 were divided between 12 other Member States (Ricardo, 2021) The more recent EU Registry data reported for 2019, after removing derogations that expire after 2023 suggests the distributional effect remains high, with 30% of the derogations granted to Swedish installations, 21% to Portuguese installations and 18% to Czech installations, and the remaining derogations divided among 7 Member States. Most reported derogations have been for installations for which the four-year implementation window following BATC adoption has ended. Furthermore, the distribution of derogations among Member States indicates the Economic impacts would not be evenly distributed, and would be concentrated in those Member States (Sweden, Portugal, and Czech Republic) with the highest number of derogations. Sweden reports that 76% of its derogations are time limited.

The measure's Economic impacts are likely to be unevenly distributed between sectors. The figure below demonstrates glass manufacturing (GLS) and pigs and poultry (PP) both received significantly more derogations than other sectors in the 2018 reporting. Furthermore, glass manufacturing installations received relatively long derogations. One example in GLS has been granted a derogation of over 200 months. It is however not possible to predict in which sectors more installations will be granted derogations; this depends on the stringency of the future BAT conclusions' BAT-AELs as well as the degree of national regulation already in force.

Figure A8-2: Box and scatter plot of durations for which Article 15(4) derogations apply, by BAT conclusions (GLS = Glass manufacturing, PP = pigs and poultry) (Ricardo, 2018).



Note: Box plots (with circular markers presenting outliers) for the GLS and PP BATC. Remaining BATCs with smaller sample sizes show each derogation granted by a single dot. Information reported by the 15 Member States where derogations have been granted. Number of derogations granted by BATC is in brackets along the x axis.
Source: (EEA, 2020)

Where measures are granted to businesses for extended periods of time, this measure could reduce the time allowed to reach compliance. Consequently, the measure would shift compliance costs (i.e. installing and/or operating additional techniques) closer to the present day than they would otherwise have been, and therefore, the measure would result in additional costs in the shorter-term (earlier transition to desired state as a result of the measure than in the baseline). For those installations with derogations set without an end date, this measure would introduce costs for those installations (if they chose to comply) or may lead to installation closure.

Question 22 of the Targeted Stakeholder Survey asked respondents ***"If you are supportive of introducing time limits for Article 15(4) derogations, what time limit would in your view be the most appropriate and effective? (express in years and months)".*** 91 stakeholders responded, 33 of whom indicated a maximum time limit for Article 15(4) derogations, broken down in the Table below, which shows 5 years was the most popular answer (13 of 33 responses), 8 years was the second most popular answer (7 of 33) and 4 years the third most popular response (5 of 33). In addition, 62 respondents provided an open text answer, most of which did not provide a specific time limit for derogations. The most popular argument (34 of 62 responses) was that time limits on derogations are not necessary and derogations should be assessed on a case by case basis. Another popular response stated "derogations are already time limited", which received 17 of 62 responses. Other responses included, time limits should not exist (4 of 62), derogations are already four years long (2 of 62), derogations should match BREF reviews cycles (2 of 62), remove derogations completely (2 of 62) and that derogations should be extended (1 of 62).

- Some position papers submitted by industry include responses related to Article 15(4) derogations. One response, from the International Association of Oil & Gas Producers (IOGP),

indicates that although very few derogations are applied to installations in their sector, those that have been granted derogations are for units which are used only in specific conditions and for specific reasons, such as, generating heat during severe frosts. The IOGP argue that adaptation of these types of installations to BAT conclusions (i.e. removal of an option of an unending derogation) would lead to higher costs than the environmental benefits gained, due to the low running hours of the plants.

Table A8-5: TSS: number of responses in favour of various derogation time limits.

Years	Count
1	1
3	1
4	5
5	13
6	2
8	7
10	3
15	1

- However, the example that was provided by the IOGP was concerning where a derogation had been sought for an offshore platform LCP[1], with the derogation sought for the installation's lifespan for NOx emissions. It was quoted that upgrades to meet the BREF BAT-AEL would have required modifications on the platform costing € 39m, and leading to NOx reductions of 60 t/year for one unit and 700 t/year for a second unit. These NOx reductions, if assumed to be in the North Sea, could be valued around €20 000/tonne[2], i.e. valuing the benefits to be around €15.2m per year. Hence, in this example provided by the industry of a plant for which long or unending derogations would be sought, it does not appear that the costs would outweigh the benefits after assuming operation of the installation for at least ~2.5 years.

[1] Of the six derogations listed in the 2019 reporting to the EU Registry as having been granted to LCPs, none appear to be for offshore platform LCPs based on the BAT numbers granted for. The LCP BAT conclusions four-year period for implementation finishes in 2021, so more derogations could yet be granted for this sEUtor than are currently reported in the EU Registry.

[2] ETC/ATNI Report 04/2020: Costs of air pollution from European industrial facilities 2008–2017

Administrative burden on businesses

This measure is likely to be **limited to weakly negative impacts** on administrative burden. The scale of this impact per installation affected depends on whether an installation currently holds an unending or lengthy derogation (and for these if the EU would wish to target these derogations retrospectively, or if an installation has not yet been granted a derogation. However, the number of installations affected will be small.

For installations which currently hold a derogation there is likely to be a small increase in administrative burden. The scale of this impact depends on the specific length of the time limit. The measure would require installations which currently hold a lengthy or unending derogation (~0.1% of installations) to review their derogation to adhere with the time limit introduced by this measure.

For installations which might require a derogation in the future, the measure would have a weakly negative impact on their administrative burden. Operators would still go through the same derogation application process and discussion with the competent authority. This process would also be happening in the counterfactual where the measure is not introduced.

The measure may have a limited impact on organisations which have currently been granted a derogation as well as organisations which might require a future derogation because it will cause a slight increase in the frequency with which businesses must review their derogation with the competent authority. If the measure introduces a time limit installations would foreseeably be required to review their derogation more often than in the counterfactual where the measure is not introduced. The impact the measure will have on administrative burden depends on the specific time limit set. According to the 2019 data, the average length of derogations with end dates was 3.4 years and the most common derogation length was 1 year or less (28% of all derogations). However, the average derogation length does not account for unending derogations; as illustrated earlier, 55% (111 of 203 derogations) of derogations granted are four or more years long. Therefore, if, for example, the time limit is set at four years, 55% of installations which held derogations in 2019 would be required to update their derogation more regularly than in the counterfactual where the measure is not introduced.

For those installations which currently hold an unending or lengthy derogation (i.e. already granted), the EU may seek to limit (or entirely avoid due to the possible uncertain legal feasibility) the number of cases where renegotiation would be needed on an existing granted derogation. If a renegotation were needed, the measure would incur an additional administrative burden where the operator must renegotiate their derogation with the competent authority. In the counterfactual where the measure is not introduced, these installations would not have been required to do any further paperwork on their derogation. Again, the proportion of existing derogations which would be affected in this way would depend on the specific time limit set. For example, using the 2019 data and excluding all derogations which end before 2023, a four-year time limit would mean 56 derogations across 38 operators would be reassessed earlier than in the counterfactual where the measure was not introduced.

Assuming this measure would affect around 50 installations, the additional administrative costs for businesses are estimated to be between €0.01m/yr and €0.8m/yr with a best estimate of €0.6m/yr.

Operating costs and conduct of business

The measure's overall impact on both the operating costs and conduct of businesses are likely to be **weakly negative**. Whether the measure will increase a business' operating costs and conduct of business depends on whether a business currently holds a derogation, and if that derogation is unending or set on a time limit or longer than the proposed time limit which could be introduced under this measure. There will be a significant increase in operational costs and changes to conduct of business for installations which rely on a future derogation, particularly installations which currently have an unending derogation. Operating costs for installations which have not yet been granted derogations will be higher if the measure is introduced because the length of derogation will not be granted for as long as they might previously have been in the counterfactual where the measure is not introduced. As discussed earlier, the scale of impact on operating costs and conduct of businesses depends on the specific time limit set for derogations.

- For those derogations which are unending or due to expire beyond 2023 introducing the measure will present completely new costs for these installations. Those operators with unending or very long derogations may have these derogations curtailed, which would bring costs forward or introduce new costs if the derogation was otherwise to the end of the Economic life of the installation. As mentioned above, the EU may seek to avoid addressing this measure at existing derogations.

Currently, it is unclear how the measure might affect business' behaviour. However, one foreseeable negative impact of the measure could be business' decision to close plants which may not be Economically feasible to transform even within an agreed period. This could occur in both the situations where businesses have not yet received derogations and in the situation where an installation currently holds a lengthy or unending derogation.

Competitiveness and level playing field

The proposed measure is likely to have a **weakly positive impact** on the level playing field. As discussed above in the section on 'Economic impacts' derogations are concentrated in certain sectors and Member States. Therefore, the measure will improve the consistency of derogation lime lengths across Member States and sectors. This will eliminate the possibility that certain Member States or sectors are granted longer derogations than installations in other states or sectors, thus removing the potential competitive advantage held in those states and sectors with longer derogations.

Position of SMEs

The impact of this measure on SMEs is **uncertain**. The level of impact depends on the size of the installations which rely on derogations. The size of installations is not known from the EU Registry data on derogations.

Innovation and research

The measure is **unlikely to impact** innovation and research. The measure is focused on tightening the conditions for derogations, which concern installations behind current BAT. Therefore, the measure is focused on incentivising uptake of existing BAT rather than encouraging research into advanced technologies. It is considered unlikely that step-changes in technology implementation might result from implementing this measure.

Public authority impacts

The measure is likely to have **limited to weakly negative impacts** on public authorities. Changing the conditions for existing derogation will incur some additional managerial or administrative tasks for public authorities concerned with issuing derogations. The measure is likely to change the frequency by which public authorities must assess and issue derogations. The measure will not impact public authorities because of changes to the process associated with achieving derogation. In addition to this change, the measure is also likely to require public authorities to write new guidance and communicate with operators to reflect the requirement of a time limit which may cause some small impact on public authorities.

Whether the measure will incur impacts on public authorities also varies between businesses which do not yet hold a derogation versus existing unending or lengthy derogations. There will be fewer impacts on public authorities which regulate businesses which do not yet hold a derogation than for public authorities which regulate businesses which have been granted unending or lengthy derogations. As discussed above in 'Administrative impact on businesses', the measure, depending on the specific time limit elected, is likely to mean public authorities will review derogations not yet granted more regularly than in the counterfactual where the measure is not introduced. For existing unending or lengthy derogations, the measure will create a short-term increase in work for public authorities. Public authorities will be required to reassess lengthy or unending derogations when the measure is introduced, thus incurring a short-term spike in workload for public authorities. As discussed in 'Economic impacts' this will be most severe for public authorities in Sweden, Portugal, and Czech Republic where the majority of derogations are concentrated.

Assuming this measure would affect around 50 installations, the additional administrative costs for public authorities are estimated to be between €0.02m/yr and €0.6m/yr with a best estimate of €0.4m/yr.

Environmental impacts

Overall, the environmental impacts of the measure are likely to be **weakly positive**. The measure is likely to cause a small overall reduction in IED installations' environmental impacts concentrated in a relatively small number of geographic areas. As noted earlier, the distribution of derogations implies introducing a time limit on derogations is likely to have a significant impact on a small proportion of IED installations.

Climate

The measure is likely to have **no impact** on greenhouse gas emissions.

Evidence: there were no derogations issued in 2019 which were relevant to climate impacts. The only type of derogation which may affect the climate are derogations for energy efficiency. The measure may have an impact on the climate if greenhouse gas emissions are brought within the scope of the IED.

The evidence is supported by views of stakeholders: 47% of respondents to the TSS believe the measure will have no impact on GHG emissions. There were significantly fewer responses in favour of the measure having at least a slight impact, which constituted 22% of responses.

Air quality

The measure is likely to have a **weakly positive impact** on air quality, more so than the other environmental issues concerned.

Evidence: In 2019 a total of 203 derogations were issued, out of which, 154 were for emissions to air and 49 for emissions to water. This implies the measure could have a more significant overall impact on emissions to air than emissions to water. Out of deorgations for emissions to air, there were 48 derogations for SO_2 emissions, 39 for NO_2 emissions and 38 for dust emissions. This indicates the measure's environmental impacts will be concentrated on reducing these pollutants. However, this approach does not account for disproportionately high environmental impacts caued by toxic pollutants, for example, mercury emissions. Out of the 154 derogations issued to emissions to air, 43 were unending or exceeded 2023. The most common pollutant with unending or lengthy derogations were dust emissions (15) and NO_2 (12). This suggests if the measure was introduced, these particualr existing derogations could be reassessed to reflect the time limit on derogations, leading to a reduction in emissions for installations in the areas local to the polluting installations.

The measure's impacts on air quality are possible to estimate. For example, according to Ricardo (2019) assessment of MS reports on IED implementation, the annual damage cost of dust and PCDD/F emissions in the iron and steel sector due to derogations was estimated to be €17m/year and €0.015m/year respectively[3]. For the glass sector, derogations for NOx, SOx and dust resulted

[3] Ricardo, 2019. Assessment and summary of Member States' reports for Modules 1, 3 and 4 of Annex II of Commission Implementing DEUision 2012/795/EU. Retrieved from: https://circabc.europa.eu/sd/a/e6a8f5a7-2b35-4bc5-a195-10acfaa49755/Final%20report.pdf

in associated damage costs of €19.5 m/year, €18.6 m/year and €3.6m/year respectively for the years the derogations were active. As discussed in 'Economic impacts', the number of derogations granted is particularly high in glass manufacturing. The high levels of additional emissions and annual damage costs for glass manufacture highlight the potential environmental value of introducing a time limit on derogations. If the measure is introduced, this will directly reduce emissions from lengthy or unending derogations. Derogations which have not yet been issued are likely to be, on average, shorter, implying there will be lower emissions than in the counterfactual where the measure is not introduced.

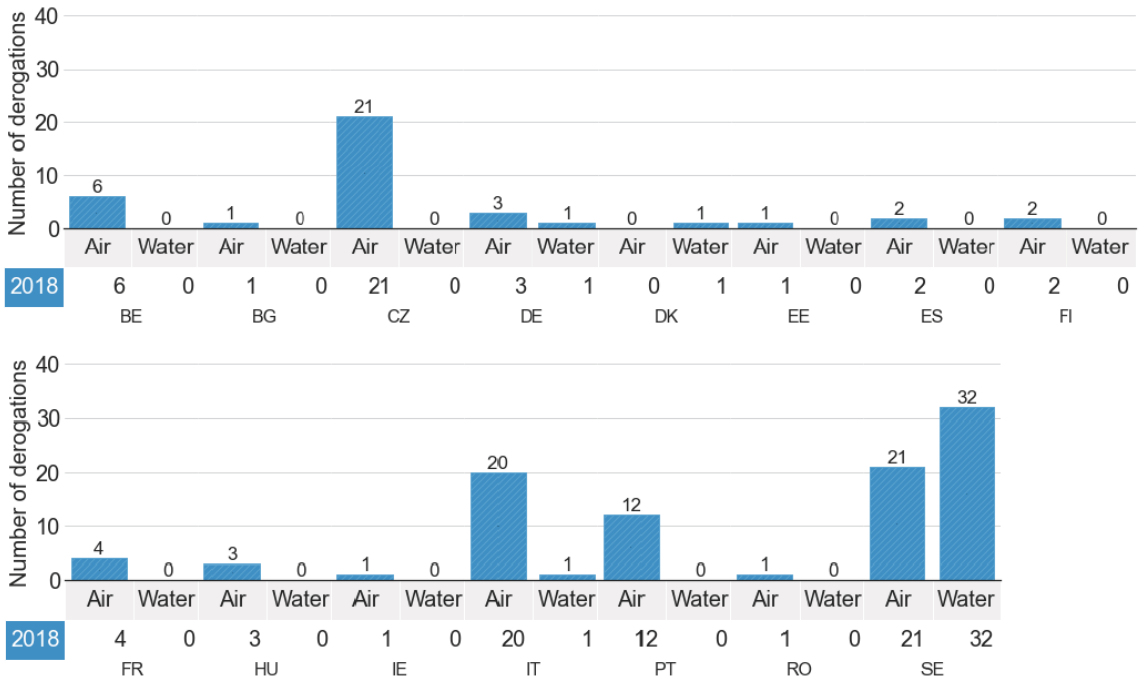
It is not possible to reliably predict the future benefit of future derogations for air pollutants, though the indications above suggest that the monetised benefits could be significant for the small number of derogations that would apply for long periods.

ClientEarth provided a case study on Article 15(4) derogations: In 2018 in Bulgaria, there was only one reported derogation which did not have an end date. However, 7 out of all 9 large coal power plants in Bulgaria have applied for derogations under Large Combustion Plant BATC. As of March 2021, 3 of these derogations have been granted[4]. Based on the granted derogation for the coal power plant TPP Maritsa East 2 EAD, this will allow the plant to operate for an indefinite period of time under the following conditions: a desulphurization rate of 97%-97.5%, which is equivalent to an emission limit value of 570 mg/Nm^3. For comparison: The general BAT-AEL range (without derogation) under the LCP BATC is 10-130 mg/Nm^3, so the granted value is between 4.4 to 57 times higher. With regards emissions of mercury, the permit limit value is 30 µg/Nm^3. The BAT-AEL range under the LCP BATC for mercury is 1-7 µg/Nm^3, so the granted value is 4.3 to 30 times higher.

The measure would not be expected to improve air quality equally across all Member States. As might be expected, those Member States who utilise derogation mechanisms proprtioanally rather more would benefit proportionallly most from the measure, regarding environmental/ health emissions and their effects, but with the corresponding "rectification" costs to reach the approppriate sectoral BAT-AEL ranges. Figure A8-3 shows, by Member State, that more derogations have been granted for BAT-AELs relating to emissions to air than for emissions to water with the exceptions of Sweden, Germany and Denmark (Ricardo, 2021). This suggests the measure is likely to have a more significant impact on air quality than water quality with the exception of the situations in the mentioned Member States, particularly Sweden.

[4] TPP Maritsa East 2 EAD (1602 MWe), TPP ContourGlobal Maritsa East 3 AD (908 MWe) and AES Maritsa East 1 EOOD (670 MWe)

Figure A8-3: Derogations by environmental medium, reported by Member States (except Slovakia) (Ricardo, 2021)



Source: (EEA, 2020)

Stakeholder input: According to the results of the TSS, 44% of respondents believe the measure will have at least a slight simpact on emissions to air versus 44% of respondents who believe the measure will have no impact at all.

Water quality and resources

The measure will have a **weakly positive impact** on water quality and a **limited impact** on use of water resources.

Evidence: As illustrated in Figure A8-3, the majority of derogations are relevant to emissions to air, not emissions to water with the exceptions of Sweden, Germany, and Denmark. Therefore, the measure will have inconsistent impacts on water quality across the Member States: most of the measure's impact will be concentrated in those three Member States. With regards the measure's impact on water resources, the measure's impact depends on whether the status of the IED's BAT-AEPLs are brought to have equal status with BAT-AELs.

In 2019 a total of 203 derogations were issued, out of which, 154 were for emissions to air and 49 for emissions to water. This implies the measure will have a more significant overall impact on emissions to air than emissions to water. Out of the derogations to water, the most derogations were granted for emissions of total suspended solids (17) followed by 6 derogations for total phosphate and the remainder were divided between 7 other pollutants. Out of the 49 derogations

issued to emissions to water, there were 10 derogations which were unending or exceeded 2023. Out of the unending or lengthy derogations, there were 4 derogations for total suspended solids and 2 for chemical oxygen demand. If the measure was implemented, these derogations may be reassessed, which would lead to an improvement in water quality in the areas local to the polluting installations.

Stakeholder input: The results of Question 21 A to the TSS show a high proportion of respondents believe the measure will have no impact on emissions to water (49%). Fewer responses support at least a slight impact (36%) on emissions to water. Only 14% of responses supported a "significant" impact on emissions to water. In comparison to the other environmental areas examined there was a relatively low proportion of responses to "N/A" (11%).

Soil quality or resources

The measure is likely to have a **limited to weakly positive impact** on soil quality or resources.

Waste production, generation, and recycling

The measure is likely to have **no impact** on waste production, generation, and recycling.

Evidence: Limit values and performance levels for waste production, generation, and recycling are not legally binding. Therefore, introducing a time limit for derogations will not have an impact on this environmental issue.

The results of the TSS show a high proportion of respondents believe the measure will have no impact on waste generation (57%), the highest proportion of responses in favour of "no impact" out of all the environmental measures examined. There were significantly fewer responses in support of the measure having at least a slight impact, accounting for only 26% of responses. Out of all the environmental areas examined in relation to the measure in question, waste generation received the fewest responses in favour of the measure carrying at least a slight impact and the highest level of confidence that the measure would have no impact.

Efficient use of resources

The measure is likely to have a **limited impact** on efficient use of resources. Currently, resource efficiency BAT conclusions do not have the same status as pollution abatement BAT conclusions in the IED. However, if BAT associated performance levels were legally binding, this measure would have a significant impact on the use of resources.

Social impacts

This measure is likely to have **limited negative impacts** on employment. As discussed in the Economic impacts section above, the measure will affect a small proportion of IED installations, some of which serve a unique function, for example, when electricity demand is at a peak. Therefore, if the measure contribute to leading to the closure of installations this would likely lead to job and Economic losses associated with plant closure. The evidence is limited and, therefore, these effects cannot be quantified.

Measure 2: Mandate the application of a standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits for assessing applications for derogations under Article 15(4).

Description of the measure and requirements for implementation

- The proposed measure is to mandate the application of a standardised methodology for assessing the (dis)proportionality between costs of implementation of BAT conclusions and the potential environmental benefits for assessing applications for derogations under Article 15(4).

Objectives:

The measure will aim to improve the approach to assessing disproportionality between costs and benefits for the IED, raising standards in the Member States where this method is currently underdeveloped.

This measure will, therefore, contribute to the general ambition of zero-pollution in the EU and, more specifically, contributing towards preventing or minimising the emission of pollutants by large industrial and agro-industrial plants and levelling the playing field across the EU.

Implementation needs:

Article 15(4) of the IED permits derogation from where achievement of emission levels associated with BAT would lead to disproportionately higher costs compared to (a) environmental benefits due to the geographical location, the local environmental conditions, or (b) the technical qualities of the installation.

There are several options which could be followed to successfully implement this measure in the legislature:

- Article 15(4) could be amended to include reference to the universal methodology for assessing costs of implementation and environmental benefits.
- Sub paragraphs (a) and (b), could be removed to avoid confusion between the official methodology and individual interpretation of the legislation.
- The EU could provide a separate piece of guidance on how to carry out a standardised methodology for Member State authorities. EU may introduce guidelines / a standardised methodology could be appended to a section of Article 15(4)

The EU has confirmed the methodology would need to be developed by the EU first.

Effective implementation of this measure should be supported by guidance for competent authorities from the EU. MS would need to integrate the EU guidance into the national guidance documents and ensure operators understood the guidance and have the resources to implement the methodology. This would require study and analysis of existing methodologies and consultation among Member States on a draft methodology. It would need to address how cost

accounting would be done, how benefits accounting would be done, and some of these could build on previous work on methodologies carried out for the EU examining methodologies for estimating potential industrial emissions reductions and compliance costs (Ricardo, 2016).

The methodology could be developed as part of the revision of the reference document on Economics and Cross-Media effects (EUM). The existing EUM document reference document contains some information on how to carry out a cost assessment for BATs, but the document was published in 2006 and a more thorough cost benefit methodology could be included in a revised document. However this was intended as informing BREF process Economic assessment rather than individual installation level Economic assessment. This would have several benefits. The methodology developed by the EU could also benefit from the existing methodologies and guidelines currently used by Member States. The table below includes an overview of existing practices in 8 Member States.

Table A8-6: Summary of existing cost benefit methodologies in use in Member States and positions on regulating for the use of a standardised method according to Member State representatives.

Member State	Description of existing cost benefit analysis method	Comments from Member State authority representatives
Belgium (Flanders)	In Flanders, the guideline document, *Guideline for determining the Best Available Techniques at installation level* (2017) is a voluntary tool which can used by operators who wish to apply for an Article 15(4) derogation or more generally to assess employment of BAT. The guideline document provides a point of reference for the operator when there might be a need to investigate how to proceed with adopting BAT or applying for derogation. The guideline can also be used by those conducting company specific BAT studies, such as, research institutions. The guideline is based on experience gained in Flemish case studies, company-specific studies and BREFs.	According to a representative from the Environment Department of the Government of Flanders, most Article 15(4) applications do not use this guideline for the following reasons; it is not mandatory to use this guideline, other methodologies can be used and the guideline is not specific for article 15(4). The representative from Belgium Flanders argued they would welcome more guidance on the cost benefit analysis, specifically, which damage cost to use to quantify the benefits. However, the representative from the Belgian department for environment does not believe the methodology should be totally standardized for all Member States. The situation in each Member State is different. Discussions on which damage costs to use, which benefits to calculate/evaluate, with each Member State is not an efficient option. Moreover, this will not create a level playing field in the EU. To accommodate for differences between Member States as well as improving homogeneity, the EU could produce a framework/template on some of the key aspects. In addition INCITE could develop and keep updated a list of damage costs.

Member State	Description of existing cost benefit analysis method	Comments from Member State authority representatives
		Finally, this measure will not solve all the issues with the article 15(4) derogations.
Italy	According to a representative from the Italian Ministry for Ecological Transition, specific methodologies for conducting cost benefit analysis do not exist. In Italy, the representative believe, the cost-benefit analysis are evaluated by an expert judgement of the competent authorities.	The representative is in favour of defining a standardised methodology at EU level to promote homogenous application. However, the representative argues there are some risks associated with regulating for the use of a standardised methodology. For example, the representative local conditions should not be ruled out by a standardised methodology. As a result, the representative suggests a trial period to test the regulation and allow interested parties to practice using a standardised tool.
Denmark	Denmark uses technology descriptions and associated financial calculations to help operators identify BAT for agricultural installations. On the basis of technology descriptions, standard conditions are set on the size of the required emissions reduction. The methodology is currently under review. A document shared by a representative of the Danish Ministry of Environment provides a detailed overview of the processes used to evaluate.	
Poland	In Poland, BAT and derogations for ***emissions to air*** released by IED installations is informed by the European Environment Agency report *Costs of air pollution from European industrial facilities 2008-2012*. A Ministry of Environment handbook supports operators and competent authorities to implement the approach (Ministerstwo Srodowiska, 2017). In addition, there is an excel file to support calculations (Ministerstwo Srodowiska, 2021). The handbook and excel are developed specifically for Large Combustion Plants. However, certain parts of the guide are universal and can therefore be used as a guide for other types of installations. The manual is not designed to be prescriptive or exhaustive and other methods can justify a request for a derogation. Regarding emissions to water, the representative from Poland states Poland has not developed	According to a representative from Poland's Ministry of Climate and Environment, the impact of standardising a cost benefit methodology depends on how the method is delivered. For example, if a "standardised" method is translated through a *guidance document* this could be easily delivered by the relevant ministry in Poland. This is a similar process to existing methods for informing cost benefit analysis. However if "standardised" referred to a legally binding method this would be significantly more challenging to implement (more so when regulating emissions to air than water). The regulation would have to be very detailed, explaining each element of the procedure (including definition of disproportion of costs compared to the environmental benefits). Delivering this kind of legislation would be further complicated by political developments.

Member State	Description of existing cost benefit analysis method	Comments from Member State authority representatives
	guidelines for this. The recommended approach has been communicated directly to the competent authorities. The methodology used to regulate emissions to water is based on qualitative assessment where the environmental impact considers the quality of the receiving water body, properties of pollutants concerned, and the impact of given installation on the identified state of water body. As a priority, the government avoids providing derogation where priority pollutants are concerned.	
Finland	The Finnish government have produced a handbook *BAT-päästötasoja lievempien raja-arvojen hyötyjen ja haittojen arvioinnin hyvät käytännöt* (BAT emission levels advantages and disadvantages of limit values good evaluation practices), which outlines good practices for the application and assessment of derogations on emission limit values based on best available techniques in the environmental permit process of installations under the Industrial Emissions Directive (2010/75/EU, art. 15(4) derogations). The guidance provides recommendations for operators and authorities to adapt to the following: 1. Costs of emission reductions based on net present values 2. Monetised environmental benefits 3. Lost environment benefits caused by atmospheric emissions should be monetised 4. No commonly accepted methodologies available on the EU level for evaluation of environmental damage to water bodies. The report rEUommends a first step to dermine whether harm can be monetised might be caused by excess emissions. 5. As a prerequisite to derogation the costs of investment should exceed the enviromnmental benefits	-
Portugal	Portugal's environmental permitting unit has developed a method for application based on theBREF on Economics and Cross-Media Effects. The guide is designed for cases when there is not an obvious conclusion or a broad agreement on	A represenative of Portugal's Department of Environmental Permitting unit believes there is margin for improvement but at least there is a baseline for all operators.

Member State	Description of existing cost benefit analysis method	Comments from Member State authority representatives
	the preferred option to be implemented. The guide is based on the fundamental principles of the IPPC Directive; a method which allows for a transparenet assessment of the costs of implementing BAT, requirements that mst be considered in analysis of Economic viablility. The guide is also supported with an excel sheet to support operators to make calculations.	
France	The French Ministere Ministère de la Transition écologique et solidaire has a methodology, produced in collaboration with the public technical institute Ineris (Ineris, 2017) and a spreadsheet to support operators with calculations (Ineris, 2017b). Regarding environmental aspect, to government request an update of the impact assessment regarding the incidence of concern (if the incidence is important, competent authority can ask to include a propEUtive health risk assessment, "Evaluation des Risques Sanitaires" in French, and/or an assessment of the environmental state of media, "Etude sur l'interprétation de l'état des milieux"). The goal is to quantify the impact. Regarding the cost, the analysis takes into account OPEX and CAPEX. Competent authorities can also ask for proof and information about the last investment regarding the source of the incidence. In addition, the French government is currently working on a methodology to identify and cover better incidences which are not currently covered or are partially covered by BREFs according to Article 14(6).	The representative for France's Ministère de la Transition écologique et solidaire states that cost-benefit calculation is a core aspect of BAT. Therefore, harmonised guidance for cost-benefit analysis in the EU to support a level playing field and a high level of enviornmental protection is crucial.
Sweden	Sweden's Naturvardsverket does not have a standardised cost benefit methofd for assessing the proportionality between costs of implementing BAT conclusions and potential environmental benefits. Instead, assessments are made by competent authorities on a case by case basis. Sweden assessed the proportionality between costs of implementing BAT conclusions and potential environmental benefits before the IED entered into force. The Swedish Environmental Code includes so-called 'General Rules of Consideration'. These are among others: Burden	-

Member State	Description of existing cost benefit analysis method	Comments from Member State authority representatives
	of proof principle, Proportionality principle, PrEUautionary principle, Best Possible Techniques Principle, Knowledge requirement. These rules stipulate that all activities and measures that may affect human health or the environment must be carried out in a way that any inconveniences or risks for inconveniences are prevented or limited. These rules apply as long as they are not unreasonable (Proportionality principle) which means that application should be environmentally justifiable and financially reasonable in each case.	
Spain	The Catalonian cost benefit methodology aims to determine environmental effects, and to establish which option has the best cost-benefit ratio (Departament de Medi Ambient i Habitage, 2007).	-

Assessing impacts

Economic impacts

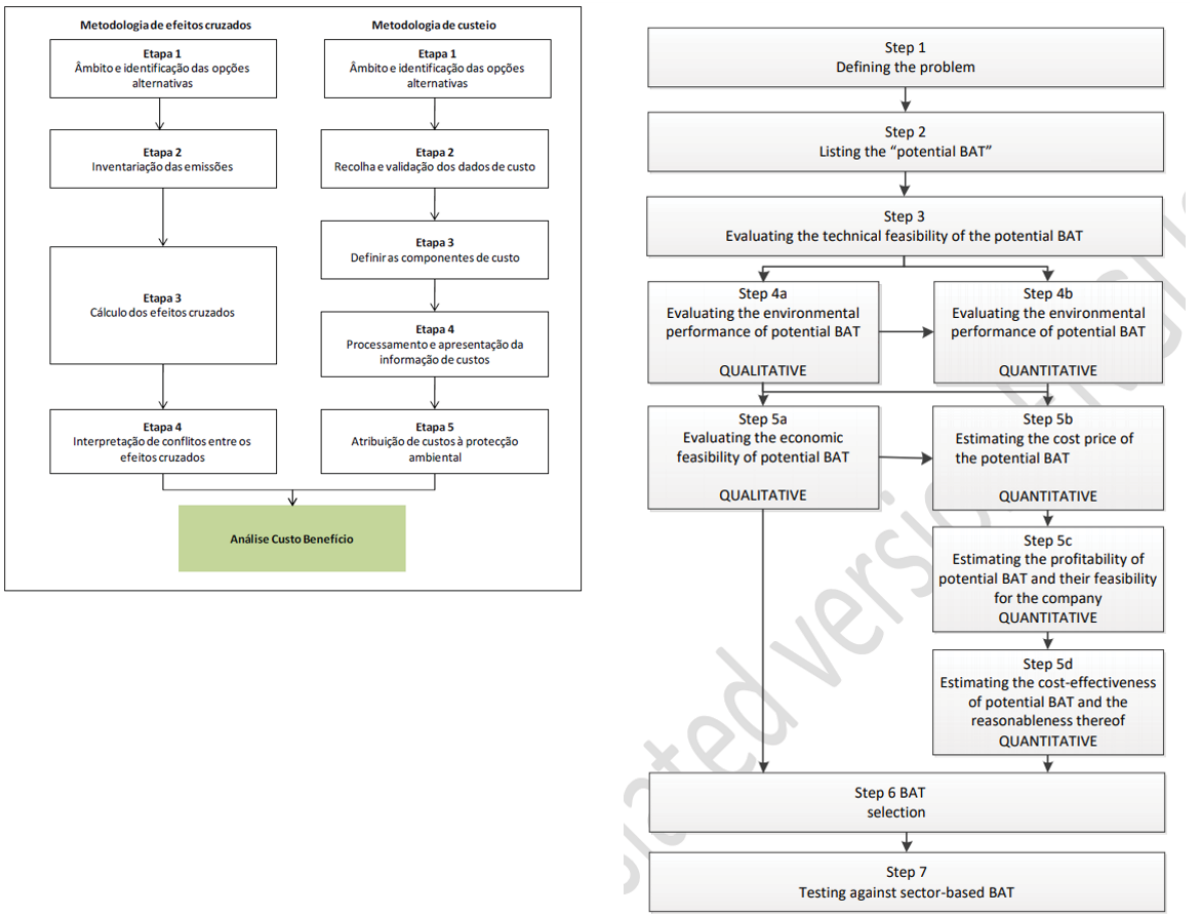
In summary, the Economic impacts of mandating the application of a standardised cost benefit methodology on both competent authorities and operators are likely to be **weakly negative**.

A small proportion of installations receive derogations from competent authorities, therefore, the potential overall economic impact of increasing the standardisation of the method is low. As indicated for measure 1, there were approximately 200 derogations for 130 of 52 000 IED installations as of 2019 reporting. In 2019, 65 derogations were issued and 5 200 permit reviews were conducted. Therefore, the most significant Economic impacts of this measure would be limited to <0.0025% of IED installations or 1.25% of annual permits reviews. However, there remains the potential for localised Economic impacts where installation operators expect to rely on derogations to help the installation more financially viable. Increasing the standardisation of the cost benefit methodology might have a negative Economic impact on operators which apply for derogations in the future, where standardisation increases the stringency of the application process. Whether the measure will increase the stringency depends on the quality and consistency of existing cost benefit methodologies employed by competent authorities to issue derogations.

In addition, this measure could potentially have Economic impacts for Member State authorities. The measure would require authorities to produce, share and provide operators with guidance on how to use the methodology. The existing cost benefit methods employed by competent authorities are summarised in **Table A8-6** and comments from Member State representatives on the value of introducing a standardised method. Currently, Member State national level

authorities are varied, and none are mandatory. Therefore, requiring the use of a standardised cost benefit methodology will change existing practices. A significant change in practices could also have an Economic impact on operators by increasing the administrative burden on businesses (discussed below) and in some cases may introduce an increased stringency that increases the difficulty of successfully demonstrating to a competent authority that an operator requires a derogation. Whether the measure will mean it is more challenging for operators to successfully gain a derogation depends on whether the new methodology is more strict than existing methodologies. Inconsistency between the measures currently used means Economic impacts will vary based on in which Member State(s) a business operates.

Figure A8-4: Schematic diagrams of steps to be taken when carrying out an installation-level cost benefit analysis. Right, Belgium (Flanders) (Vito, 2017) and left, Portugal (iSBS Consultancy, APA, IP, 2013).



Administrative burden on businesses

The measure is likely to have a **limited to weakly negative impact** on business' administrative burden. Existing cost benefit methodologies are inconsistent. This has been confirmed by the responses to the TSS. Therefore, if a standardised methodology to assess the costs and benefits of derogations were developed, it is likely this will increase operator's administrative burden in most cases. However, this conclusion assumes a standardised methodology implemented by the Member State authorities would be more detailed or stringent than the existing practices, which remains uncertain at this stage. Assuming that this measure would increases the costs of a derogation process by around 25% on average for operators, and that over the 20 year period 400 installations would make derogations applications, the additional administrative cost for business is estimated to be between €0.1m/yr and €0.9m/yr, with a best estimate of €0.2m/yr.

Operating costs and conduct of business

The measure is likely to have a **weakly negative impact** on business' operating costs and conduct. As discussed above in the "Economic impacts", it is possible the measure will make it more difficult for operators to apply for derogations, as a result of an increase in the stringency or level of detailed required to work with the standardised methodology.

Competitiveness and level playing field

This measure is likely to have **positive impacts on the level playing field**. The cost benefit methodologies which are currently used by Member States and regional competent authorities are inconsistent. Therefore, there is significant potential for the measure to **improve the level playing field** both within Member States and between Member States by introducing a more uniform process to assess the costs and benefits of derogation.

Position of SMEs

The measure's impact on SMEs is **unclear**.

Innovation and research

The measure is **unlikely to have an impact** on innovation and research.

Public authority impacts

The measure is likely to have **limited and negative short-term impacts** on public authority resources across the EU. However, the measure may have **limited and positive long-term impacts** on all public authorities' operational systems as a result of streamlining currently separate/disparate approaches. Assuming that this measure would increase the costs of a derogation process for public authorities to the level of half the cost of operators, and that over the 20 year period 400 installations would make derogations applications, the additional administrative cost for authorities is estimated to be between €0.06m/yr and €0.4m/yr, with a best estimate of €0.09m/yr.

Short-term impacts on public authority resourcing will apply to high level European and national level authorities. The measure will require the EU to develop a methodology and provide guidance for operators and competent authorities on how to use the methodology. As illustrated in the examples in Figure A8-2, none of the MS examined have a dedicated tool to cover Article 15(4) derogations across all sectors or pollutants which are regulated by the IED. Furthermore, out of the tools which MS have produced, they are all voluntary. Therefore, most MS authorities will have to either implement a new methodology or methodologies or adapt an existing methodology to comply with the measure. MS will also need to produce guidance or offer support to operators and competent authorities to support their use of the methodology. In the grand scheme of public authority actions, creating and implementing the tool will have a relatively limited demand on Member State resources. Furthermore, the initial investment is likely to be somewhat offset by the marginal logistical benefits gained through streamlining.

If a more stringent cost benefit methodology is introduced, it is foreseeable that public authorities in Member States which grant a relatively high number of derogations would be most affected. As discussed above in 'Economic impacts', Sweden, Portugal and the Czech Republic are the Member States with the most derogations. In the answers submitted to the Targeted Stakeholder Survey questionnaire the representative from Sweden's Naturvårdsverke stated they were supportive of introducing time limit for derogations. The representative also stated it is necessary and important to conduct assessments which are specific to the installation, sector, and technological development in question. This indicates that Sweden, the Member State which grants the most derogations in EU, does not believe the measure would have any significant negative impacts on their operations, on the condition a standardised methodology has flexibility to accommodate for different installations, sectors and technologies.

The representatives from Italy and Denmark's environment ministries both suggested the EU could produce information to support development of a standardised methodology, specifically relating to damage costs. Therefore, if this measure is implemented, the EU could consider provide MS with guidance to support MS to implement the measure. Effective guidance could lessen the measure's administrative burden on public authorities and increase the homogeneity of the tools produced across Member States, thus improving the level playing field within the EU.

Environmental impacts

Generating a more standardised methodology that is applied across the MS should harmonise how benefits and costs are calculated. When a derogation is being considered by an authority, they will have a more comprehensive assessment to use to know whether to grant a derogation. If the methodology is more comprehensive, with greater support provided in how to value benefits and how to standardise the quantification of costs, this could mean fewer derogations are granted. If fewer derogations are granted, or are granted on stricter terms, this may result in **limited to weakly positive impacts on the environment** overall. In particular, this is expected to be the case for the environmental issues most commonly within scope of Article 15(4) derogations: emissions to air and emissions to water.

Climate

The measure is likely to have **no impact** on greenhouse gas emissions.

Evidence: there were no derogations reported in 2019 which were relevant to climate impacts. The only type of derogation which may affect the climate are derogations for energy efficiency. The measure may have an impact on the climate if GHG emissions are brought within the scope of the IED (see measures in problem area 4).

The evidence is supported by views of stakeholders: 44% of respondents to the TSS believe the measure will have no impact on GHG emissions. There were significantly fewer responses in favour of the measure having at least a slight impact, which constituted 27% of responses.

Air quality

This measure is likely to have **weakly positive impacts** on air quality.

As identified for measure 1, the majority of derogations granted to date have been for emissions to air. The use of a standardised methodology may lead to reduced numbers of derogations or derogations granted with more stringent limits. Hence weakly positive impacts may occur in these cases, though no benefits would accrue if derogations continue to be granted.

The evidence is supported by views of stakeholders: a high proportion of respondents believe the measure will have no impact on emissions to air (47%). There were slightly fewer responses in favour of the measure having **at least a slight impact,** which constituted 41% of responses. In comparison to the responses to the other environmental fields examined, this was the joint-highest level of support alongside emissions to water.

Water quality and resources

This measure is likely to have **weakly positive impacts** on water quality.

As identified for measure 1, a minority of derogations granted to date have been for emissions to water. The use of a standardised methodology may lead to reduced numbers of derogations or derogations granted with more stringent limits. Hence weakly positive impacts may occur in these cases, though no benefits would accrue if derogations continue to be granted.

The results of the targeted survey support the evidence found on releases to water. In comparison to air quality, a high proportion of respondents believe the measure will have no impact on emissions to water (46%). There were slightly fewer responses in favour of the measure having **at least a slight impact**, which constituted 41% of responses. In comparison to the responses to the other environmental fields examined, this was the joint-highest level of support alongside emissions to air.

Soil quality or resources

The measure is likely to have a **limited impact** on soil quality or resources.

Evidence: very few derogations granted appear to affect releases to soil.

The results of the targeted survey support the conclusion reached using data on permits for releases to soil: a high proportion of respondents believe the measure will have no impact on emissions to soil (48%). There were significantly fewer responses in favour of the measure having **at least a slight impact**, which constituted 31% of responses. This could reflect the view held among many that in its current state the IED does not do much to regulate emissions to soil. Therefore, without broader changes to the IED, this measure alone would have a limited impact on emissions to soil.

Waste production, generation, and recycling

The measure is likely to have **no impact** on waste production, generation, and recycling.

Evidence: Limit values and performance levels for waste production, generation, and recycling are not legally binding, and derogations have not been granted for these topics.

The results of the targeted survey support the conclusion reached based on the nature of limit values and performance values for waste production: a high proportion of respondents believe the measure will have no impact on waste generation (52%), the highest proportion of responses in favour of "no impact" out of all the environmental measures examined. The responses in favour of the measure having **at least a slight impact** was half the number of responses in favour of the measure having no impact, accounting for only 26% of responses. Alongside resource use of other materials, waste generation received the lowest level of support from stakeholders in the measure having an impact.

Efficient use of resources

The measure is likely to have a **limited impact** on efficient use of resources.

Evidence: Currently, resource efficiency BAT conclusions do not have the same status as pollution abatement BAT conclusions in the IED, and derogations have not been granted for these topics.

The results of the targeted survey support the conclusion reached based on the nature of limit values and performance values for waste production: a high proportion of respondents believe the measure will have no impact on energy use (51%), water use (50%) and use of other materials or resources (48%). There were significantly fewer responses in favour of the measure having **at least a slight impact** on energy use (28%), water use (27%) and use of other materials or resources (26%) of responses.

Social impacts

This measure is likely to have **limited impacts** on employment. Where public authorities operated a less rigorous or stringent methodology to calculate the cost of compliance against environmental benefit, this measure may reduce the number of derogations issued to businesses. With reduced derogations, businesses will be forced to invest in implementing new techniques. This could have some positive impacts in terms of the employment impacts to install to

techniques, and/or some negative impacts if the business' ability to employ the same number of FTEs is affected by reduced margins.

Measure 3: Amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases

Description of the measure and requirements for implementation

This measure would amend Article 15(1) to introduce an explicit requirement that indirect releases of polluting substances to water shall be assessed and evidence must be provided to demonstrate that such releases would not lead to an increased load of pollutants in receiving waters when compared to a scenario where the IED installation applies BAT and meets AELs for direct releases.

Under the existing IED legislation, the first paragraph of Article 15(1) states that emission limit values apply at the point when the pollution leaves the installation and clarifies that the effect of any processes which dilute the final emission should be disregarded:

> *"The emission limit values for polluting substances shall apply at the point where the emissions leave the installation, and any dilution prior to that point shall be disregarded when determining those values."*

However, the second paragraph of Article 15(1) makes an exception for emissions assessment in the context of water pollution. This exception allows for consideration of the treatment processes in a water treatment plant when evaluating limit values on final emissions. Pollution in all other circumstances cannot consider the effect of "any dilution prior to that point". The text in question, paragraph two of Article 15(1), states:

> *"With regard to indirect releases of polluting substances into water, the effect of a water treatment plant may be taken into account when determining the emission limit values of the installation concerned, provided that an equivalent level of protection of the environment as a whole is guaranteed and provided this does not lead to higher levels of pollution in the environment."*

- Therefore, the suggested measure would remove or adjust the exception in Article 15(1) for water treatment plants and indirect water pollution more generally. Consequently, emission limit values in the context of releases to water would be assessed based on BAT. The 2nd paragraph of 15(1) currently allows for the effects of waste water treatment plants (WWTP) to be accounted for. The measure is to strengthen this, to say if a WWTP is used [i.e., indirect releases] that would not lead to an increased load of pollutants in the final release environment compared

to if no WWTP was used and the installation applied BAT and meets the BAT-AELs for direct releases. According to this approach, it would be necessary to show that using a WWTP would not lead to a worse result than if BAT was applied directly. Other conditions which could be considered include, released pollutants do not impede the operation of the WWTP (e.g. they are not toxic to the biological process) and the receiving WWTP is designed to abate these pollutants.

Objectives:

The measure aims to reduce industrial indirect releases to water bodies. This measure will, therefore, contribute to the general ambition of zero-pollution in the EU and, more specifically, contributing towards preventing or minimising the emission of pollutants by large industrial and agro-industrial plants and levelling the playing field across the EU.

Implementation needs:

- EU to amend IED legislation
- MS to transpose legislation onto the national legal frameworks
- EU/MS to provide guidance or communication for operators on the changing of practice
- Operators to implement requirements to monitor, assess and provide evidence on indirect releases to water.

Assessing impacts

Economic impacts

In summary, the measure has potential to have **weakly negative** Economic impacts on installations which release emissions to water indirectly. Therefore, including indirect emitters within the scope of the Directive will require operators to demonstrate equivalence with BAT. Two factors are examined to estimate the Economic impact of the measure on operators: the nature of the BAT conclusions and the sectors and types of installations which would be affected by the measure.

The majority of existing BREFs for water emissions do not include changes to manufacturing processes technologies. This implies the measure will not have significant Economic impacts of in the short term. According to a 2018 study of the IED's potential contribution to broader water policy, most techniques included in the BREFs for water emission reductions include abatement or managerial techniques (Ricardo, 2018). A small proportion of techniques aim to change or select a given primary manufacturing process that leads to lower emissions to water. In the BREFs reviewed under the IED for the same study, 80% of BAT conclusions related to water emission topics do not contain a BAT-AEL. Most techniques inside the BAT conclusions documents do not contain BAT-AELs. The most common generic conclusions on water topics included in the BREFs since 2011 (IED) are environmental management systems, monitoring of emissions to water, and wastewater strategies.

The Economic impacts of this measure are likely to be unevenly distributed between installations based on their size. Emissions to water from small industrial installations are more often classed as indirect releases to water than large installations (Ricardo, 2018). Economic impacts of the measure are also likely to be unevenly distributed between sectors, whereby some sectors are more responsible for emissions to water than others (Ricardo, 2018). For example, the chemicals sector is responsible for most fluorine emitted to water and is one of the top IED emitters of nitrogen while the pulp, paper and board industry emits three times the quantity of TOC than the second largest polluter (organic chemical production) (Ricardo, 2018).

The number of installations estimated to be affected has been taken from the number of EU27 facilities reporting pollutant transfers in water in E-PRTR in 2018: 1 056 facilities, assumed to be 1 056 installations.

The measure will have a limited Economic impact on installations which currently use independently operated WWTPs to treat their waste water. Independently operated WWTPs are normally plants dedicated to the treatment of industrial waste water which serve several installations located in proximity to each other. For certain industrial waste water effluents this can be a more efficient option compared with treatment onsite, as EUonomies of scale and synergies between waste water types can be exploited (EEA, 2018). According to E-PRTR data from 2017, there are 74 independently operated WWTPs in Europe which are regulated by the IED. Independently operated waste water treatment plants are more likely to be able to filter out harmful pollutants due to their Specialist design. Therefore, it is unlikely installations which are served by independently operated WWTPs would release fewer indirect emissions into the receiving body of water if they implemented BAT at the plant level. However, since a small proportion of installations are served by independently operated WWTPs, the measure is still likely to have, overall, a negative Economic impact on installations.

The position papers submitted by CEFIC, an association for the EU chemicals industry, and by Verband Der Chemischen Industrie (VCI), an association for German chemical companies, argue a centralised system for treatment of waste water is the most Economically efficient approach (no quantitative evidence provided). The papers note that decentralised and additional treatment plants focus on selected substances, at the expense of overall efficiency.

The position paper from industry stakeholder IOGP notes that while there already exists well-established and clear waste water legislation which serves to regulate indirect water discharge to water bodies via treatment plants, they “urge careful consideration of the potentially detrimental effects that may stem from a lack of efficiency if each installation covered by the IED had to conduct its own waste water treatment [and] underline the need for a pragmatic approach in all the circumstances.”

Administrative burden on businesses

- The measure will have **weakly negative impacts** on the administrative burden on businesses. Environmental management systems, monitoring of emissions to water, and waste

water strategies are all frequent requirements in BAT conclusions concerned with water quality (Ricardo, 2018). The need to introduce and comply with environmental strategies and monitoring would be one of the driving forces increasing business' administrative burden. In addition, the IED operator and the WWTP operator would need to cooperate closely, including, communicating what its pollution load is and what is the reference load to be complied with (i.e. corresponding to BAT-AEL for direct discharge).

- In comparison to the total costs in the baseline, this measure is expected to require additional resource from operators, assumed at around an additional 5% in costs during permit reviews, inspections and monitoring and reporting activities. Over a 20-year period, therefore, it is estimated that operators may incur an additional €0.01m/yr to €0.8m/yr, on average, with a central estimate of €0.6m/yr.

Operating costs and conduct of business

The measure is likely to have **negative impacts** on the operating cost of businesses.

It is however difficult to quantify the impact of this measure. The likely consequence is that some IED installations would need to install their own WWTP in the cases where they would not be able to prove they were able to meet the demands of the revised Article 15(1) text. The additional costs for WWTP could be rather significant CAPEX and OPEX. However, whether a WWTP would be required would be specific to each installation, based on the quantities released, and the local situation with the existing receiving WWTP. This is impossible to predict the number of installations that may incur the costs. The possible level of costs for one installation is quoted by one source[5] for large industrial WWTP to be between $20 000 and $40 000 per cubic meter per hour (m^3/h), with a central estimate at $25 000 /$m^3$/h for capital costs, and with operating costs principally due to additional chemical consumption to be $3/$m^3$.

A paper provided by CEFIC argues that large-scale waste water treatment plants can remove pollutants more effectively than decentralised systems. Therefore, the organisation argue that this measure is not an efficient way of reducing emissions to water.

Competitiveness and level playing field

The measure is likely to have **limited to weakly negative impacts** on competitiveness, resulting from significant increase in the costs of conducting business. The measure is also likely to **improve the level playing field** across the EU on how indirect releases are monitored and managed across the EU.

Current BAT-AELs for pre-treatment are fixed, but implementation varies among Member States. Furthermore, due to the non-binding nature of BAT-AEPLs (Art. 14(3) of the IED) only a few Member States implement these values as intended. Clarifications on setting and interpreting BAT-AELs for waste water discharge is needed, and specifically, where technically reasonable

[5] https://www.watertEUhonline.com/wastewater/article/14183810/industrial-wastewater-treatment-print. No cost data were identified in the CWW BREF.

and justified, BAT-AELs should be derived separately for direct and indirect discharge. An updated BREF Guidance (Implementation Decision 2012/119/EU) could be used to stipulate pre-treatment as binding.

There is limited further evidence to support the assessment of this measure. The remaining assessment is from stakeholder consultation:

- ClientEarth (Environmental NGO) suggests that the monitoring of indirect releases is likely to result in a **slight** improvement in the harmonisation between sectors and Member States.
- Jernkontoret and VCI (national industry associations) in contrast do not expect the monitoring of indirect releases to improve harmonisation between sectors and Member States. VCI argue that this measure would lead to a more than 15% decrease EU competitiveness.
- EUROCOAL (EU industry association) request the effects of waste water treatment plants should be taken into account (rather than Article 15(1) 'may be') when determining permit ELVs, to support the integrated approach. Euracoal note that "*often, Special water treatment plants are better suited for removing pollutants, rather than installations within the site boundaries of IED-regulated plants*".

Position of SMEs

The measure will likely have **weakly negative impacts** on SMEs. According to (Ricardo, 2018) most installations responsible for indirect releases of pollutants are small-scale. Therefore, the measure is likely to disproportionally affect SMEs than larger organisations.

Innovation and research

The measure will likely have **no impact** on innovation and research.

Public authority impacts

In the short-term, this measure is likely to result in **weakly negative impacts** on public authorities to engage with and review the evidence provided by operators on how indirect releases are being managed. Analysis of the implications of this measure and associated costs is ongoing.

The measure would create additional burden for public authorities in permit reviews, inspections and information management. In comparison to the total costs in the baseline, this measure is expected to require additional resource from public authorities , assumed at around an additional 5% in costs during permit reviews, inspections and monitoring and reporting activities. Over a 20-year period, therefore, it is estimated that public authorities may incur an additional €0.02m/yr to €0.5m/yr, on average, with a central estimate of €0.4m/yr.

Member States which have not yet implemented Article 15(1) may be left behind if the measure is implemented. The existing legislation requires competent authorities to assess how indirect emissions are abated in the WWTP. This implies competent authorities which are currently

implementing measures will have experience and knowledge in calculating indirect emissions to water and examining how effective WWTPs are in abating indirect emissions. The findings of a Ricardo study indicate there are at least six Member States which do not currently implement Article 15(1) will have more work to do to successfully implement the measure (Ricardo, 2020b).

The measure includes the requirement to understand whether indirect releases of polluting substances to water do not lead to an increased load of pollutants in receiving waters. **Estimating the impact of an installations' indirect emissions on the receiving body of water is technically challenging** (Ricardo, 2020b). Special conditions such as dilution or synergistic effects need to be considered by the competent authorities. When mixed streams occur, a case-by-case approach is necessary to account for the specific circumstances of each installation. Successfully implementing the measure requires competent authorities to compare emissions between scenarios where the installation applies BAT in comparison to relying on the WWTP to abate emissions. Therefore, **the measure would be challenging for authorities to implement** which are unfamiliar with the technologies and approaches to measure emissions where pollutants are mixed in the waste water stream.

Mixing of waste water streams presents a technical challenge for implementing this measure for public authorities. The measure relies on the public authority's capability to estimate the quantity and severity of indirect emissions, which can be amplified or reduced by the synergistic effects following mixing waste water streams. Existing practices to tackle mixed waste water streams are employed in a handful of Member States (Ricardo, 2020b). Belgium (Flanders) uses additional monitoring requirements where necessary (e.g. monitoring of the individual streams) to enable a complete assessment of mixed streams. This testing has allowed competent authorities in Belgium to identify examples of a positive effects of mixing waste water streams, including neutralisation resulting from the mixing of basic and acidic waste water and the use of waste water with a high TOC value as a carbon source for biological treatment. In Austria, Belgium (Flanders) and Sweden (as well as Norway), ELVs are established individually for each waste water stream before their confluence. This is useful where at least one stream presents a high risk for humans or the environment. In Austria, Belgium (Flanders), Germany, Poland and Portugal, exceptions are also possible for substances that do not present a high risk. In such cases, the substances can be treated either at a WWTP or, where separate treatment is not possible, a mixing rule can be applied to establish a combined ELVs for emissions after treatment in the WWTP. Therefore, successfully implementing this measure will require public authorities to have the technical expertise to account for the impacts of waste water mixing..

In question 26 of the Targeted Stakeholder Survey, respondents were asked if their Member State had implemented or is planning to implement measures to set ELVs for indirect releases of polluting substances to water when taking into account the effect of a waste water treatment

plant. 15 Member States plus Norway[6] answered "yes" and 7 Member States answered "no"[7]. Out of the Member States which answered "yes", some Member States described how they set ELVs for indirect releases of polluting substances to water, and some MS expanded on their answers to explain they are working in compliance with Article 15(1) to set ELVs for indirect releases considering the effect of a WWTP.

Environmental impacts

There are excessive releases of pollutants to water bodies in the EU (European Commission, 2020b). Data on direct and indirect releases reported by IED industry, which are reported separately under the E-PRTR, show that direct releases have been significantly reduced, especially heavy metals, but that indirect releases going to centralised waste water treatment plants including urban waste water treatment plants have remained rather stable over the last 10 years (European Commission, 2020b). Reporting of indirect water releases is however rather incomplete. Competent authorities have difficulty in applying the existing legislation, and there are inconsistencies in the joint implementation of the IED and the Urban Waste Water Treatment Directive (European Commission, 2020b). Therefore, there may be a need to change the existing legislation to reduce emissions to water at source.

The measure will encourage more installations to comply with existing BAT conclusions on releases to water (as opposed to devolving clean-up to off-site WWTP). Implementing existing BAT conclusions on emissions to water can have a **significant impact on reduction of water pollution**. BAT-AELs may be useful for indirect discharges of pollutants for which municipal waste water treatment plants are generally not designed (e.g. substances that are difficult to degrade/not degradable, heavy metals, AOX, volatile substances, stubborn substances). For example, those BAT conclusions forcing higher monitoring frequencies will normally lead to better water effluent management and thus lower emissions to water, but the absolute impact is highly uncertain. The potential emission reductions of key pollutants due to BAT-AELs vary by BATc. In some sectors' processes emissions could be reduced by up to 80% while there might be negligible reductions in other processes. For example, in the production of pulp, paper and board, there would be significant reductions in high quantity pollutants such as chemical oxygen demand and Total Nitrogen to meet lower BAT-AELs, as well as reasonable reductions to meet the upper BAT-AELs as well.

Climate

This potential impacts of this measure on the climate are **uncertain**. The position paper submitted by the business association for the chemical industry highlights that WWTPs are major consumers of power. The considered measure may result in additional waste water processing on site at the installation, which would be expected to be an increase in power

[6] Belgium, Finland, Netherlands, Sweden, Austria, Denmark, Estonia, France, Germany, Italy, Latvia, Malta, Norway, Portugal, Romania, and Spain

[7] Sweden, Croatia, Cyprus, CzEUhia, Poland, and Slovenia

consumption compared to the utilisation of a combined offsite waste water treatment plant. This would increase greenhouse gas emissions in Member States where fossils fuels are still a core part of the energy mix.

Air quality

This measure is likely to have **limited impacts** on air quality, at least directly.

The application of BAT to control water pollutant loads from industrial installations is not expected to have an impact on air pollutant releases.

48% of TSS respondents think the measure will have no impact on emissions to air. The next largest proportion were 7% of respondents that think the measure will have a slight impact on emissions to air.

Water quality and resources

The measure will have **weakly positive to positive impacts** on emissions to water, although this is highly uncertain due to the unknown number of installations that may need to fit WWTP.

Table A8-7 provides an overview of the key indirect water pollutant releases from main IED activities which the measure would affect. The table has been compiled using 2018 E-PRTR EU-27 data on transfers and releases to water. The table estimates (final column) the possible benefit of this measure from the difference in the average emission rate per installation between reported transfers and reported releases. Activity/pollutant combinations where the average emission release per installation was higher than the average emission transfer are excluded. The analysis is based only on quantities of emissions from IED activities with at least 10 installations reporting to the E-PRTR in an attempt to identify the main polluters / key environmental issues. Therefore, the results are underestimates. Furthermore, the analysis is limited by installation reporting to E-PRTR being limited by the reporting thresholds, and thus is a further underestimate. From the very approximate results, the sector with the largest quantity of releases are plants for the pre-treatment or dyeing of fabrics and textiles, which release over 200 thousand tonnes of total organic compounds indirectly to water per year in 2018.

Table A8-7: Emissions to water by IED activity which the measure would affect, based on E-PRTR

E-PRTR activity code	E-PRTR Activity	Pollutant	Estimated emission reduction of measure (tonnes/year)
1(c)	Thermal power stations and other combustion installations	TOC	750
2(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or	Cr and compounds	20

E-PRTR activity code	E-PRTR Activity	Pollutant	Estimated emission reduction of measure (tonnes/year)
	chemical process	Zn and compounds	10
4(a)(ii)	Chemical installations for the production on an industrial scale of basic organic chemicals: Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins	TOC	1 210
4(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	TOC	510
5(a)	Installations for the recovery or disposal of hazardous waste	Phenols	60
5(c)	Installations for the disposal of non-hazardous waste	Ni and compounds	10
5(d)	Landfills (excluding landfills of inert waste and landfills, which were definitely closed before 16.7.2001 or for which the after-care phase required by the competent authorities according to Article 13 of Council Directive 1999/31/EU of 26 April 1999 on the landfill of waste has expired)	Cr and compounds	10
		Hg and compounds	10
		Phenols	20
6(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	TOC	23 790
7(a)(ii)	Installations for the intensive rearing of pigs with 2,000 places for production pigs (over 30 kg)	TOC	1 510
8(a)	Slaughterhouses	TOC	10 910
8(b)	Treatment and processing intended for the production of food and beverage products.	TOC	9 670
		Total phosphorus	30
8(b)(i)	Treatment and processing intended for the production of food and beverage products from animal raw materials (other than milk)	TOC	1 070
8(c)	Treatment and processing of milk	Total nitrogen	610

E-PRTR activity code	E-PRTR Activity	Pollutant	Estimated emission reduction of measure (tonnes/year)
		Total phosphorus	90
9(a)	Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles	TOC	208 980
		Total nitrogen	90
		Total phosphorus	20
		Zn and compounds	10

In the response to the consultation, Question 21 A and B of the TSS asked stakeholders to estimate the environmental impacts of the proposed measure. As would be expected, a large proportion of stakeholders believe the measure's **largest potential positive impact will be on emissions to water**. A relatively high proportion of respondents, 40% believe the measure will have at least a slight impact on emissions to water, divided between significant (13%), moderate (9%) and slight (18%). However, 39% of stakeholder responses considered this measure may have no impact on emissions to water.

Environmental NGO EEB expect a lower pollution load to enter into the WWTP input waste water stream and hence a lower discharge into the receiving water if pre-treatment is applied prior to indirect emissions release to UWWTP. EEB support this measure or a more stringent interpretation of prohibiting all indirect releases of waste water, and they consider it should be BAT to monitor emissions from both direct and indirect discharges.

Soil quality or resources

This measure is likely to have **limited impacts** on soil quality, at least directly.

44% of TSS respondents think the measure will have no impact on emissions to soil. The next largest proportion were 7% of respondents that think the measure will have a slight impact on emissions to soil.

Waste production, generation, and recycling

This measure is likely to have **no impact** on waste production, generation and recycling.

55% of TSS respondents think the measure will have no impact on waste generated. The next largest proportion were 7% of respondents that think the measure will have a slight impact on waste generated.

Efficient use of resources

The measure is likely to have **no impact** on resource efficiency.

The application of BAT to control water pollutant loads from industrial installations is not expected to have an impact on water use.

53% of TSS responses believe the measure will have "no impact" on water use. 17% of respondents believe the measure will have at least a slight impact on water use, divided between significant (2%), moderate (8%) and slight (8%).

Social impacts

The social impacts of this measure are **uncertain.**

Measure 4: Amend Article 18 to require that stricter ELVs are set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions

Description of the measure and requirements for implementation

This measure would amend Article 18 to require that stricter ELVs that go beyond current BAT shall be set in permit conditions in the case that environmental quality standards cannot be met by implementing existing BAT conclusions.

As part of the IED evaluation some stakeholders suggested that current wording of Article 18 is not specific enough with regard to concrete actions that have to be carried out. Currently Article 18 states that:

> *"Where an environmental quality standard requires stricter conditions than those achievable by the use of the best available techniques, additional measures shall be included in the permit, without prejudice to other measures which may be taken to comply with environmental quality standards."*

The existing legislation does not specify what 'additional measures' should be prescribed by competent authorities in the case that BAT do not meet environmental quality standards. The revision proposed by this measure would clarify that permit ELVs need to be set below the lower end of BAT-AEL range (or in the cases where the BAT-AEL lower range is not specifed, and instead a "<" sign is used, to be towards the lower end of the BAT-AEL range) where the environmental quality standards are not met by setting ELVs in line with BAT-AEL range. This revision would therefore contribute to a higher level of environmental protection.

Objectives:

The measure aims to clarify the intention of Article 18 and contribute to ensuring that environmental quality standards are met. This measure will, therefore, contribute to the general ambition of zero-pollution in the EU and, more specifically, contributing towards preventing or

minimising the emission of pollutants by large industrial and agro-industrial plants and levelling the playing field across the EU.

Implementation needs:

- EU to update Article 18 of the IED.
- EU and Member States to issue guidance for competent authorities and businesses which experience a change in practice as a result of the rule change.
- Competent authorities and installation operators to update permits.
- Installation operators may lead to changes related to additional techniques deployed.

Assessing impacts

In general, very few permit conditions have been reportedly set to date that are more ambitious than those achievable by the use of BAT. For reporting year 2018, only Sweden and Germany reported setting stricter ELVs in permit conditions, in relation to Article 18 (to meet Environmental Quality Standards; stricter conditions set in 5 cases).[8] This information was reported in Ricardo (2021), and the latest reporting for 2019 does not materially change this (6 installations are mentioned, when considering reporting years 2018 to 2019). Further conditions may still be reported by Member States as further BATC are implemented though. The 5 cases reported in the IED registry for 2018 represents 0.01% of all installations. Analysis in Ricardo (2021) suggests that this lower level of reporting of Article 18 uptake compared to previous IED implementation reporting (against Commission Implementing Decision 2012/795) reflects an improvement from previous misunderstanding among some Member State competent authorities. The conclusion from the reported data is that competent authorities rarely set stricter permit requirements that are below the lower end of the BAT-AEL range, particularly in relation to Article 18 of the IED.

However, based on limited information provided during the stakeholder workshop held in July 2021, German authorities indicated that "*Environmental Quality Standards in Germany often trigger stricter conditions than those based on BAT only*", and the approach followed is to first apply BAT and then check if this allows meeting EQSs; if not, stricter conditions are applied. However, these occurrences have not been reported within the IED reporting mechanism but they do exist.

The Eunomia reports[9] on the distribution of ELVs in relation to BAT-AEL ranges do nevertheless concur that the overriding majority of permit ELVs are set at upper BAT-AEL levels. It is concluded that the number of installations setting permit conditions related to Article 18 must be very low.

Furthermore, the installations that are the subject of this measure are already some of the lowest environmental performers, by definition.

[8] In addition, 16 cases of stricter permit conditions related to Article 14(4) (to achieve greater emission reductions than those achievable by the use of BAT in the adopted BATC) were reported for year 2018.
[9] E.g. Eunomia Research & Consulting (2019), "An Assessment of IED Permitting Stringency"

All impacts related to implementation of this measure are, therefore, **expected to be very limited**.

Economic impacts

The measure will have very **limited Economic impacts** overall.

Administrative burden on businesses

The measure will have **very limited negative impacts** on the administrative burden on business. A very small number of installation operators may need to negotiate an updated permit.

Operating costs and conduct of business

The measure will have **very limited negative impacts** on the operating costs and conduct of business. A very small number of installation operators may need to change installation operation to meet stricter ELVs.

Competitiveness and level playing field

The measure will have **limited to no impact** on competitiveness or the level playing field.

Position of SMEs

The measure will have **no additional impacts** on the position of SMEs.

Innovation and research

The measure will have **no impact** on innovation and research.

Public authority impacts

The measure will have a **very limited negative impact** on the competent authorities which apply emission limit values that are stricter than the BAT-AELs. Authorities may have to adjust the processes used to issue stricter permit conditions with ELVs, incurring some small administrative changes.

Environmental impacts

The measure will have very limited environmental impacts.

Climate

The measure will have **no impact** on greenhouse gas emissions.

Air quality

The measure will have **very limited positive impact** on air quality, for those installations where the stricter ELVs lead to lower emissions to air.

Water quality and resources

The measure will have **very limited positive impact** on water quality, for those installations where the stricter ELVs lead to lower emissions to water.

The European Commission's Staff Working Document on the Water Framework Directive Fitness Check[10] indicated in its Section 3.1 on *State of European waters* that surface water status was more problematic than groundwater status, and that for surface waters, industrial releases made a 3% contribution (emphasis added below):

- Surface water:
    - *For surface waters, good chemical status is determined by limits (environmental quality standards) on the concentrations of certain pollutants found across the EU, known as priority substances. In the second RBMPs, 38% of surface water bodies had good chemical status, while 46% had not achieved good chemical status and for 16% their status was unknown.*
    - *The most common pressure for surface water bodies is hydromorphology, which affects 40% of surface water bodies, followed by diffuse source pollution (38%), atmospheric deposition (38%),* ***point source pollution (18%)*** *and abstraction (7%).*
    - *Diffuse source pollution is mostly due to excessive emissions of nutrients (nitrogen and phosphorus) and chemicals such as pesticides, as well as deposition of some persistent substances from the atmosphere. For surface waters, agricultural production is a major source of diffuse pollution (25%). Other drivers include rural dwellings (emissions from households not connected to sewerage systems (11%), and run-off from urban areas (3%) and forested land (4%).*
    - *The point source pressures on surface waters relate mostly to effluent discharges of pollutants from urban waste water (12%), followed to a lesser degree by discharges from storm water overflows (4%),* ***industrial sites (3%)*** *and aquaculture.*
- Groundwater
    - *With respect to groundwater, 74% and 89% of the area of groundwater bodies had good chemical and quantitative status respectively.*
    - *The primary impact on groundwater is from chemical pollution (22% of groundwater body area), followed by nutrient pollution (18%).*
    - *The point source pressures affecting groundwater relate more to the leaching of hazardous substances from landfills and contaminated sites, including industrial sites, waste disposal sites, and mining areas, together with urban waste water.*

This suggests that, in terms of making a greater contribution to environmental quality standards, the potential contribution to reduction from industrial installation water pollution is limited.

[10] https://EU.europa.eu/info/sites/default/files/swd_2019_0439_en.pdf

The measure will have **no impact** on water resources.

Soil quality or resources

The measure will have **no impact** on soil quality.

Waste production, generation, and recycling

The measure will have **no impact** on waste production, generation, and recycling.

Efficient use of resources

The measure will have **no impact** on the efficient use of resources.

Social impacts

The measure will have **no social impacts**.

Measure 5: Clarify Article 15(3)(a) by specifying that when setting emission limit values that do not exceed the BAT-AELs, the starting point is the lower limit of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT techniques as described in BAT Conclusions only allows meeting a higher ELV within the BAT-AEL range.

Description of the measure and requirements for implementation

The measure would seek to introduce a process that encourages the setting of emission limit values (ELVs) at the lower end of the BAT-AEL range as default, through implementation guidance and/or legislative amendments in Article 15(3). To deviate, the operator would need to demonstrate why the ELV cannot be set at this level during the permitting and/or permit reconsideration processes.

Under Article 14(1)a of the IED, permits must include emission limit values for polluting substances, or equivalent parameters, or technical measures (Article 14(2)) and conditions should be set based on best available techniques (Article 14(3)). However, this mechanism does not specify or encourage a default emission limit value, allowing competent authorities to determine the emission limit value based on individual circumstances within the constraints of Article 15(3).

The intention of the IED is to provide a high level of protection for the environment as a whole through the use of BAT. In practice, however, installations permitted under the IED typically have ELVs set at the upper end of the range that represents BAT. Therefore, this measure is intended to redress this shortcoming by requesting that competent authorities use the lower end of BAT-AEL ranges as the starting point for discussions with operators for the setting of permit ELVs, given that this represents a potentially significant opportunity to contribute towards the

zero-pollution ambition. The aim by adopting this measure is that more installation permits will end up with lower ELVs than they would do if continuing with the status quo.

The measure is not foreseen as a means to make the lower end of BAT-AEL ranges mandatory, but rather to encourage a reflection by the authorities when setting and reviewing permit ELVs and, where operators seek to set ELVs that are higher than the lower end of BAT-AEL ranges, operators shall demonstrate why more ambitious ELVs are not possible despite having been judged as achievable with BAT. Competent authorities can use the evidence supplied by operators during permitting issuance or permit reconsideration processes to make decisions on a case-by-case basis, continuing to account for local environmental conditions and the technical characteristics of the installation, i.e. allowing for the possibility to set ELVs towards or at the upper end of the BAT-AEL range.

- However, there are times when the lower BAT-AEL is not feasible, for various reasons and national bodies and inspectors would have a difficult time if the values are too restrictive, hence the retention of the flexibility of the BAT-AEL range is important. There would be risk however that this measure may increase administrative burdens (without necessarily leading to lower permit ELVs and hence environmental benefits) and could lead to discrepancy between best and worst performing Member States.

There is potential for positive synergies with other policy measures such as the introduction of a standardised cost-benefit methodology (measure #2). Setting the lower limit value as a default will increase the discussion between competent authorities and operators. A standardised methodology will improve the consistency and quality of discussions between competent authorities and operators, particularly important this measure increases the frequency and detail of these discussions.

Objective(s):

This measure will encourage a tightening of the emission limit values or increase in ambition in permit conditions for installations across the EU. This measure will, therefore, contribute to the general ambition of zero-pollution in the EU and, more specifically, contribute towards preventing or minimising the emission of pollutants by large industrial and agro-industrial plants as well as levelling the playing field across the EU.

Implementation need(s):

- EU to make minor changes to the BREF process. BREFs would need to be adjusted to provide clearer information on the emission levels associated with each technique. This could be achieved by providing clearer information on which techniques are associated with lower BAT-AELs or by identifying more AEL ranges to better reflect process configurations and techniques used. Since the BREF process already gathers this information through the existing data collection, no major change would be foreseen. However, minor increases in the efforts to analyse the collected data may be needed. This measure may also increase the emphasis on the combination of techniques rather than

individual techniques. The constraining of the upper BAT-AEL in the BAT Conclusions will continue to represent a very important approach to providing minimum standards (excepting of cases of derogations) and provides a mitigation against the possibility that this measure only leads to additional discussion between authorities and operators without any lowering of permit ELVs and their associated environmental benefits.

- EU to decide whether the measure should apply to both new and existing permits or only to new permits.
- EU to consider introducing a method to "police" the measure, for example, considering a role for INCITE, or alternatively to tighten implementation checks at the Joint Research Centre or overall European Commission level. Introducing a new body to police the measure would need to be resourced.
- EU to make legislative change to the IED: The measure could be implemented via a legislative change through a change to the wording of e.g., Article 15(3)(a):

  "… (a) setting >> *emission limit values at the lowest level possible associated with the best available techniques (lower BAT-AEL), or at the very least setting* << emission limit values that do not exceed the emission levels associated with the best available techniques."

Other legislative amendments could be envisaged. Implementing a legislative change to the IED would provide more clarity and certainty of the change but would also lead to a transposition requirement for the Member States to implement. This could also be complemented as a guidance document from the Commission/ EU, confirming their interpretation.

Further consideration of baseline

Member States from three public authorities (Belgium (Flanders), the Netherlands and Sweden) returned with information on their permitting process.

- The Flanders Government of Belgium use the upper AEL as default. When permits are reassessed, lower AELs are considered. The Flemish authorities do not check permits individually on a regular basis. The lower AEL is not considered for political reasons. In some cases, local legislation mandates the lower AEL or value close to the lower AEL.
- In the Netherlands, the approach is to apply the lower BAT-AEL for new installations. For existing installations, they use the information from BATIS about performance of 30 reference plants set ELVs at 30% above the lower AEL. If the operator believes implementing an ELV 30% above the lower AEL would lead to costs outweighing the benefits, the operator must demonstrate why it is not possible to the competent authority. In this approach, not every ELV set is a discussion.
- In Sweden, permits are primarily allocated based on best available technologies. The IED limit values and Economic considerations are secondary. A representative from Sweden's

Environmental Protection Agency stated that implementing the measure would require a significant overhaul of the approach to permitting in Sweden.

The existing approaches employed by Member State public authorities to determine appropriate emission limit values vary. Therefore, the measure could harmonise the approach Member States take to set emission limit values in permits.

Assessing impacts

Economic impacts

This measure could have **limited to weakly negative Economic impacts**, although this is highly uncertain and depends on the extent to which the measure would lead to installations adopting new practices to meet lower emission limit values, and whether the measure will apply to both new and existing permits or only to new permits. The difference between existing upper and lower limit values is also a determining factor for the measure's Economic impacts. A larger difference between upper and lower limit values will require larger reductions in emissions, potentially requiring more advanced techniques or alternative processes to reduce emissions which would result in higher Economic impacts for operators. Secondly, the distribution of existing permit emission limit values will indicate the proportion of installations which will need to reduce their emissions.

Additional evidence is expected in a forthcoming study currently being conducted for the Commission entitled "Assessment of BAT Conclusions Implementation in Permits".

Administrative burden on businesses

This measure will have **negative impacts** on the administrative burden for the regulated industries. By making the lower BAT-AELs the default option for discussions when agreeing permit ELVs, operators will need to engage in more discussions with the competent authority and there will be an increase in resources devoted to developing and exchanging information in the BREF process.

These additional administrative efforts will build upon the baseline permitting processes, both issuing new permits as well as reconsidering and updating existing ones. There are around 52 000 existing IED installations which may undergo permit reconsiderations and updates at a frequency of once every 10 years (in line with the BREF review cycle). It is assumed that this measure could require around 10% of additional effort from operators that undergo a permit reconsideration and update. In addition, evidence available and analysis suggests that there might be 500 new permits issued every year, on average, which would require additional effort from operators assumed at around 5% of baseline costs. In summary, this measure would add between €1.0m/yr and €17.8m/yr of additional burden each year, on average, over a 20-year period, with a central estimate of around €8.0m/yr (2020 euros).

Operating costs and conduct of business

This measure's impact on the operating costs and conduct of business are **likely to be negative to strongly negative**, although the degree of how negative this will be is highly uncertain and depends on several interacting factors.

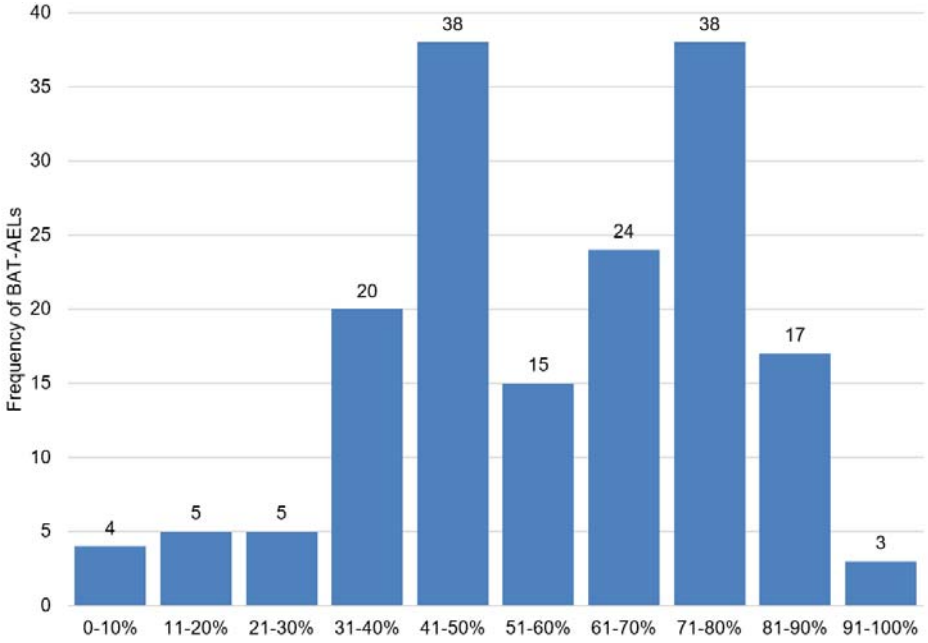
The measure's impact on the operating cost on businesses are uncertain as it is difficult to predict how stakeholders will respond, and because the details of the measure are uncertain (e.g. whether this would apply retrospectively. If the measure is implemented, operators who wish to prove the lower limit value would lead to an imbalance of costs and benefits for their installation must submit evidence to the competent authorities. Operators would weigh up the administrative costs of submitting evidence against the costs of changing practices or technology. Based on insight gained through interviews with representatives of Member State ministries for environment, it is likely the majority of operators would submit evidence rather than electing to change production practices. Once an operator has submitted evidence to the competent authority, the competent authority would judge whether the evidence proves setting the permit ELV at the lower BAT-AEL would lead to an imbalance of costs and benefits.

The overall outcome of this decision will be strongly influenced by the method Member States use. There is potential for synergy with proposed measure #2 "standardised cost-benefit methodology". Implementing a consistent and rigorous method could result in issuing of permits which are stricter. If this is the case, the operating costs and conduct of business could be strongly negatively impacted. Stricter ELVs may require different techniques to be fitted at installations to achieve lower emission levels. The different techniques will still be recognised as BAT, and the identification of BAT through the BREF process accounts for the Economic aspects of techniques and uses examples of commercial deployment of the techniques, which ensures that even if alternative techniques were needed, this should still be economically viable.

Examining the baseline for BAT-AEL ranges can also be used to estimate the measure's impacts on operating costs for business.

The difference between the upper and lower ends of a BAT AEL range will determine how significant the change will be. Using the Commission's BAT-AEL tool (EC, 2020), it is possible to provide an overview of the percentage decrease from the upper to the lower BAT-AELs, as outlined for the glass manufacturing BREF in Figure A8-5. The GLS BREF shows the majority of the decreases from the upper to the lower BAT AEL are between 40% and 80%. This demonstrates the difference between BAT AELs is relatively high, implying the measure has the potential for significant environmental improvements as well as economic costs for operators required to change production practices, depending on the level of implementation of this measure which is not mandatory.

Figure A8-5: Histogram of % reduction of the lower BAT-AEL from the upper BAT AELs for the glass manufacturing sector



The number of installations which currently operate with ELVs around or at the lower BAT-AEL will influence the number of installations affected by the measure. In the most detailed comprehensive *ex-post* assessment of BAT conclusion compliance carried out, which assessed the impacts of the Iron and Steel Production BAT conclusions, no installations were identified with ELVs at the lower end of the BAT-AEL ranges. Furthermore, no information was available from operators when consulted in that study on what techniques they would have fitted if the ELVs applicable at their installations had been at the lower BAT-AEL range (Ricardo, 2018). That study confirmed that, to carry out a robust assessment of the impacts of BAT conclusions, a very high-level of effort is needed and extensive stakeholder engagement as well as dedicated data sources.

One 2019 study by Eunomia, *An Assessment of IED Permitting Stringency* examines the emission limit values for 117 permits for European cement installations and 24 electric arc furnaces (Eunomia, 2019). The results are outlined in the tables below for cement installations and electric arc furnaces. The results indicate that most installations have ELVs set in line with the upper BAT-AEL (79%), while a minority have derogations (9%, i.e. above the upper BAT-AEL) or were set at the lower BAT-AEL (11%). When the pollutants with no AEL range (BAT16, BAT25, BAT26, BAT28 (all)) are removed from calculations, 64% of installations have permit ELVs set at the upper BAT-AEL, 18% are set at the lower BAT-AEL and 18% have ELVs above the upper BAT-AEL. **This indicates that most installations in the cement sector**

(82%) would need to change or upgrade their practices to comply with the lower BAT-AEL. The following BATs relevant to the cement industry and examined in the Eunomia study, BAT16, BAT25, BAT26, BAT28 (all) do not contain ranges.

Out of the nine BATs for electric arc furnaces examined, only BAT90 contains a BAT AEL with a range, which itself was only relevant to 5 of the 24 furnaces examined. Therefore, the electric arc furnace data from the Eunomia study is not able to deliver much information relating to the Economic impacts of this measure.

Table A8-8: Permit limit values according to Eunomia (2019) and BAT AELs according to the BREF for Cement, Lime and Magnesium Oxide industries (European Union, 2013).

Pollutant	Number permits examined	BAT-AELs	Installations incompliant with upper BAT-AEL	Installations compliant with upper BAT-AEL	Installations compliant with lower BAT-AEL
BAT16 – Dust (channelled)	47	<10 mg/Nm^3	2	10	NA
BAT17 – Dust (kiln firing)	74	<10 – 20 mg/Nm^3	7	48	19
BAT18 – Dust (cooling/milling)	69	<10 – 20 mg/Nm^3	10	43	16
BAT19 – NO_X (preheater kiln)	91	<200 – 450 mg/Nm^3	50*	31	10
BAT19 – NO_X (long rotary)	5	<400 – 800 mg/Nm^3	0	5	0
BAT20 – NH_3 (slip)	74	<30 – 50 mg/Nm^3	16	42	16
BAT21 – SO_2**	95	<50 – 400 mg/Nm^3	8	62	25
BAT25 – HCL	90	<10 mg/Nm^3	0	90	NA
BAT26 – HF	92	<1 mg/Nm^3	0	92	NA
BAT27 – PCDD/F	94	<0.05 – 0.1 ng PCDD F I-TEQ/Nm^3	0	94	7
BAT28 – Hg	96	<0.05 mg/Nm^3	0	96	NA
BAT28 – Sum of Cd & TI	95	<0.05 mg/Nm^3	0	95	NA
BAT28 – Sum of As, Co, Cr, Cu, Mn, Ni, Pb, Sb, V	94	<0.5 mg/Nm^3	0	94	NA

** All 50 which are incompliant with the upper BAT-AEL for combustion of fuels are compliant with the ELV used when plants burn waste materials*

*** It was not possible to differentiate between permits where plants burnt waste or fuels, which prescribe different limit values (lower limit value for waste, higher limit value for fuels)*

Table A8-9: Permit limit values according to Eunomia (2019) and BAT AELs according to the BREF for iron and steel production (European Union, 2012).

Pollutant	Number permits examined	BAT-AELs	Installations incompliant with upper BAT-AEL	Installations compliant with upper BAT-AEL	Installations compliant with lower BAT-AEL
BAT88 – Dust emissions to air (primary and secondary dedusting)	24	<5 mg/Nm^3	6	18	NA
BAT88 – Hg, emissions to air (primary and secondary dedusting)	18	<0.05 mg/Nm^3	1	17	NA
BAT89 – PCDD/F, emissions to air (primary and secondary dedusting)	18	<0.1 ng I-TEQ /Nm^3	3	15	NA
BAT90 – Dust, emissions to air (on-slag processing)	5	<10 – 20 mg/Nm^3	0	1	4
BAT92 – Suspended solids, emissions to water (continuous casting machines)	15	<20 mg/l	6	15	NA
BAT 92 – Fe, emissions to water (continuous casting machines)	15	<5 mg/l	5	10	NA
BAT 92 – Zn, emissions to water (continuous casting machines)	16	<2 mg/l	3	13	NA
BAT 92 – Total Chromium, emissions to water (continuous casting machines)	16	<0.5 mg/l	3	13	NA
BAT 92 – Hydrocarbons, emissions to water (continuous casting machines)	16	<5 mg/l	7	9	NA

Comparing the permit conditions between the examined installations in the cement sector highlights that there are some pollutants where ELVs are relatively consistent, for example, BAT19 NO_X (preheater kiln) and PCDD/F, while there is considerable variation in permit conditions in other BATs such as BAT21 SO_2 and BAT20 NH_3, illustrated in Figure A8-6. This indicates that introducing a measure to make the lower end of BAT AEL ranges the default option will not have an even Economic impact across installations.

Figure A8-6: Variation between permit conditions across permits for cement sector installations examined by Eunomia (2019).
(The red dotted lines indicated the BAT-AELs. In the lower two diagrams, measurements above the lines indicate non-compliance. Top left BAT19 NOX (preheater kiln) and top right BAT27 PCDD/F examples with relatively low variation. Bottom left BAT21 SO2 and BAT20 NH3 (slip) examples with relatively high variation.)

A detailed *ex-ante* assessment of the possible impacts of BAT conclusions was carried out for selected plants under scope of the LCP BAT conclusions. This found that, for the largest plants (>300MW_{th}) firing solid fuels, there was an appreciable increase in the expected compliance costs to comply with lower BAT-AELs for SO_2, NO_X, dust and Hg compared to if the upper BAT-AEL was met (Ricardo, 2017). The estimates from that study were total annualised costs

of €0.6bn/year for meeting upper BAT-AELs, rising 10 times to €5.7bn/year for meeting lower BAT-AELs (two thirds of this higher cost was estimated to be due to fitting high efficiency SO_2 reduction measures), i.e. around 10 times the cost of meeting upper BAT-AELs. These estimates included the assumption that existing LCPs would have needed to comply with minimum standards (IED Annex V ELVs) prior to achieving BATC compliance (and this existing compliance was accounted for in the estimation of costs). This latter point is important to note due to it being specific to this sector and because it leads to increases in estimated compliance costs due to a proportion of the costs being stranded assets. The specificities of this sector's situation mean that it would be inappropriate to assume the findings from this single information source could be extrapolated to other sectors.

In Q4 2020 the EC launched a contract to further assess how BAT conclusions are implemented within permits - "Assessment of BAT conclusions implementation in IED Permits"[11]. This benefitted from the experience of previous pilot projects and focused on four IED sectors: glass, pulp and paper, non ferrous metals and wood based panels. Pre-final estimations show that, overall, **75-85%** of ELVs in permits are based on the upper level of BAT-AEL range (or are above), ith variations by sector and pollutant. This project also showed that the access to the permits as well as permits quality is various across member states.

Despite these uncertainties and as a partial illustration of the potential scale of impact, it is assumed that around 10% of existing 52 000 installations and 5% of 500 new installations every year over a period of 20 years may increase their environmental ambitions as a result of this policy measure IED#5. This means that around 5 700 installations could require additional (and/or earlier) capital investments over the period. Based on expert input, these investments could be at least €0.5 million for each installation. Thus, additional (and/or earlier) capital costs could be at least €2 850 million over the 20-year period or an equivalent annual cost of around €210 million per year over the period.

Competitiveness and level playing field

This measure is likely to have **weakly negative impacts on** the competitiveness of EU industry internationally, for those sectors that compete with international businesses. Further tightening environmental standards in the EU will increase capital and operational costs, with the consequence of making products less competitive (purely based on price) with products imported from nations with lower environmental standards. There could also be negative impacts within the EU on intra-EU trade, if there is variation in implementation between the Member States on the degree to which operators are pushed to accept permit ELVs at lower BAT-AELs (and hence the potential importance of standardised methodologies for cost-benefit analysis, similar to measure 2).

The measure is likely to have **weakly positive impacts** on the level playing field, particularly for those MS which currently set lower emission levels than the upper BAT-AEL. Findings on the regulatory baseline indicate there is substantial variation between Member States approaches to

[11] Terms of reference available at: Circabc (europa.eu)

setting ELVs in permits. Therefore, there is scope to increase the consistency by which Member States allocate permits. Consequently, this would improve the level playing field for operators working in different Member States. There would be risk however that this measure may increase administrative burdens (without necessarily leading to lower permit ELVs and hence environmental benefits) and could lead to discrepancy between best and worst performing Member States, manifest as an unlevel playing field.

Position of SMEs

The measure's impacts on SMEs are **uncertain**.

Innovation and research

The measure is likely to have a **positive impact** on innovation and research. If the lower end of BAT-AEL ranges are adopted as ELVs by more operators, there will be incentives to increase investment in research, development and demonstration to make complying with more stringent environmental standards more cost-effective.

Public authority impacts

This measure will have **negative impacts** on the administrative burden for Member State competent authorities.

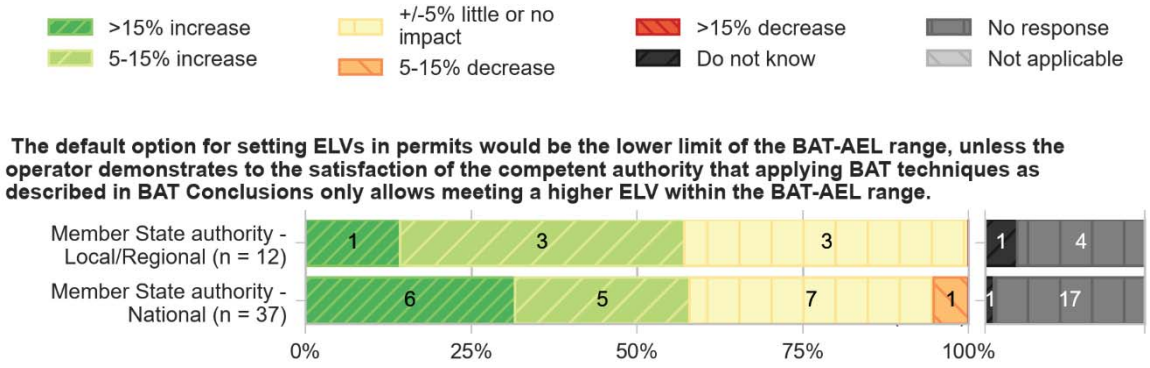
In setting or reconsidering and updating permit conditions, competent authorities need to assess each installation individually to consider the appropriate ELVs that should be included in said conditions, except if General Binding Rules are used for which no case-by-case approach is taken. This measure will not change the ability to use General Binding Rules. However, it will require additional effort for authorities to consider evidence provided by operators in a new context where the lower end of BAT-AEL ranges are set as default for consideration in the permitting processes.

These additional administrative effort will build upon the baseline permitting processes, both issuing new permits as well as reconsidering and updating existing ones. There are around 52 000 existing IED installations which may undergo permit reconsiderations and updates at a frequency of once every 10 years (in line with the BREF review cycle). It is assumed that this measure could require around 10% of additional effort from public authorities when engaging with permit reconsiderations and updates. In addition, evidence available and analysis for this study suggests that there might be 500 new permits issued every year, on average, which would require additional effort from public authorities assumed at around 5% of baseline costs. In summary, this measure would add between €0.9 million and €10 million of additional burden each year, on average, over a 20 year period, with a central estimate of around €6.7 million (2020 euros).

On the assumption that operators may try to bring more evidence to the authorities to show why they cannot meet lower BAT-AELs, this may increase the time needed for competent authorities to assess the evidence provided by operators. This is a concern raised by authorities in the

response to the TSS for this study. The results, illustrated in the figure below show that, with one exception, all public authority respondents believe that making the lower limit values of BAT-AEL ranges the default option will increase their administrative tasks. On average, the respondents expect a medium impact, in fact, their responses are distributed evenly between a little or no impact (+/-5% increase) medium impact (5-15% increase) and large impact (>15% increase) on administrative costs.

Figure A8-7: Distribution of responses to question 25 to the targeted stakeholder survey: "*To what extent would you expect the following options to impact on annual administrative costs i.e. related to permitting, compliance, inspection and enforcement (relative to existing annual costs)?*"



Environmental impacts

This measure is likely to have **positive impacts** on the environment overall, although this is uncertain and will depend on the number new installations that set ELVs at the lower end of BAT-AEL ranges and existing installations that tighten their ELVs as part of permit reconsiderations and updates.

The evidence gathered by Eunomia (2019) (and included above) indicates setting the lower limit value as default would have **positive environmental impacts** if the measure encourages operators and public authorities to consider whether the environmental benefits of adopting the lower limit value outweigh the costs. The data on ELVs in permits for cement sector installations shows 64% of permits examined are compliant with the upper limit value. This suggests the measure will lead to discussions with a large proportion of installations' operators. By increasing the number of discussions between the public authorities and operators it is likely some proportion of the discussions will translate into stricter ELVs for companies which previously had permits ELVs set at the upper BAT-AEL.

Analysis of the typical difference between upper and lower BAT-AELs (Figure A8-5) also confirmed that a potentially significant drop in emissions would be expected after dropping ELVs from the level of upper to lower BAT-AELs.

Some BAT-AELs do not include ranges of emissions, which means these standards would not be affected by this measure unless the BREFs are updated to refine such ranges.

The position paper for the European Environmental Bureau (EEB) highlights that this measure would not affect all environmental issues as some BAT Conclusions do not necessarily cover the environmental issue, such as, substitution of the production of chemicals of high concern in the LVOC BREF and further use of treated waste in the Water Treatment BREF.

According to a position paper from the business associations European Federation of Intelligent Energy Efficiency Services, Business Europe, International Association of Oil & Gas Producers and Euro Heat and power, the measure could have a detrimental effect on the IED's effectiveness as a tool to reduce environmental impacts in an integrated approach. The position papers make the argument that BAT-AEL ranges are crucial to accommodate for interactions between pollutants. The papers highlight as an example that CO_2 and NO_X emissions are interlinked (an abatement in NO_X emissions would lead to an increase in waste or CO_2 emissions). Therefore, the argument goes that making the lower limit value the default for NO_X emissions, CO_2 emissions would rise, creating a trade-off between air quality and global warming.

The position paper from ClientEarth highlights the interaction between this measure and measure 1, which focuses on implementing a strict and clear regime to manage derogations. The paper argues that the environmental impacts of implementing this measure are dependent on whether an improved regime to implement derogations is introduced.

Climate

The measure is likely to have a **limited impact** on climate change because, in its current state, GHGs are not in scope of the IED such that permit ELVs are not set for GHGs.

According to responses to the TSS, 40% of participants believe the measure will have no impact. Respondents who believe the measure will have an impact on GHG emissions were divided between slight, moderate or significant, with 11%, 8% and 7% of responses respectively. More respondents answered "I don't know" for the measure's impacts on greenhouse gas emissions than for the other emissions; 24% in comparison to 10%, 9% and 16%.

The relatively high proportion of respondents answering "I don't know" could reflect uncertainty relating to whether greenhouse gas emissions are within the IED's scope. If the measure reduced energy usage this could have an indirect impact on greenhouse gas emissions where energy is produced using non-renewable sources.

Air quality

The measure is likely to have a **positive impact** on air quality.

Figure A8-6 demonstrates most installations are compliant with the upper limit value for the emissions to air examined (PCDD/F, NOx, SO_2, NO_3). This demonstrates the measure would force discussion between the operator and public authorities on the costs and environmental benefits of issuing a permit with lower emission limit values. The environmental impacts are

challenging to quantify. It is unclear how many discussions between public authorities and operators could translate into a stricter ELV than before.

Figure A8-8 demonstrates the % decrease from the upper to the lower BAT-AEL for dust emissions across all BATC. The data shows % decrease from upper to lower BAT-AEL is relatively high. If the measure encourages public authorities to consider issuing permits at the lower limit value or closer to the lower limit value, the emissions reduction for dust emissions would be significant.

Figure A8-9 demonstrates the % reduction from the upper to the lower BAT-AELs for emissions to air of NOx. The figure shows the range of differences between the upper and lower BAT-AELs for NOx is slightly different to dust emissions. This indicates the measure will have an uneven impact across the different emissions to air which the IED regulates.

Figure A8-8: Histogram of % reduction from the upper to the lower BAT-AEL for dust emissions

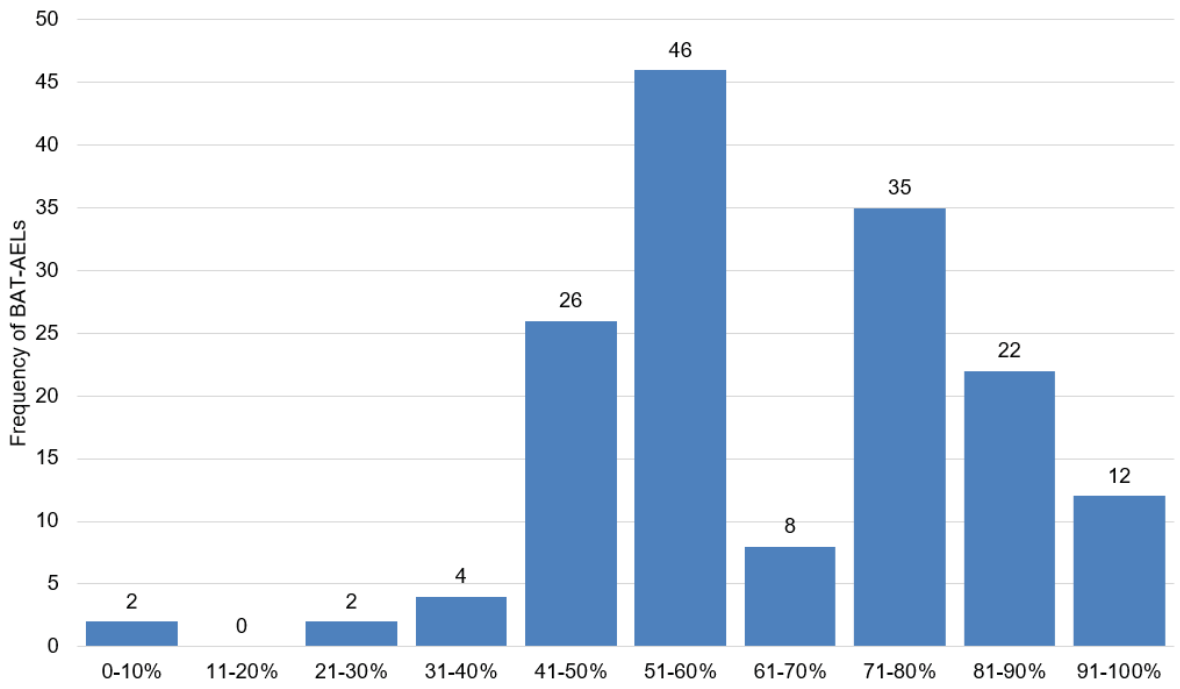
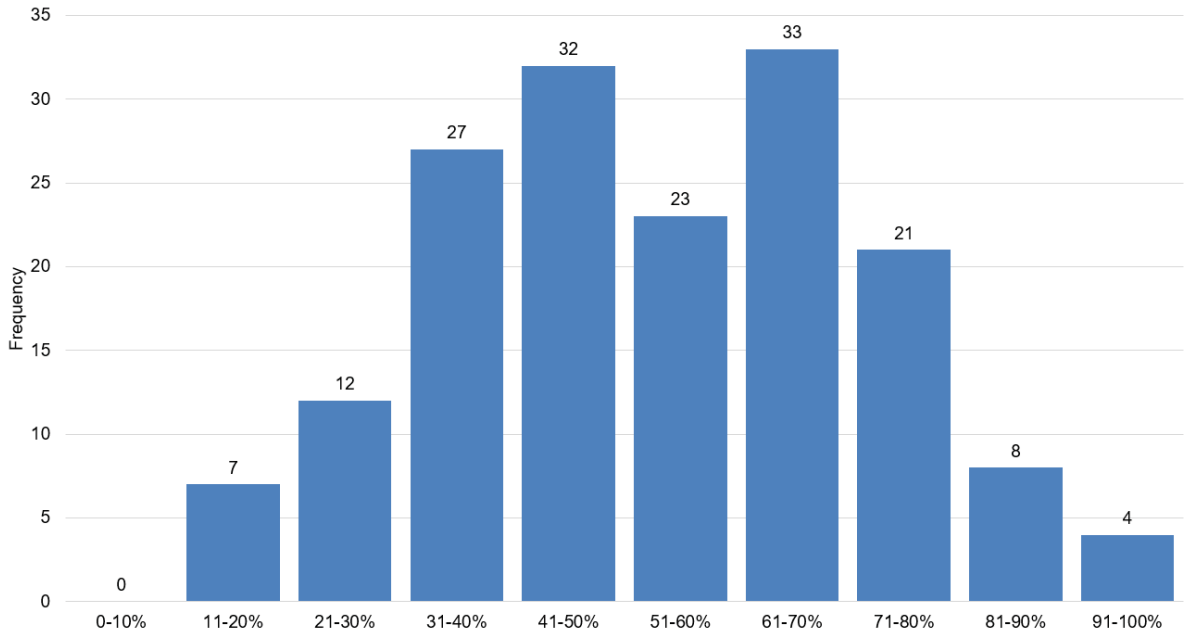


Figure A8-9: Histogram of % reduction from the upper to the lower BAT-AEL for NOx emissions to air for all BATC



NOx, as one of the key air pollutants which also happens to be a key environmental issue for several sectors, is taken as an illustration of the possible scale of impacts of policy measure IED#5. It is noted of course that this is an illustration only of partial impacts of this measure and is not a comprehensive assessment of impacts. In Table 10, BAT-AELs for emissions of NOx to air are examined by sector to estimate the potential percentage emissions reduction if the measure was introduced. The percentages were calculated by taking an average of the percentage reductions from the upper to the lower BAT-AEL across all the sectors' BAT-AELs (for varying processes) and multiplying by 10% (the estimated proportion of existing installations that might set an ELV at the lower BAT-AEL as a result of this measure). To complement this, the sectoral NOx emissions for 2019 were extracted from E-PRTR to estimate the very approximate hypothetical NOx emission reductions of this measure. Together with the damage cost of NOx (taken from Schuchte et al. (2019)), this has allowed an estimate of the monetised value of these hypothetical emissions reductions. This shows that, for five sectors, the monetised NOx emission reductions could range between €0.9bn and €2.8bn per year.

Table A8-10: Potential reduction of NOx emissions to air across selected BATC which include BAT-AELs for releases of NOx to air, and their range of monetised impacts

BREF	Reductions from measure 5 (%)	E-PRTR NOx emissions (2019) (kt/year)	NOx emission reductions of measure (kt/year)	Damage cost (€/t)		Monetised emission reduction €m/year	
				low	high	low	high
CLM	7%	163 (1)	11.4	16 767	54 815	191	625
GLS	7%	27	1.9			31	102
LCP	8%	391	31.3			525	1716
PP	8%	56	4.5			75	244
REF	5%	43	2.1			36	118
Total		**679**	**51.2**			**858**	**2 805**

(1) NB emissions from cement sector only, excluding lime and magnesium production

The total benefits for this measure would sum the impacts across all environmental issues. A brief assessment for SO_2 emissions to air of the reductions from upper to lower BAT-AELs identified broadly similar average percentage reductions as those identified for NOx in Table 10. Overall, these would be expected to be in the tens of €billions per year.

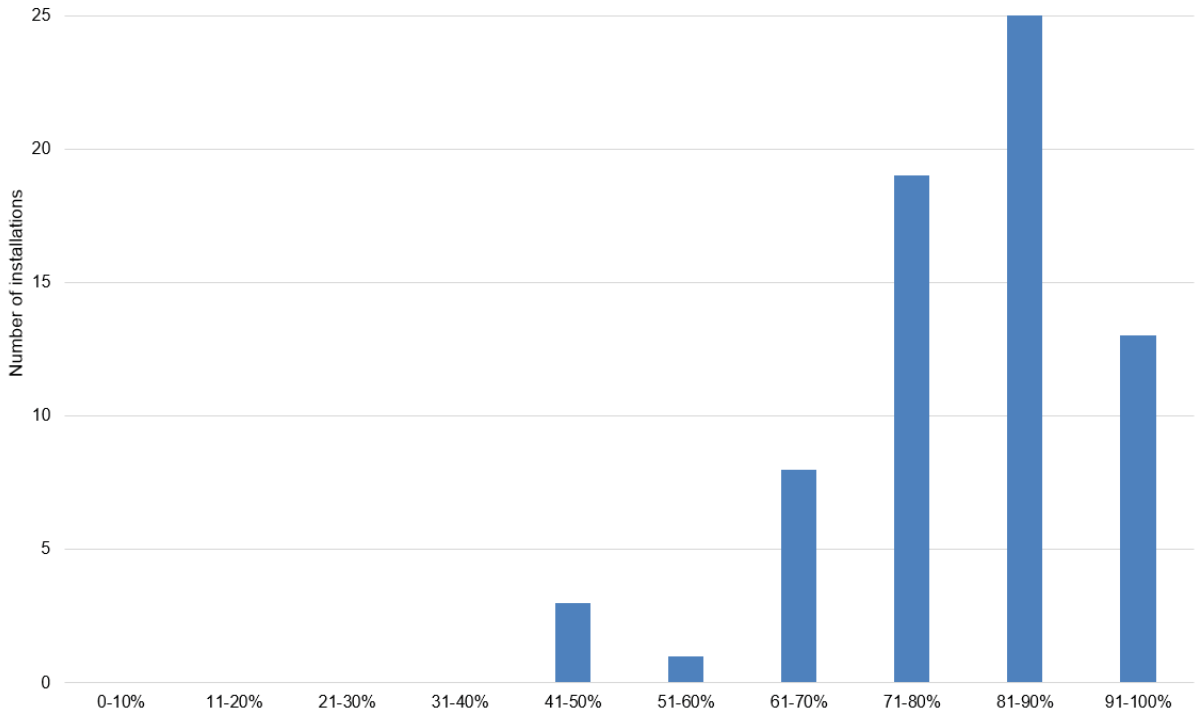
Drawing on previous evidence, Ricardo (2017) estimated for large solid fuelled LCPs the benefits and costs of reaching lower BAT-AELs compared with upper BAT-AELs. The findings were that benefits still outweighed costs at the lower BAT-AEL levels, although by a smaller margin (benefit-cost ratio around 2 at lower BAT-AEL rather than around 5 at upper BAT-AEL). Given this finding, it would be presumed that the monetised air pollutant impacts of this measure would exceed the costs of the measure.

According to responses to the TSS, 48% of respondents believe the measure will have at least a slight impact on emissions to air, which is the highest proportion of respondents out of all the environmental areas examined. In particular, this is split into slight, moderate, or significant, with 16%, 16% and 17% of responses respectively. The rest, 37% of participants, believe the measure will have no impact on emissions to air.

Water quality and resources

The measure is likely to have a **positive impact** on water quality, and **unclear impacts** on water resources as BAT-AEPLs are not currently mandatory. Figure A8-10 demonstrates the % reduction of the lower BAT-AEL from the upper BAT-AEL for emissions of metals to water. The figure demonstrates the difference between the upper and lower values is relatively high in comparison to emissions to air for dust for example. This indicates the measure could have significant positive impacts on emissions to water.

Figure A8-10 Histogram of % reduction of the lower BAT-AEL from the upper BAT-AELs for emissions of metals[12] to water



Similar to the analysis on NOx emissions, Table 11 examines BAT-AELs for heavy metal emissions to water, by sector. The percentage of emissions reduction that could result from the introduction of the measure has also been estimated. These percentages were calculated by taking an average of the percentage reduction from the upper to the lower BAT-AEL, multiplying by 85% (the rough proportion of installations that are issued at the upper limit value) and then multiplying by 10% (the proportion of existing installations which are assumed to potentially set EVLs closer to the lower end of BAT-AEL ranges as a result of this measure). The analysis suggests the difference between the lower and upper limit values is greater in BAT-AELs for emissions to water, than for emissions to air. **This would imply that the measure could have a significant positive impact on emissions to water.**

[12] Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Nickel, Silver, Tin and Zinc

Table A8-11: Potential percentage reduction of heavy metal emissions to water across selected BATC which include BAT-AELs for heavy metal releases to water

BREF	% emission reduction for existing installations subject to permit reconsiderations, assuming 10% of existing installations are affected by measure IED#5
CWW	9%
LCP	9%
TAN	9%
WI	9%
WT	8%

Some Member States have implemented or are exploring ways to issue lower limit values for water BAT-AELs (Ricardo, 2020b). For example, authorities in Germany, Belgium (Flanders) and Bulgaria have issued recommendations on the application of BAT and the setting of ELVs. In 2018, Finland was considering introducing daily average values is being considered when setting ELVs to clarify permit controls (Ympäristöministeriö, 2018). This approach would establish a threshold under which the daily average ELV would be compliant (e.g., where over 80% of the daily operating conditions during a calendar year fall below the ELV and where an individual sample does not exceed the limit by more than 100%). The approach may also set a maximum load per installation, e.g., on an annual basis (kg p.a.), to avoid any adverse effects that might result from high cumulative emissions. The evidence collected by Ricardo indicates existing practices to issue lower limit values are in the minority and are inconsistent between Member States. Therefore, although the measure may have less of an impact in the mentioned Member States (Germany, Belgium (Flanders), Bulgaria, and Finland) the measure is likely to have a positive impact on overall water quality.

Responses to the TSS indicate that more than 40% of respondents believe this measure will have at least a slight impact on emissions to water, which is the second highest proportion of respondents out of all the environmental areas examined. 39% of participants believe the measure will have no impact on emissions to water.

Soil quality or resources

The measure is likely to have a **limited to weakly positive** impact on soil quality and resources.

This is due to the limited BAT-AELs specifically targeting releases to soil. That said, the reductions for releases to water may have knock on positive impacts on eventual releases to soil.

Responses to the TSS indicate that a third of respondents believe the measure will have at least a slight positive impact on emissions to soil. However, 46% of participants believe the measure will have no impact on emissions to soil. Additional analysis is ongoing to illustrate the potential impacts of this measure on soil quality.

Waste production, generation, and recycling

The measure is likely to have a **weakly positive impact** on waste production, generation and recycling.

Responses to the TSS indicate that a quarter of respondents believe the measure will have at least a slight impact on waste generation.

Efficient use of resources

The measure is likely to have **weakly positive impacts** on efficient use of resources. If BAT-AEPLs are made mandatory this measure could also have additional positive impacts on energy, water, material consumption and on waste generation.

Responses to the TSS indicate that a fifth of respondents believe the measure will have at least a slight impact on energy use, water use, use of other resources and waste generation. For energy use, water use, use of other resources and waste generation, respectively 24%, 23%, 24% and 21% believe the measure will have at least a slight impact on the efficient use of resources. On the other hand, 43%, 60%, 41% and 48% respectively believe the measure will have no impact. Additional analysis is ongoing to illustrate the potential impacts of this measure on the use of resources.

The position paper from the European Environmental Bureau argues that the impact of the measure on efficient use of resources depends on whether the Commission gives BAT-AEPLs an equal legal status as BAT-AELs, as well as noting that if the measure was applied to BAT-AEPLs, the measure would need to be inverted. This inversion is needed becuase in the context of efficient use of resources, the upper limit corresponds with the improved performance level.

Social impacts

The measure's social impacts are **uncertain**.

Measure 6: Allow Member State Competent Authorities to suspend non-compliant installations in cases where non-compliance (Article 8) causes significant environmental degradation until compliance is restored.

Description of the measure and requirements for implementation

This measure would amend Article 8 to allow Member State Competent Authorities to suspend non-compliant plants in cases where non-compliance causes significant environmental degradation until compliance is restored.

In the responses to the TSS, a potential issue with Article 8 of the IED (and potentially the same article of the MCPD) was further elaborated. It has been stated that in some Member States, even if the competent authority suspends the Economic activity of an operator due to a serious breach, this suspension can itself be suspended. This could be as the result of the operator challenging the sanction decision in the court. It has been argued in the responses to the TSS that such a challenge would effectively and immediately suspend the sanction previously applied until the court case is settled. This process can take several years meaning that the operator can continue its operation until the final decision has been made.

Objectives:

The measure is expected to bring legislative certainty with regards to non-compliant plants.

Implementation needs:

Under this measure, the competent authorities are allowed to suspend operation of non-compliant plants. This is drawing on experience with MCPD Article 8(3) whereby in cases that "non-compliance causes a significant degradation of local air quality, the operation of the medium combustion plant shall be suspended until compliance is restored".

Assessing impacts

Economic impacts

The measure is expected to have very **limited negative impacts** on the administrative burden on businesses, especially as this is expected to affect a relatively small number of the IED installations.

Based on the limited evidence available and expert input, it is assumed that around 0.05% of the baseline number of (52 000) IED installations could be affected by enforcement of this measure or around 26 installations. This figure is based on a personal communication with the European Commission reference in the IED evaluation report that expects only a few tenths of a percent of all the IED installations may be taken to court as the result of uncooperative operators or very serious pollution incidents.

There has also been an indication in the responses to the TSS that a number of IED installations, including several coal power plants, such as CET Govora, Turceni, Paroşeni and Mintia, all situated in Romania, could be affected as the result of introducing more stringent enforcement mechanisms within the IED.

The operators of these installations would be affected by some additional limited administrative burden to gather evidence, particularly through further monitoring campaigns. These costs have been estimated to be €0.004m/year to €0.3m/year, with a central estimate of €0.2m/year. In addition, these operators would also experience substantive compliance costs arising from losses from closing their operations. These costs would depend upon the type of installation affected and this is uncertain. However, given that it is expected that only a few installations would be

affected by this measure, the EU-level effects on the conduct of business or compliance costs are unlikely to be significant.

This measure is also **likely to establish a more level playing field** between different Member States, although this is also unlikely to be a significant impact.

The majority of respondents (95 out of 112) to the TSS from industry expected no to slight improvement to the implementation of the IED as the result of allowing competent authorities to suspend operation of non-compliant plants. On the other hand, the majority of respondents from the Environmental NGOs (7 out of 7), Local/Regional (6 out of 9) and National (9 out of 17) MSCAs and other (8 out of 8) contributors to the survey expected that the suspension of the operation of non-compliant plants could result in moderate to significant improvement in the IED implementation.

Environmental impacts

The measure aimed at enhancing enforcement of the IED, which could result indirectly in improved compliance with the Directive. Therefore, a **limited positive impacts** on climate, air quality, water quality and resources, soil quality or resources, waste production, generation and recycling as well as efficient use of resources could be expected as the result of implementation of this measure. There is limited evidence available, however, which does not allow for a more thorough evaluation of the extent to which these impacts could affect the environment.

Social impacts

The measure's social impacts are **likely to be negligible,** although it could lead to some limited increases in unemployment.

Measure 7: Introduce common rules for assessing compliance with emission limit values under Chapter II of the IED.

Description of the measure and requirements for implementation

This measure would introduce common rules for assessing compliance with emission limit values under Chapter II of the IED.

The evaluation of the IED concluded there was variation in compliance assessment approaches for Chapter II installations, (as well as variation in interpretation of the compliance assessment elements of IED Annexes V and VI for Chapter III and Chapter IV plants respectively). These elements are important to redress due to the continued need to achieve a high level of protection of the environment as a whole (i.e. avoiding cases where interpretation of the legislation is not achieving the intended environmental benefits) as well as to continue to level the playing field for commercial entities operating across the EU27 bloc.

Special provisions for Large Combustion Plants and Waste Incinerators are included in Chapters III and IV, respectively, and Annex V/Annex VI for the calculation of validated limit values for

compliance assessment by the subtraction of measurement uncertainty. While mandatory for LCP and WI sectors, this topic is also relevant to Chapter II installations in other IED sectors. In work previously undertaken (Ricardo, 2018), Member States provided examples of other flexibilities implemented for compliance assessment of Chapter II installations. This has demonstrated the variation across Member States and the potential for benefit in levelling the playing field. Some areas where a common approach to the assessment rules would be beneficial have been identified in previous studies[13]. These include further clarifications on the role of measurement uncertainties in determining compliance with ELVs and also a more structured approach towards compliance with ELVs for combined waste water streams from different processes or installations.

Different application of measurement uncertainty in compliance assessment leads to an inconsistent assessment of environmental performance, and in some cases the underestimation of actual emissions at an installation.

A separate study requested by the European Commission that is currently underway (as at August 2021) will provide more information and/or evidence to support the assessment of this measure.

Objective(s):

The measure will improve legal certainty and eliminates varied interpretation of enforcement and insufficient guidance. It will aim to help level the playing field and lead to emission reductions in those cases where currently less stringent compliance assessment practices are deployed.

Implementation need(s):

- EU to develop and publish (e.g. as a Commission Decision) the compliance assessment rules based on the to the relevant consultations with Member States
- EU to develop additional guidance and supporting mechanisms to aid implementation of the measure across Member States
- Member States to enact on the proposed new approaches to be considered in their national laws

Assessing impacts

Economic impacts

The overall economic impacts of this measure are **uncertain**. There are some weakly negative impacts on administrative burdens on operators and authorities, and some weakly positive impacts on improvement of the level playing field.

This measure is likely to **limited impacts on operating costs and conduct of business, on SMEs, and on innovation and research.**

[13] Ricardo. (2020). Assessment of compliance with Emission Limit Values under the Industrial Emission DirEUtive.

Administrative burden on businesses

This measure is likely to have, overall, **negative impacts** on business administrative burden.

This measure would be expected to lead to, in the short term, for one or two years, additional monitoring and reporting costs for businesses. Based on the assumption that there are around 48 000 installations which are not subject to LCP or WI compliance assessment rules (as there are approximately 4 000 LCPs and WI plants), and that 50% of the installations would need to change their currently adopted compliance assessment approach, and assuming that for the two years after implementation this measure would lead to an additional 20% administrative burden for operators in their monitoring and reporting obligations, this measure is estimated to have weakly negative impacts from €0.1m/year to €5.8m/year with a central estimate of €3.8m/year for the EU27.

For those operators with installations in different Member States that are currently needing to deploy multiple approaches to compliance assessment, this measure would be expected to provide weakly positive benefits, as centralisation of compliance assessment following a standard approach would be possible. The possible effect on this has been approximately quantified based on limited evidence as part of measure #16 and is not reproduced here to avoid double counting.

Competitiveness and level playing field.

This measure is expected to have a **weakly positive impact on creating a more level playing field** for the businesses. The overall impact of the measure is expected to be weakly positive.

Given there has been evidence provided by Member States that varying approaches to compliance assessment are used across Member States, having a single harmonised approach for assessing the compliance of Chapter II installations would be expected to help level the playing field across the EU, with particular positive impacts on the transnational operators.

Industry stakeholders who contributed to the TSS provided a mixed response to the question as to what extent would introduction of common rules for ELVs compliance assessment under Chapter II of the IED contribute to a level playing field in terms of inspection and enforcement of environmental permits for their sector across the EU Member States. The most popular response was that there would be a slight improvement (33% of those who provided a response), with the remaining responses fairly evenly spread between the other options available.

Public authority impacts

This measure is expected to have a **negative impact** on public authority burdens.

In terms of Economic impacts on public authorities, there will be additional costs for the development of the harmonised methodology. The costs could be assumed to be equivalent to those for developing one-off guidelines for introducing common rules for assessing compliance. The one-off cost of developing such common rules could be estimated to be between €0.3m and €0.4m and, therefore, not likely to be significant. This estimate is based on a similar case where

the EU is commissioning a project for "Developing of a Guidance Document on the Impact of Water Treatment Processes" in 2021 with a proposed budget of around €0.2m, on top of which the costs for the EU and other public authority stakeholder input would be sought, which is estimated to add 50%-100% costs.

This measure would also be expected to lead to, in the short term for one or two years, additional inspection costs for authorities. Based on the assumption that there are around 48 000 installations which are not subject to LCP or WI compliance assessment rules (as there are approximately 4 000 LCPs and WI plants), and that 50% of the installations would need to change their currently adopted compliance assessment approach, and assuming that for the two years after implementation this measure would lead to an additional 20% administrative burden for authorities in their inspection obligations, this measure is estimated to have negative impacts from €0.2m/year to €5.8m/year with a central estimate of €4.6m/year for the EU27.

Environmental impacts

Although the measure itself is aimed at more homogenised approach towards enhancing enforcement of the IED, this could also result in minor benefits for environmental impacts for those Member States where the new standardised compliance assessment methodology would in effect provide a more stringent interpretation of complying with ELVs in permits, and hence lead to small environmental benefits in the cases where operators need to reduce their emissions to comply with slightly more stringent rules. Therefore, a **weakly positive impact on** environmental impacts that typically have ELVs set in permits (**air quality, water quality**) could be expected as the result of implementation of this measure.

The measure would likely have only **limited impacts on remaining environmental impacts** (climate, soil quality or resources, waste production, generation and recycling as well as efficient use of resources).

There is limited evidence available to date on the extent of variation in compliance assessment methodologies among Member States which limits any further detailed assessment of environmental impacts. This evidence gap may be filled by a separate study underway for the Commission.

The majority of respondents (80 out of 105) to the TSS from Industry expected no to slight improvement to the implementation of the IED as the result of introducing common assessment rules with emission limit values under Chapter II of the IED. This was against the expectations of the majority of respondent from the Environmental NGOs (6 out of 6), Local/Regional (4 out of 7) and National (17 out of 18) MSCAs and other (6 out of 7) contributors to the survey expecting the introduction of such common compliance assessment rules to result in moderate to significant improvement in the IED implementation.

Measure 8: Require Member States, in determining the penalties under Article 79, to give due regard to the nature, gravity, extent and duration of the infringement as well as the impact of the infringement on achieving a high level of protection of the environment.

Description of the measure and requirements for implementation

This measure will require Member States authorities to take into account the nature, gravity, extent and duration of infringements of the IED, as well as the impact of the infringement on achieving a high level of protection of the environment, for determining the penalties that they lay out in their national transposition of the IED.

The current text of Article 79 is as follows:

> *"Member States shall determine penalties applicable to infringements of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive. Member States shall notify those provisions to the Commission by 7 January 2013 and shall notify it without delay of any subsequent amendment affecting them."*

As can be seen from the existing text of the IED, Article 79 requires MS to notify provisions to the Commission related to penalties. No centralised register of the penalties has been assembled. The IED evaluation indicated significant variation across Member States on the type and scale of penalties that may be imposed under IED Article 79.

There have been arguments stated by some of the respondents to the TSS, that the current penalties for non-compliance with the IED's provisions are regulated in a broad and generic manner under Article 79. While Member States are under the obligation to ensure the effective, proportionate and dissuasive implementation of penalties under national law, the lack of detail may result in a lack of compliance with this obligation in certain Member States. This is then argued to lead to arbitrary and contradictory results among different Member States.

For this measure, given the purpose is to ensure that Member States, when setting penalties, give due regard to the nature, gravity, extent and duration of the infringement as well as the impact of the infringement on achieving a high level of protection of the environment, it could be expected that some guidance from the Commission may be sought by Member States for implementing this measure.

Objectives:

The measure will limit varied interpretation of enforcement across Member States. The aim is to ensure that penalties sufficiently account for the environmental impacts, and hence that, where the penalties form a deterrent against infringement of requirements, higher compliance rates will ensue, leading to a higher level of protection of the environment.

Implementation need(s):

- EU to develop guidance to Member States on how to account for ensuring the penalties reflect the impact on achieving a high level of protection for the environment
- Member States to re-assess their existing penalties for whether the penalties give due regard to the nature, gravity, extent and duration of infringements and whether they account for the impacts of infringements on achieving a high level of protection of the environment, and adjust the penalties if needed.
- There is currently no monitoring/central register of penalties imposed on non-compliant installations. Therefore, a system for monitoring the penalties/new requirements would need to be set up by the EU as part of implementing this measure.
- The monitoring and enforcement responsibilities would also be on the EU.

Assessing impacts

Economic impacts

This measure is likely to have **limited negative** Economic impacts.

This measure will likely have **limited impact on administrative burden on businesses**. More stringent penalties may result in greater administrative burden on businesses, although this is uncertain and depend on current practices across Member States. On the other hand, this measure will have **no direct impacts on the costs of doing business** as it does not introduce additional requirements for operators.

Under the proposed measure, public authorities would be responsible for reviewing and potentially updating the relevant penalties being imposed on non-compliant installations (and communicating the outcomes to the Commission). This measure is, therefore, likely to lead to **very limited negative impacts on public authorities**. The implementation of the measure would require setting up an online platform for monitoring/central register of penalties imposed on non-compliant plants. Therefore, the European Commission would also be affected by a very small additional burden associated with design, deployment and maintenance of the online platform as well as training of staff and authorities for using the platform.

Member State authorities would need to harmonise their approaches for determining penalties that result in effective, proportional and dissuasive outcomes. This could be achieved by sharing the relevant evidence and the outcome of such decisions with the EU through a central register. A register would require retrieving information from the permit documentation and other relevant evidence and summarising it effectively into a new uniform template. Based on evidence from the 2007 IED IA[14] and expert input, it is assumed that this might require 8-60 hours of labour at €29/hour per non-compliant installation. The available information suggests that there might annually be court cases affecting less than a few tenths of a percent of all IED

[14] EU (2007); Summary of the Impact Assessment accompanying the proposal for a DirEUtive of the European Parliament and of the Council on industrial emissions; 2007 impact assessment (IA) reports - Impact Assessment - European Commission (europa.eu)

installations[15]. Additional average annual costs over a 20-year period could, therefore, range between €0.01m to €0.09m per annum, with a best estimate of €0.05m/year.

The measure is expected to have a **weakly positive impact on establishing a more level playing field** between different Member States, although these are not likely to be significant.

Environmental impacts

The measure is aimed at enhancing enforcement of the IED, which could indirectly result in improved compliance with the Directive. **Limited positive impacts** could be expected on climate, air quality, water quality and resources, soil quality or resources, waste production, generation and recycling as well as efficient use of resources could be expected as the result of implementation of this measure, with the most significant of these being air and water quality.

Measure 9: Add a new provision in or linked to Article 26 for requiring effective multidisciplinary cooperation among competent national administrative, law enforcement and judicial authorities in cases of transboundary pollution, and for Member States receiving a request for cooperation to respond within three months of receipt.

Description of the measure and requirements for implementation

This measure would introduce an obligation in Article 26, for the Member States receiving a request, to respond within three months of receipt. To complement this, the European Commission will produce guidance for horizon scanning for potential issues and the development of a Watch List for pollutants of potential concern for transboundary emissions through the BREF and other IED processes.

The IED evaluation highlighted that the monitoring and control of emissions had been implemented in a variable way, and such potential cumulative impacts from facilities emitting to environment in neighbouring States could cause build-ups of materials within the same environmental sinks.

IED Article 26 relies on the receiving state to identify a problem and source in order to investigate. There are variable resources and regulatory zeal to carry out such identifications.

Furthermore, bilateral co-operation between MS on transboundary issues tend to be more limited. Best examples relate to water and some of the larger water systems (i.e. Rivers Danube and Rhine) where co-operation is necessary.

Objective(s):

The measure is aimed at increasing the cooperation between the relevant competent authorities in order to further limit the impact of transboundary emissions.

[15] Ricardo, Support to the evaluation of the Industrial Emissions DirEUtive (DirEUtive 2010/75/EU), 2020

Implementation need(s):

- Further harmonisation in the implementation of the IED in different Member States (e.g. as the result of implementing measures 6 and 7) is expected to enhance the effectiveness of this measure.
- EU to develop guidance for horizon scanning of potential transboundary pollution issues and development of a watch list for pollutants of concern.
- Member States to enhance capabilities to allow for timely and effective cooperation with neighbouring Member State authorities with regards to tackling transboundary pollution.

Assessing impacts

Economic impacts

This measure is likely to have **limited negative economic impacts,** which would depend on the number of IED installations that would require such transboundary cooperation between authorities. This is uncertain and the evidence is limited.

Competent authorities would, however, be required to respond to the reported cases within 6 months of the receipt of the complaint. Assuming that the respond from Member States would require additional effort, assumed at 10% over the baseline, in checking compliance, maintaining systems to make information available and engaging with permit reconsiderations and updates.

It is also assumed, based on expert input, that around 520 installations or 1% of the existing IED installations (52 000) may be affected over a period of 20 years. Thus, additional burden to public authorities could range, on average, between €0.02 to €0.5 million each year over a 20-year period, with a central estimate of €0.4 million per annum.

The respective costs for the operators include providing monitoring reports, accommodating site visits by inspectors and reporting changes in their operation. Additional burden to businesses could range, on average, between €0.01 to €1 million each year over a 20-year period, with a central estimate of €0.6 million per annum.

Environmental impacts

This measure is likely to have **limited positive impacts** on the environment by improving cooperation across countries.

Climate related pollution is a transboundary issue in itself and, therefore, any environmental performance related improvement as the result of more effective implementation of the IED can have a positive impact on climate. Therefore, the **impacts of the measure on climate is expected to be weakly positive**.

The measure is expected to have **weakly positive impact on air, water and soil quality**. It is unlikely that the measure impacts the waste production, generation and recycling and efficient use of resources.

The relevant stakeholders, including Environmental NGOs, Industry, MACAs and others were asked to contribute to the TSS to express their views on the extent to which improved cooperation between neighbouring Member States would impact on transboundary environmental pollution from (agro-) industrial plants. The Environmental NGOs were shown to be split (3 votes for each side of the argument) on the matter, whilst the majority of the rest of the participants believed improved cooperation to have slight to no impact on transboundary pollution. The split for Industry was 56 out of 92 for slight to moderate improvement. The local/regional MSCAs voted for 6 out of 9 in favour of slight to moderate improvements. The national MSCAs share was 10 out of 14 in favour of slight to moderate improvements. This figure was 7 out of 9 for slight to moderate improvement.

Measure 10: Require that information from Member States' monitoring of the impact of Article15(4) derogations is made publicly available

Description of the measure and requirements for implementation

Article 15(4) permits derogations where the costs of employing BAT are greater than the potential environmental benefits. The regulation includes the following subparagraph:

"The competent authority shall document in an annex to the permit conditions the reasons for the application of the first subparagraph including the result of the assessment and the justification for the conditions imposed."

However, the regulation does not contain any reference to whether public authorities should make the environmental impacts of derogations available in the public domain. According to:

- Article 24(2f), authorities must publish the rationale for granting derogations, and
- Article 24(3), authorities must make public the results of emission monitoring as required under the permit conditions held by the competent authority.

Nevertheless, the IED does not require public authorities to publish the environmental impact of granted derogations.

Therefore, this measure requires that this information is made available and thus provides interested individuals, researchers, and NGOs with access to new information relating to the impact that Article 15(4) has on the IED's ability to protect the environment.

In 2018, 133 Article 15(4) derogations are reported for 98 installations across 15 Member States (Ricardo, 2021).. Furthermore, there are cases where derogations have been granted for installations where the information reported to the EU Registry indicates BAT conclusions are not yet adopted (Ricardo, 2021).

Objectives:

This measure will aim to improve public access to information relating to the IED and increase the public's ability to scrutinise the practices of competent authorities and the effectiveness of the IED.

This measure will, therefore, contribute to the general objective of empowering private individuals and civil society organisations to exercise their rights with regard to scrutinising the impacts of industrial emissions, and more specifically, ensure access of private individuals and civil society organisations concerned to environmental information, participation in environmental decision making and access to justice, in relation to permitting, operation and control of large industrial and agro-industrial plants.

Implementation needs:

- EU to add a paragraph to legislation establishing new requirements to make information available e.g. Article 15 (4) or Article 24 (2).
- EU to share guidance or best practice with public authorities on making information open access and provide some oversight to ensure MS implement the requirement consistently.
- MS authorities and operators to pull together any additional information that may be required and make this public.

Assessing impacts

Economic impacts

This measure is likely to have **limited negative Economic impacts** by adding burden onto public authorities, primarily.

Administrative burden on businesses

This measure will have **limited to no impacts** on the administrative burden on businesses. IED installation operators already report emissions monitoring data; however, this need not necessarily be at the depth required to make this information publicly available. Even if so, there is only a small number of operators with derogations and emissions monitoring data are likely readily available. The additional direct costs to businesses would, therefore, be marginal at most. Indirectly, this measure could lead to further scrutiny that may put the derogation in question. This could have higher costs to the operators affected. This is, however, uncertain and cannot be estimated with the evidence available.

Operating costs and conduct of business

This measure will have **no direct impacts** on the costs of doing business as it does not introduce additional significant requirements for operators. In the case that making data open access reveals that derogations are causing significant environmental harm, it is possible that these operators will come under increased public pressure to improve their environmental practices. Consequently, operators would need to take action that may results in additional capital and operating expenditures. This would only affect a small number of operators overall and,

therefore, it would be marginal at most. Further, these costs are uncertain and cannot be estimated with the available evidence.

Competitiveness and level playing field

This measure will have **no impacts** on competitiveness or the level playing field. The measure is unlikely to affect the costs of doing businesses in any significant way and, therefore, the operators' capacity to innovate or the comparative advantage of industry in an international context would not be affected either. There is no evidence to suggest that this measure would affect the level playing field.

Position of SMEs

This measure will have **no additional impacts** on the position of SMEs.

Innovation and research

This measure will have **no impact** on innovation and research.

Public authority impacts

This measure is likely to lead to **limited to weakly negative impacts** on public authorities. These authorities will be responsible for retrieving the information submitted by operators, pulling together and making it public. According to the recent study by Ricardo (Ricardo, 2021), nine Member States have functioning URLs to all the installations where derogations have been approved[16], and seven do not have a set of functioning URLs to derogations[17].

In addition, where information is provided by Member States, the information made publicly available via the URLs and its relevance is often limited. The use of central permit repositories to publish site-visit reports facilitates access to the reports at installation level (Austria, Bulgaria, Czech Republic and Denmark), as does the use of a common report template (Austria, Czech Republic, Romania, and some regions in Spain).

This suggests that this measure will require at least seven Member States and likely more to update and continue to service their URLs on existing derogations. This is unlikely to have a significant administrative burden on public authorities across the EU.

Based on the evidence available, we assume that there are around 130 15(4) derogations, of which around 50% have information available to the public in an open-access format. Competent authorities would need to retrieve information submitted by operators and pull it together before making it public. This would primarily have labour costs as well as some marginal IT costs.

Building on evidence from the 2007 IED IA (EC, 2007), adjusted for inflation and based on expert input, it is assumed that this may require around 8-60 hours of labour (or around 20% of the worker input required to manage the derogation process) at a labour cost of €29/hour or a total one-off cost of €230 - €2 700. In total, therefore, the measure would have additional one-off

[16] Belgium, CzEUhia, Denmark, Estonia, Finland, France, Portugal, Romania, and Sweden
[17] Bulgaria, Germany, Hungary, Ireland, Italy, Slovakia, and Spain

costs of €15 000 - €110 000 in the shorter to medium term, that is, negligible average annual costs over a 20-year period.

Environmental impacts

This measure is likely to have **indirect and limited positive environmental impacts**. This measure would ensure that public authorities make the derogations' emissions monitoring data open access. As a result, the public will have improved information on the impacts of derogations on the environmental performance of IED installations and would be empowered to make a more evidenced case for change as required. This could indirectly influence the level of investment and environmental performance for those installations with derogations.

Social impacts

This measure is likely to have **no impacts** on employment. The measure will, however, have other social impacts by improving transparency on permitting and emissions monitoring. For example, this would allow researchers and concerned organisations and citizens to make informed criticisms and requests relating to the state of industrial emissions.

Measure 11: Widen public participation in permitting as requested by the Aarhus Convention Committee and facilitate access to justice and redress in case of damages relates to non-compliance.

Description of the measure and requirements for implementation

This measure seeks to widen the scope of public participation under the permitting procedures based on the findings and recommendations by the Aarhus Convention Compliance Committee (ACCC), made under case ACCC/C/2014/121, and facilitate access to justice and redress in case of damages related to non-compliance.

The ACCC recommended that:

> *"The Party concerned [European Union] put in a place a legally binding framework to ensure that, when a public authority in a Member State of the Party concerned reconsiders or updates permit conditions pursuant to national laws implementing article 21 (3), (4) and (5) (b) and (c) of the Industrial Emissions Directive, or the corresponding provisions of any legislation that supersedes that Directive, the provisions of article 6 (2)–(9) [of the Convention] will be applied, mutatis mutandis and where appropriate, bearing in mind the objectives of the Convention."*
>
> Article 21(3),(4) of the IED concerns the reconsideration or update of permits in accordance with BAT conclusions, typically according to a 4-year timeframe.
>
> Article 21 (5)(b) and (c) refers to other conditions where permit reconsideration or update may be necessary, such as the need to comply with an environmental quality standard introduced under Article 18.

Article 6 (2)-(9) references the text of the Aarhus Convention, which in turn lays out provisions to ensure the public participate in the governance of environmental information. These provisions are similar to the provisions of Article 24, which lay out the IED's means of public participation.

These provisions, especially those set out in Article 24, would need to be amended to include the processes laid out under Article 21 (3), (4) and (5) (b) and (c), which will require competent authorities to facilitate further public participation than in the baseline.

Such widening of public participation inreases the possibilities to accessjustice. Furthermore, jurisprudence of the Court of Justice of the EU[18] requires making clear that, based on the objective of ensuring 'wide access to justice', standing shall not be made conditional on the role the public concerned may or may not have played during a possible participatory phase of the decision-making procedures under this the IED. In addition, acces to justice should provide adequate and effective remedies, including injunctive relief as appropriate, and be fair, equitable, timely and not prohibitively expensive.

Objectives:

This measure will aim to widen public participation and access to justice and redress mechanisms in IED permitting and other procedures. This measure will, therefore, contribute to the general objective of empowering private individuals and civil society organisations to exercise their rights with regard to scrutinising the impacts of industrial emissions, and more specifically, ensure access of private individuals and civil society organisations concerned to environmental information, participation in environmental decision making and access to justice and redress, in relation to permitting, operation and control of large industrial and agro-industrial plants.

Implementation needs:

- EU to adjust IED provisions, e.g. Articles 24 and 25, and provide implementation guidance/ advice; and introduce a new provision on redress.
- MS authorities to adjust their processes to increase the capacity and accommodate wider public participation and provide adequate and effective remedies, including injunctive relief as appropriate, and be fair, equitable, timely and not prohibitively expensive.
- The public to participate in permitting and other relevant IED procedures and seek access to justice and redress, as appropriate.

[18] Judgment of 15 October 2009, Djurgården-Lilla Värtans Miljöskyddsförening, C–263/08; and Judgment of the Court (First Chamber) of 14 January, LB and Others, 2021C–826/18. See also Commission Notice on access to justice in environmental matters (2017/C 275/01).

Assessing impacts

Economic impacts

This measure is likely to have **limited to weakly negative Economic impacts** by adding burden onto public authorities, primarily.

Administrative burden on businesses

This measure will have **no direct impacts** on the costs of doing business as it does not introduce additional requirements for operators. This is because under current IED provisions:

- Public authorities are responsible to facilitate public participation and acces to justice.
- Operators are already required to submit to public authorities all the information that is needed.

Operating costs and conduct of business

This measure will have **no direct impacts** on the costs of doing business as it does not introduce additional significant requirements for operators. However, enhancing public participation and access to justice could increase the environmental ambition exercised under the IED permitting and other processes. Consequently, operators may need to take further action that may results in additional capital and operating expenditures. These costs are uncertain and cannot be estimated with the available evidence. Furthermore, effective redress may require financial compensation from individual operators.

Competitiveness and level playing field

This measure will have **no impacts** on competitiveness. The measure is unlikely to affect the costs of doing businesses in any significant way and, therefore, the operators' capacity to innovate or the comparative advantage of industry in an international context would not be affected either. There is no evidence to suggest that this measure would affect in a direct manner the level playing field, although better compliance with IED requirements would reinforce the general contribution of the IED to establishing a more level playing field.

Position of SMEs

This measure will have **no additional impacts** on the position of SMEs.

Innovation and research

This measure will have **no impact** on innovation and research.

Public authority impacts

This measure is likely to lead to **negative impacts** on public authorities. These authorities will be responsible for facilitating a wider public participation and acces to justice for requirements and/or processes detailed in Article 24(1) and Article 25 and, as a result, will incur costs. Most costs incurred would relate to wider public participation that concerns a large number of

procedures, compared to only occasional judicial procedures. The scale of these costs is uncertain.

It is assumed that public participation activities during the permitting processes account for no more than 25% of the current administrative costs incurred by public authorities. This measure envisages doubling the criteria for public participation, although this may not result in a doubling of participation activities or associated costs. it is, therefore, assumed that this could lead to a 30% increase in the public participation activity and associated costs based on expert input.

Based on the data available and expert input, 500 new permits are issued and around 5 200 permit reviews and/or updates are carried out every year. In this the case, annual costs to public authorities from additional public participation in IED permitting and other processes could range from €0.8 to €8 million each year, on average, over a period of 20 years and across sectors and countries in the EU, with a central estimate of around €5.5 million per year on average.

Environmental impacts

This measure is likely to have **indirect and weakly positive environmental impacts**. With public participation and acces to justice extended to new provisions in the IED, there are more and better opportunities to challenge the 'substantive or procedural legality of decisions, acts or omissions subject to Article 24' under Article 25, which is the legal review procedure available to the public concerned and notably NGOs. These challenges would likely influence and/or ensure that higher environmental standards would be maintained than otherwise, for example, in the case of compliance with BAT conclusions via permit conditions.

Social impacts

This measure is likely to have **no impacts** on employment.

Measure 12: Introduce a requirement for a uniform permit summary to be made public.

Description of the measure and requirements for implementation

This measure would introduce a requirement for a uniform permit summary to be made public by public authorities across the EU.

The 'uniform permit summary' shall include an overview of the ELVs regulated and monitoring frequency and the timings for permit reconsideration or reviews. This would serve to summarise the information within the permit, aiding accessibility for the purposes of public engagement activities under Article 24(2) of the IED.

A reference to a template of the uniform permit summary could be added to IED provisions, notably Article 14, so that at least the format and content requirements of the permit summary are uniform across the EU. Certain considerations will need to be given to the availability of the permit in a given language.

The uniform permit summary must be available in a common IT format to enable database searching via meta-crawling etc initially by the European Commission, the EEA, ESTAT and other EU bodies, and then rolled out to enable access to all interested party entities, according to Aarhus access rules (see below).

Objectives:

This measure will aim to ease the access to information for the public concerned, including NGOs, therefore enhancing public engagement towards permits, and in turn support the objectives of the Aarhus Convention, to which the EU is a party.

This measure will, therefore, contribute to the general objective of empowering private individuals and civil society organisations to exercise their rights with regard to scrutinising the impacts of industrial emissions, and more specifically, ensure access of private individuals and civil society organisations concerned to environmental information, participation in environmental decision making and access to justice, in relation to permitting, operation and control of large industrial and agro-industrial plants.

Implementation needs:

- EU to develop a permit summary template that is compatible amongst Member States. This may require engagement with Member State competent authorities as well as representatives of the public concerned, such as NGOs.
- MS authorities to make the permit summary templates publicly available.
- MS to introduce a process through which permit summaries are reviewed and updated as required. This could be, for example, via the periodic review of the permit URLs submitted to the EU Registry on Industrial Sites, if the permit summary is connected or within the same document as the detailed permit, or more sophisticated searching and cross-comparisons.

Assessing impacts

Economic impacts

This measure is likely to have **limited to weakly negative Economic impacts** by adding burden onto public authorities, primarily.

Administrative burden on businesses

This measure will have **no direct impacts** on the administrative burden for operators. This is because under the proposed measure public authorities would be responsible for maintaining and publishing the uniform permit summary. This process may, nevertheless, require some engagement between public authorities and operators. Such costs are likely to be marginal.

Operating costs and conduct of business

This measure will have **no direct impacts** on the costs of doing business as it does not introduce additional significant requirements for operators.

Competitiveness and level playing field

This measure will have **no impacts** on competitiveness and **limited to weakly positive impacts** on the level playing field. The measure is unlikely to affect the costs of doing businesses in any significant way and, therefore, the operators' capacity to innovate or the comparative advantage of industry in an international context would not be affected either.

The measure will, however, contribute to levelling the playing field by ensuring that all permits are summarised and accessible regardless of the complexity of the installation regulated, and that such information is presented in a relatively consistent manner.

Position of SMEs

This measure will have **no additional impacts** on the position of SMEs.

Innovation and research

This measure will have **no impact** on innovation and research.

Public authority impacts

This measure is likely to lead to **weakly negative impacts** on public authorities. EU and MS authorities would need to develop, populate and make public a uniform permit summary. The bulk of this work would be additional and it would require retrieving information from the permit documentation and summarising it effectively into the new uniform template. Based on data collected for the IED IA 2007 (EC, 2007), this work may require between 8-60 hours of work by public authority officials and some minor checks or engagement with operators. If the hourly labour costs are around €29 (Eurostat, 2020), each summary could cost around €225 - €1 700.

In the shorter to medium term, permit summaries should be produced for around 52 000 installations at least once and updated during permit reconsiderations, although requirements for ongoing updates are uncertain at this stage. Further, 500 new permits are expected to be issued each year in the EU, and these would also need to be accompanied by the production of these summaries. In total, this may imply a total cost to authorities of €12 million to €90 million. Public authorities may be given time to produce and publish these permit summaries. Average annual costs over a period of 20 years could range from €1 to €10 million each year, with a central estimate of €2.0 million per annum.

Total administrative costs are likely to be closer to the lower bound estimate as public authorities, working with operators, will find efficiencies in producing these permit summary over time.

Environmental impacts

The environmental impacts of this measure will be **indirect and likely marginal** across these categories. Where currently, ease of access to permit information is weakened by permit presentation, this measure would seek to make such information more accessible. This in turn

would facilitate a more active public participation within IED processes. Where there is sufficient concern or interest, such ease of access may aid the legal review procedure described in Article 25 of the IED, which in turn may result in high environmental standards than otherwise expected. However, these effects are likely to be marginal.

Social impacts

This measure is likely to have **no impacts** on employment.

Measure 13: Amend legislation to state that 'the competent authority shall make available to the public by publishing open-access on the internet' the information requirements listed in Article 24 (2) free of charge and without restricting access to registered users

Description of the measure and requirements for implementation

IED's Article 24 states that:

"The competent authority shall also make available to the public, including via the Internet at least in relation to point:

a) the results of emission monitoring as required under the permit conditions and held by the competent authority relevant information on the measures taken by the operator upon definitive cessation of activities in accordance with Article 22
b) the results of emission monitoring as required under the permit conditions and held by the competent authority."

The existing regulation requires competent authorities to publish information. However, the existing regulation does not specify how the public should be able to access the information. Public access to information across Member States is, therefore, inconsistent at present.

This measure will seek to clarify that information should be open access, for example, removing the possibility that competent authorities require some form of payment to access the data. This could be done by amending Article 24 to state that 'the competent authority shall make available to the public by publishing open-access on the internet' (i.e. free of charge and without restricted access to registered users).

Objectives:

This measure will aim to improve access to information for all, especially the public, stakeholders and NGOs. These adjustments would support the objectives of Directive 2003/4/EU on access to environmental information, in addition to the Aarhus Convention, of which the EU is a party.

This measure will, therefore, contribute to the general objective of empowering private individuals and civil society organisations to exercise their rights with regard to scrutinising the

impacts of industrial emissions, and more specifically, ensure access of private individuals and civil society organisations concerned to environmental information, participation in environmental decision making and access to justice, in relation to permitting, operation and control of large industrial and agro-industrial plants.

Implementation needs:

- EU to develop and issue guidance in publishing open access data, using experience from other sectors to reduce any inefficiencies and support MS competent authorities.
- EU to monitor compliance across Member States.
- MS authorities to make information publicly available and open access on the internet.

Assessing impacts

Economic impacts

This measure is likely to have **limited to weakly negative economic impacts** by adding burden onto public authorities, primarily.

Administrative burden on businesses

This measure will have **no direct impacts** on the costs of doing business as it does not introduce additional requirements for operators. This is because:

- Public authorities would be responsible to pulling together and publishing the information.
- Operators are already required to submit to public authorities all the information that is needed.

Indirectly, however, in the case that making data open access reveals inaccuracies and gaps and reported data, it is possible that operators will come under increased public pressure to improve their environmental monitoring and reporting practices. This could result in additional albeit likely marginal increases in total compliance costs for industry.

Operating costs and conduct of business

This measure will have **no direct impacts** on the costs of doing business as competent authorities will be responsible for pulling together and sharing these data. Indirectly, however, in the case that making data open access reveals inaccuracies and gaps and reported data, it is possible that operators will come under increased public pressure to improve their environmental monitoring and reporting practices. This could result in additional albeit likely marginal increases in total compliance costs for industry.

Competitiveness and level playing field

This measure will have **no impacts** on competitiveness and **limited to weakly positive impacts** on the level playing field. The measure is unlikely to affect the costs of doing businesses in any significant way and, therefore, the operators' capacity to innovate or the comparative advantage of industry in an international context would not be affected either.

The measure will, however, contribute to levelling the playing field by ensuring that all competent authorities are required to publish open access data. This will also imply that industries across the EU may be subject to similar levels of scrutiny by concerned citizens and NGOs for their compliance and environmental footprint.

Position of SMEs

This measure will have **no additional impacts** on the position of SMEs.

Innovation and research

This measure will have **no impact** on innovation and research.

Public authority impacts

This measure is likely to lead to **limited to weakly negative impacts** on public authorities.

Ricardo carried out a horizontal assessment of Member State reporting recently (Ricardo, 2021), including on public access to information.

- For access to permit documentation, central permit repositories are available and fully updated at the national level in 20 Member States[19]. There are also regional permit repositories in five Member States[20]. However, repositories do not exist for all regions in the Member States that use this approach.
- Emissions monitoring data is available in 13 Member States[21] (Ricardo, 2021), although the data made available has some limitations. In a few cases[22], databases have been established, providing access to the data, while in most cases, the information is available via annual reports (often published in PDF format and in national languages). No valid URLs / relevant information was reported by 13 Member States [23].
- There are seven Member States which have incomplete or partially functioning databases[24].

In addition, challenges with reporting to the EU Registry have been flagged by Member States. Where URLs have been reported for individual installations, Member States have raised concerns about URLs becoming outdated between reporting years (in such cases, there is a risk that the reported URLs may appear as a broken link in subsequent years).

[19] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovenia, Slovakia (some uncertainty relating to the veracity of the database), and Sweden

[20] Belgium, Germany, Netherlands, Poland, and Spain

[21] Austria, Bulgaria, Czechia, Estonia, Finland, Germany, Greece, Italy, Latvia, Luxembourg, Portugal, Romania and Sweden

[22] Austria and Czechia

[23] Belgium, Croatia, Cyprus, Denmark, France, Hungary, Ireland, Lithuania, Malta, Netherlands, Poland, Slovenia and Spain

[24] Cyprus, Hungary, Italy, Netherlands, Poland, Romania and, Spain

Therefore, all competent authorities may require some additional work to address gaps in the information they currently share publicly, and at least seven or a quarter of competent authorities would be expected to incur additional administrative burden to update and publish the relevant documentation.

It is assumed that data for around 13 500 IED installations has not been made public yet (over a quarter of a 52 000 baseline). Pulling together the information and publishing would primarily have labour costs as well as some marginal IT costs. Building on the 2007 IED IA (EC, 2007), adjusted for inflation and based on expert input, this may require around 8-60 hours of labour at €29/hour per installation or a total one-off cost of €225 - €1 700. In total, therefore, the measure would have additional costs over the period of €3 to €23 million, or an average of €0.2 to €1 million each year over a period of 20 years, with a central estimate of €0.2 million. These costs are likely to be incurred over a period of time agreed for MS to complete this task of publishing information open access.

Issuing any guidance on publishing this information open access is likely to marginal costs, especially if this is something that has already been done before.

Environmental impacts

This measure is likely to have **indirect and marginal environmental impacts** across these categories. Where public authorities do not currently make environmental data open access, this measure would improve public access to information. The public, with improved information and understanding of shortcomings in environmental reporting could be empowered to make evidenced cases for and spur improved environmental standards, or increased enforcement of existing standards or permits.

Social impacts

This measure is likely to have **no impacts** on employment. The measure will, however, have other social impacts by improving transparency on permitting and emissions monitoring. For example, this would allow researchers and concerned organisations and citizens to make informed criticisms and requests relating to the state of industrial emissions.

Measure 14: Amend the legislation to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants as well as to biogas plants.

Description of the measure and requirements for implementation

This measure is being considered in parallel via a contract on the "Impact of the biogas plants and of gasification, liquefaction and pyrolysis of wastes on the environment". An initial assessment is outlined in this section, primarily of qualitative nature.

The current implementation of the IED with regards to gasification, liquefaction and pyrolysis plants as well was with biogas plants has challenges.

- Firstly, some aspects of the IED are tailored to pyrolysis to produce syngas to be used for the production of energy, and not more modern uses that produce syngas as an intermediate for production of chemicals. The IED's Article 42 defines that two conditions must be met: (1) if the process delivers end of waste, and (2) if its emissions are lower than combustion of natural gas. There is currently a shift in the industry, where sites are burning syngas to generate power on site less frequently, and instead they are converting their products (i.e. Syngas or Syn-oil) into chemicals/fertilisers that do not generate direct emissions compared to natural gas post-combustion exhausts. Therefore, the Article 42 clause on emissions lower than natural gas may become irrelevant in the near term, or of difficult application.

- Secondly, there is a lack of clarity around the IED's current coverage of gasification, liquefaction and pyrolysis. Descriptions of several activities in Annex I are worded in a way that may exclude these processes. For example, the definition of Activity 4 specifies "the production on an industrial scale by chemical or biological processing of substances or groups of substances listed in points 4.1 to 4.6." This, as written, excludes thermal treatments, including liquefaction and pyrolysis. There is a need to revise those descriptions. Further, the IED's Annex I does not make reference to pyrolysis as a process. Although not all common processes are described in this annex, it would be beneficial to amend to include pyrolysis to provide clarity to operators and competent authorities that they are within the scope.

Concerning the production of biogas, this activity may be covered by point 5.3 or point 6.5 of Annex I of the IED.

Article 3.1 of Regulation 1069/2009 laying down health rules as regards animal by-products and derived products not intended for human consumption8 defines animal by-products (ABP) as follows: *entire bodies or parts of animals, products of animal origin or other products obtained from animals, which are not intended for human consumption, including oocytes, embryos and semen*. The concept of 'animal by-products' has replaced the former terminology of 'animal waste', however the latter is still used e.g. in point 6.5 of Annex I IED.

In addition, Member states may interpret the provisions of Annex I of the IED in various ways, i.e. that plants processing manure and slurry can fall under either point 5.3 or 6.5 of this Annex. The above mentioned activities are associated with different capacity thresholds as well as with different BAT Conclusions. The following approaches would address these issues:

- Develop syngas quality criteria to support end of waste principle for syngas
- Develop alternative quality criteria for Article 42 instead of the natural gas emissions clause, to capture those that generate products or feedstocks, and which are aligned with EU climate targets
- Revision of Annex I activities to include a reference to pyrolysis.
- Clarification of points 5.3 and 6.5 of Annex I of the IED as to the production of biogas.

An initial research exercise found some data that suggests there is a general absence of reliable information for the gasification, liquefaction and pyrolysis sector, on the technology adopted, application and any relevant parameter related to emissions, plant thermal input and output products. The lack of a clear definition for the processes, fuel characterisation and cataloguing and details on the production sites and overall common metric to measure plant capacity creates overall uncertainty. Most importantly, it is not possible to identify plants, which have gasification, liquefaction and pyrolysis units as secondary or auxiliary activity (i.e. Manufacturing waste minimisation or energy recovery). Other issues include:

a) Plants may have been identified as Incineration or Co-incineration activities
b) Plants are part of a larger manufacturing site, therefore their emissions are catalogued under a different manufacturing activity.

Objectives:

The measure will amend Annex I to clarify the scope of coverage of the IED pertaining to gasification, liquefaction, and pyrolysis plants as well as to biogas plants.

This measure will, therefore, contribute to the general and specific objectives of ensuring proportionately of EU law and keeping the burden on businesses and public authorities at the lowest possible level.

Implementation needs:

- The EU would amend the IED
- Participants of the BREF review process to gather more data on these processes and their current usage, environmental performance and applied techniques/BAT.

Assessing impacts

Economic impacts

- There are potentially impacts on operators and Member State authorities relating to administrative burden. Clarifications to Article 42 for non-incineration activities as well as clarity on what to categorise activities as under the IED may lead to **limited positive impacts** through reducing administrative burden by creating clarity and removing confusion.

Environmental impacts

- An update to Article 42, which captures non-incineration applications of gasification and pyrolysis can ensure that these plants are regulated effectively, and a revision of the wording in Annex I can also create certainty around which activities are regulated, potentially also improving the effectiveness of existing environmental regulation. There are, therefore, **limited positive impacts** on the environment that could be expected from this measure.

Social impacts

This measure is expected to have **no impact** on employment.

Measure 15: Delete Annex II of the IED "List of polluting substances".

Description of the measure and requirements for implementation

The list of polluting substances in Annex II can potentially be limiting and become outdated in the consideration of KEI addressed in the BREF review process. The BREF review process can consider a list of environmental issues and pollutants that is wider than that in IED Annex II, including but not only new and emerging environmental issues and pollutants.

Objectives:

The measure will delete Annex II in order to ensure that the BREF KEIs considers all environmental issues including new and emerging issues and pollutants.

This measure will, therefore, contribute to the general and specific objectives of ensuring proportionately of EU law and keeping the burden on businesses and public authorities at the lowest possible level.

Implementation needs:

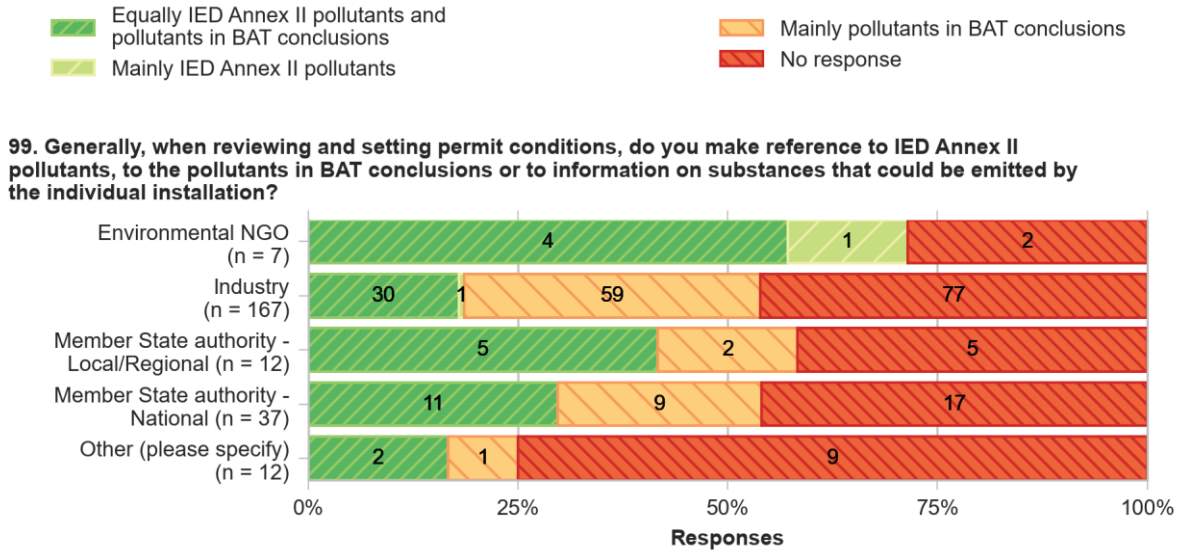
- The EU would amend the IED
- Participants of the BREF review and permitting processes to disregard Annex II's list of polluting substances

Assessing impacts

The scale of impact from implementing this measure depends on the extent to which permit writers currently refer to the Annex II list of pollutants when reviewing and setting permit conditions. The evidence on this is limited.

In the TSS for this study, the majority (66%) of industry stakeholders indicated that they primarily refer to the BAT conclusions when reviewing and setting permit conditions, while 33% indicated that they refer to the BAT conclusions and Annex II equally (Figure A8-11). In summary, 42% of respondents have indicated that they refer equally to Annex II and the BAT Conclusions when setting permits OR mainly to Annex II when reviewing and setting permit conditions. Almost no stakeholders (1 out of 167 industry stakeholders) indicated that they refer only to the Annex II pollutants.

Figure A8-11: TSS responses related to the use of IED Annex II



Economic impacts

There are expected to be **weakly positive impacts** on administrative burden caused by the deletion of Annex II. This is because permit writers would not need to refer to both the BAT Conclusion and Annex II, leading to very small improvements in administrative efficiency. This administrative efficiency has been assumed to affect around 40% of the existing installations covered by the IED (or over 22 000) and pertinent public authorities, and benefit these with a reduction of 0%-5% of their permit reconsideration and/or update costs, with a central estimate of around 2% reduction.

These **administrative savings to operators** would range from €0 to €3 million per annum, on average, over a period of 20 years, with a central estimate of €0.6 million. Similar **savings may also accrue to public authorities**, and these have been estimated at €0 to €2 million per year, on average, over the period, with a central estimate of €0.5 million.

Environmental impacts

The main environmental impacts are as described above, in the future BREF revisions, ensuring that reference is not made to the outdated Annex II, and includes new and emerging environmental issues. Therefore, there are expected to be **limited impacts** on the environment from ensuring an optimal BREF review process.

Social impacts

This measure specifically is expected to have **no impact** on employment.

Measure 16: Introduce a provision in Chapter II of the IED that sets out that the compliance assessment rules for Chapter II installations take precedent over other compliance assessment provisions for those installations.

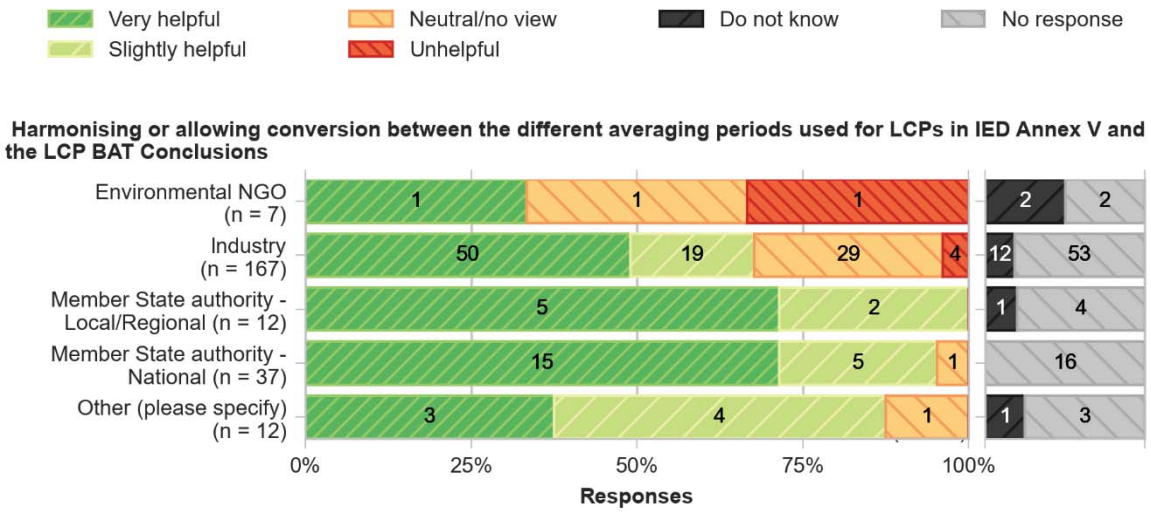
Description of the measure and requirements for implementation

There are currently issues caused by discrepancies in emission limit values set out for combustion plants in the IED under Annex V and VI, and requirements set out in the Large Combustion Plant (LCP) and Waste Incineration (WI) BAT Conclusions . This includes differences in averaging periods, leading to operators and Member State authorities needing to assess compliance for the same pollutants and processes multiple times, which causes unnecessary administrative burden.

Measure #7 proposes the introduction of a new set of Chapter II compliance rules. This measure proposes that these Chapter II rules take precedence over existing Annex V and VI provisions, i.e. leading to increased efficiency from the harmonisation of compliance assessment rules for Chapter II installations. ELVs contained in Annex V and VI can still be an important environmental backstop for combustion plants that have received an Article 15(4) derogation, as such plants would not be required to comply with BAT-AELs. The measure would, therefore, instil a provision that gives the new Chapter II rules a clear precedent for compliance assessment, whilst retaining the "safety net" of ELVs from Annex V and VI, to ensure that there is no development of gaps in coverage.

Stakeholders were asked how helpful the harmonising of averaging periods for LCPs in Annex V would be (Figure A8-12), with the majority responding that this would be very or slightly helpful.

Figure A8-12: TSS responses to the question asking how helpful the harmonising of averaging periods for LCPs in Annex V would be



Objectives:

The measure will aim to clarify compliance assessment by introducing wording that ensures Chapter II compliance assessment rules take precedent over Annex V provisions retaining the Annex V provisions as safety net ELVs.

This measure will, therefore, contribute to the general and specific objectives of ensuring proportionate implementation of EU law and keeping the burden on businesses and public authorities to the lowest optimal level.

Implementation needs:

- EU to introduce new text that sets out the precedent of Chapter II provisions

Assessing impacts

Economic impacts

Administrative burden on businesses

This measure is likely to have **weakly positive impacts** on administrative burden on businesses. A positive impact is expected as a result of the harmonised averaging periods for LCPs, which could reduce administrative burden. This is uncertain, and the evidence to identify the potential savings that could accrue as a result of this measure is limited.

It is assumed that operators reconsider and/or update the permits once every ten years (in line with the baseline BREF cycle), in general, or 2 times in a period of 20 years. Further expert input suggests that around 10% or 5 000 installations may be affected by the proposed amendment to the IED, by benefitting from lower administrative burden when compared to the baseline. The extent to which baseline costs for operators would be reduced is uncertain. Drawing primarily on the outputs of the TSS, an assumption has been made that savings could range from 0% to 5%, with a central estimate for this reduction of 2%. This would mean that on average over 20 years, savings to operators would range between €0 to €0.8 million each year, with a central estimate of €0.1 million per year.

Stakeholder input via the TSS suggests that the reduction in administrative burden from these amendments to the IED could range between 0%-15% of the permit review costs when compared to the baseline, whilst the vast majority of stakeholders have indicated little (+/- 5%) or no impact is expected. The central estimate for this reduction is, therefore, around 2% when compared to the baseline.

Operating costs and conduct of business

This measure is likely to lead to **limited to no impacts** on the costs of doing business, as no substantial changes in the operation and or investment decisions of operators or other businesses would be expected as a result of this measure.

Competitiveness and level playing field

This measure is likely to lead to **limited to no impacts** on competitiveness, and a **weakly positive impact** on levelling the playing field. A harmonised approach to compliance assessment for LCPs and WI from the introduction of Chapter II compliance assessment rules can lead to an improved level playing field by ensuring approaches and associated administrative costs for operators are similar.

Position of SMEs

This measure is likely to lead to **no impacts** on the position of SMEs. This measure focusses on large combustion plants and, therefore, will not affect SMEs.

Innovation and research

There is **no impact** expected on innovation and research.

Public authority impacts

This measure is expected to have **weakly positive impacts** on public authorities. A positive impact is expected as a result of the harmonised averaging periods for LCPs and WI, which could reduce administrative burden. This is uncertain and the evidence to identify the potential savings that could accrue as a result of this measure is limited.

It is assumed that operators reconsider and/or update the permits once every ten years (in line with the baseline BREF cycle), in general, or 2 times in a period of 20 years. Further expert input suggests that around 10% or 5 000 installations may be affected by the proposed amendment to the IED. The extent to which baseline costs for public authorities would be reduced is uncertain. Drawing on the outputs of the TSS, an assumption has been made that savings could range from 0% to 15%, with a central estimate for this reduction of 5%. This would mean that on average over 20 years, savings to public authorities would range between €0 to €1 million each year, with a central estimate of €0.3 million per year.

A third of national authorities and a quarter of local authorities responding to the TSS indicated that a 5%-15% decrease in administrative costs could result from the harmonised averaging periods for Chapter II. For public authorities, stakeholder input via the TSS suggests, therefore, that the reduction in administrative burden from these amendments to the IED could range between 0%-15% of the permit review costs when compared to the baseline, whilst the majority of stakeholders have indicated little (+/- 5%) or no impact is expected. The central estimate for this reduction is, therefore, around 5% when compared to the baseline.

Environmental impacts

The environmental impacts of the measure are likely to be limited, although they **remain uncertain**. The primary aim of this measure is to improve the efficiency of the compliance assessment processes, whilst the ambition of these processes will remain as is. Unifying

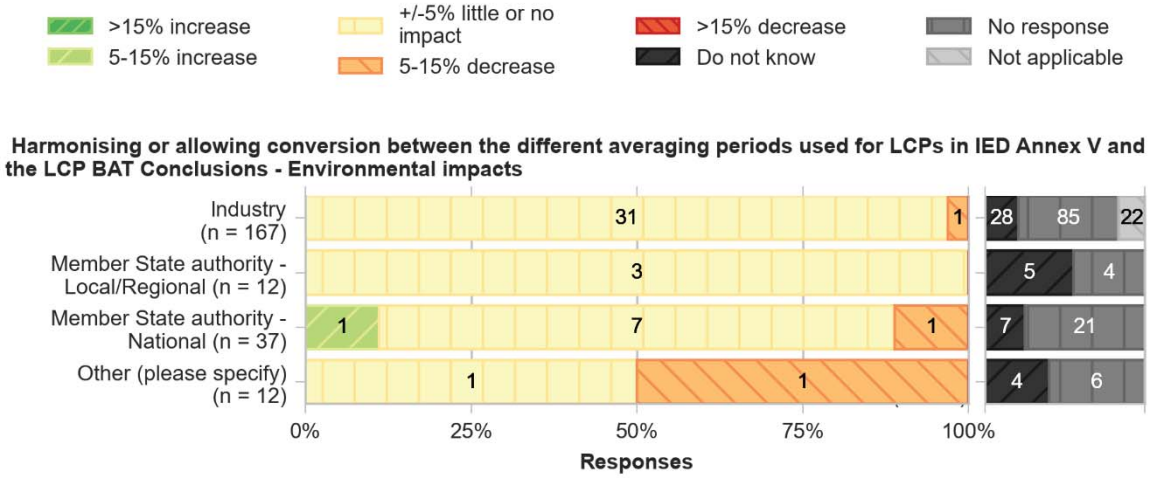
averaging periods may have some impacts on air quality due to longer averaging periods being more tolerant of periods of elevated emissions.

Should the use of the Annex V ELVs as a safety net be retained solely for those installations that have secured derogation(s) from the Chapter II requirements (i.e. Annex V ELVs would not apply to installations that have not received a derogation) it should be noted that this does potentially increase the risk of elevated air quality impacts over shorter duration averaging periods.

[For example, one could consider the hypothetical case of a 250 MWth coal-fired power station, operating with hourly averaged NOx emissions of 450 mg/Nm^3 for 5% of the year, and hourly averaged emissions of 170 mg/Nm^3 for the remaining 95% of the time. In this case, the annual average level of emission (184 mg/Nm^3) would be compliant with the Chapter II annual average BAT-AEL (200 mg/Nm^3) but would exceed the Annex V hourly average ELV (400 mg/Nm^3). However, since both averaging periods are required for compliance assessment currently, it is not expected that changes will lead to a change in environmental performance.]

Note that, as show in Figure A8-13, the majority of stakeholders that participated in the TSS indicated that there would be little or no impacts on the environment from the harmonisation of averaging periods (measure #7) that would take precedence as a result of the proposed measure (#16). Nearly all (97%) of industry stakeholders who responded to this question indicated that there would be +/-5%, i.e. little or no impact, via harmonising averaging periods.

Figure A8-13: TSS responses on the perceived environmental impacts of harmonising or allowing conversion between averaging periods for LCPs



Social impacts

This measure specifically is likely to result in a **limited to no impacts** on employment.

Summary of problem area 1 measures

For the measures presented in problem area 1, Table 12 summarises the Economic, environmental and social impacts of the measures using the qualitative ratings. Overall, these policy measures would yield weakly negative Economic impacts in the shorter to medium term, positive environmental impacts and limited social impacts. These impacts have been assessed using a qualitative scoring approach. The measures that are likely to have most significant impacts within this problem area are measures #3 and #5, although all of them expected to be effective in addressing issues identified with the IED during the recent evaluation.

Table A8-12: Summary of Economic, environmental and social impacts for measures in problem area 1

Policy measure	Economic impacts	Environmental impacts	Social impacts (employment focus)
#1	×	✓	O
#2	O	✓	O
#3	××	✓	O
#4	O	✓	O
#5	××	✓✓	O
#6	×	✓	×
#7	×	✓	O
#8	O	✓	O
#9	×	✓	O
#10	×	O	O
#11	×	✓	O
#12	O	O	O
#13	O	O	O
#14	✓	✓	O

Policy measure	Economic impacts	Environmental impacts	Social impacts (employment focus)
#15	✓	O	O
#16	✓	O	O

Table A8-13 similarly uses qualitative ratings to summarise costs and benefits for measures in problem area 1, with central estimates of administrative costs for businesses and public authorities also shown. Overall, expected costs and benefits associated with the measures retained to improve the effectiveness of the IED, improve transparency and reduce unnecessary regulatory burden. The benefits are often uncertain, however, these appear to be generally likely to outweigh costs.

Table A8-13: Summary of costs and benefits for measures in problem area 1, with central estimates of administrative costs for businesses and public authorities shown

Policy measure	Administrative costs – businesses (€m/yr)	Administrative costs – public authorities (€m/yr)	Overall costs	Overall benefits
#1	0.6	0.09	✗	✓
#2	0.2	0.4	✗	✓
#3	0.6	0.4	✗✗	✓
#4	No/limited	No/limited	**O**	✓
#5	8.0	6.7	✗✗	✓✓
#6	0.2	No/limited	✗	✓
#7	3.8	4.6	✗	✓
#8	No/limited	0.05	✗	✓
#9	0.06	0.4	✗	✓
#10	No/limited	No/limited	✗	**O**
#11	No/limited	5.5	✗	✓
#12	No/limited	2.0	✗	✓
#13	No/limited	0.2	✗	✓
#14	No/limited	No/limited	**O**	✓
#15	-0.6 (benefit)	-0.5 (benefit)	**O**	✓
#16	-0.1 (benefit)	-0.3 (benefit)	**O**	✓

Problem area 2: The IED is not dynamic enough and does not support the rapid deployment of innovative technologies

There are six policy measures shortlisted to address the problems, drivers and consequences associated with this problem area. For example, the static character and backwards-looking nature of the BREF process restricts innovation and, as a result, the IED has not been dynamic enough to support the rapid deployment of innovative technologies.

We have structured these measures based on the specific problems they are trying to tackle and provide a description, outline the requirements for implementation and a rapid assessment of their impacts. Following this, we provide an overview of the Economic, environmental, and social impacts supported by evidence.

Measure 17: Introduce legislative amendments to facilitate the development and testing of emerging techniques over a longer period.

Description of the measure and requirements for implementation

This measure would introduce a period during which IED installation operators are exempt from meeting BAT-AELs for pertinent sources of emissions whilst testing and/or developing Emerging Techniques. This period could be introduced by amending IED provisions such as Article 15(5).

This exemption period is yet to be defined. We have considered extending the period to 24-36 months. Evidence collected during the recent IED evaluation showed that this exemption has been used by very few IED installations.

During a focus group for this study, France confirmed that this is also the case in their installations. Austria explained that they offer exemptions for up to 36 months subject to explicit boundary conditions.

Further, a technology provider (Accessa) stated that "granting more time is unlikely to be a sufficient incentive for operators to take the risk (e.g. of meeting lower AELs). A more direct support and reward system would be more effective".

Objectives:

The measure will aim to to promote the testing and/or development of Emerging Techniques that could deliver higher environmental protection (or similar protection levels at lower operating costs). This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of breakthrough technologies and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.

Implementation needs:

- EU to clarify and establish a proposal for the exemption period, including the required justification. The period of exemption may only be for the commissioning or start-up period or longer, as required. During consultation activities for this study, public authorities suggested that a more tailored approach could be used where justification is provided to ensure the exemption period was effective in encouraging testing and development of emerging techniques.
- Competent authority to introduce and manage applications for temporary derogations.
- Operators to engage with the derogation process and use this to test and develop emerging techniques.
- EU to issue rules covering legal redress and the default position if the longer period with a temporary exemption does not produce positive results, to avoid the measure being subject to abuse by operators, causing excess pollution.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **limited economic impacts** when compared to the baseline, although this will depend upon the take up of this exemption by operators.

Administrative burden on businesses

This measure is likely to have **limited to weakly negative impacts** on the administrative burden on businesses, depending on the number of sites engaged in this process.

Evidence on derogations currently possible for IED installations in the glass and the iron and steel sectors, outlined in the recent evaluation, shows that over 10% of installations may have been granted an exemption (on article 15.4 derogations) but only three cases on innovation (article 15.5) derogations. Given this, and evidence gathered, it is to be expected hat only a limited set of installations may decide to ask for this temporary derogation over a period of 20 years. This is assumed at 5%-10% of all existing installations (i.e., of a total of around 52 000), as they may be interested in seeking this new exemption when reviewing their permits and/or otherwise, and a similar percentage of installations seeking new permits (assumed at around 500 each year). This will generate some additional administrative costs for operators associated with developing the request for derogation and engaging with public authorities.

There is limited direct evidence available on the costs to businesses of developing an application for this type of derogation. The evidence available and summarised earlier in this Annex suggests that applications for exemptions may require between 40 to 300 hours for IED operators to complete, submit and iterate with public authorities. That is, an operator that seeks an extension from meeting BAT-AELs whilst testing and/or developing emerging technique may spend between €1 100 and €8 550 in administrative costs, assuming an hourly labour cost of around €29 (Eurostat, 2020).

Over a 20-year period, therefore, it is assumed that between 155 and 310 installations may seek this exemption each year, on average, over and above the baseline. This would imply an average

of €0.2 to €3 million in additional costs each year spread across the EU, with a central estimate of around €0.4 million each year. These costs are, therefore, unlikely to be significant, although it will depend on the number of installation operators that finally decide to seek a derogation.

Operating costs and conduct of business

This measure is likely to lead to **limited to no impacts** on the costs of doing business at the EU level. The measure does not require investments to comply with regulations. Further, this measure may lead to investments on Emerging Techniques, which in some cases may have higher overall costs. However, these are only likely for a very small number of installations, based on the evidence collected so far. For example, in a focus group for this study, Eurofer stated the proposed exemption period remains relatively short to lead to widespread changes in the way operators make investment decisions. Actual capital and operating costs incurred as a result of these exemptions would depend upon the emerging techniques that are being tested, and there is uncertainty as to what operators across sectors may take forward.

Competitiveness and level playing field

This measure is likely to lead to **limited to no impacts** on competitiveness or the levelling the playing field. This measure provides a possible exemption to implement BAT Conclusions. In this regard, businesses may take decisions to invest in techniques that could lead to improvements in their competitiveness. This measure should also have limited to no impacts on the level playing field, although it could lead to differential outcomes across countries and sectors depending on how they may be incentivised to take up this derogation.

Position of SMEs

This measure is likely to lead to **limited to no impacts** on the position of SMEs. There is a very large list of candidate emerging techniques that are applicable to small and large plants in any sector. This measure is not generating a different or disproportionate impact on smaller installation operators.

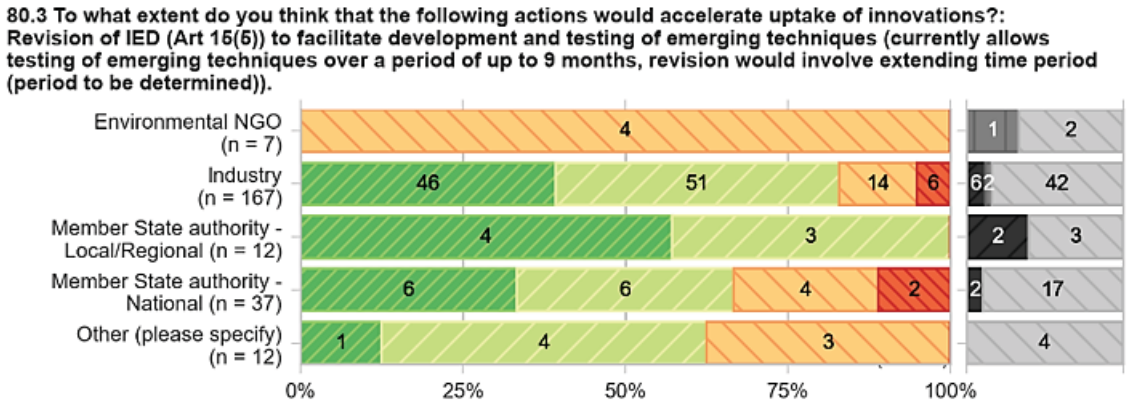
Innovation and research

This measure is likely to have **limited to weakly positive impacts** on innovation and research. The measure would likely encourage a smaller number of industrial operators to invest in research and development and testing of novel techniques in lieu of implementing BAT Conclusions for a period of time. It is possible, however, that this measure would encourage the adoption of existing knowhow (IP) from a supplier based in the EU or other industrial regions (USA or China). This would also generate opportunities for revenue generation for the industrial research and development sector. These uncertainties limit our ability to estimate the potential impacts on innovation and research.

Respondents of the TSS for this study have suggested that it is likely that these measures may lead to significant to moderate contributions towards research and development (Figure A8-14).

This conclusion supports the likelihood that this measure leads to weakly positive impacts; although, again, these are unlikely to be widespread and thus limited at the EU-level.

Figure A8-14: TSS responses



Public authority impacts

This measure is likely to have **limited to weakly negative impacts** on public authorities. As outlined earlier for administrative burden on businesses, evidence available suggests that only a limited set of installations may apply for this temporary derogation. This will generate some additional administrative costs for public authorities, primarily associated with reviewing any requests for derogation and considering the validity of the proposed justification.

The burden of proof during this administrative process is on IED operators. However, public authorities also need to engage with the 'applications for the exemption' from IED operators. Based on the evidence available, a broad assumption was developed that public authorities would incur up to 50% of the time spent by operators in considering these applications and engaging in the process, that is, between 20 to 150 worker hours at an hourly labour cost of €29 (Eurostat, 2020).

As noted earlier (see administrative burden on businesses), it is assumed that over a 20-year period between 155 and 310 installations may seek this exemption each year, additional to the baseline. This would imply an average of €0.1 million to €1 million in additional costs each year spread across public authorities in the EU, with a central estimate of around €0.2 million each year. These costs are, therefore, unlikely to be significant, although it will depend on the number of IED operators that finally decide to seek this exemption.

Further, public authorities may also establish a procedure and template for these specific derogations. They may build on existing infrastructure and resources linked to current derogation procedures; however, this may result in some additional one-off costs. These costs are also unlikely to be significant.

Environmental impacts

Overall, this measure is likely to have **limited to weakly positive impacts on the environment** when compared to the baseline, although these will depend upon the take up of this exemption by operators and the technologies or techniques deployed, potentially earlier than otherwise expected in the baseline.

Climate

This measure is likely to have **limited to no impacts** on the climate, especially in the shorter term. This is because emerging techniques are likely to have a focus on reducing pollution in scope of the current IED (such as NO_X) and, therefore, unlikely to focus on GHG emissions. Novel techniques do not often include improvements in GHG emission performance, although this may change in the medium to longer term if measures are introduced to adjust the scope of the IED.

Air quality and other environmental impacts

This measure is likely to lead to **limited to weakly positive impacts** on air quality; water quality and resources; soil quality or resources; waste production, generation and recycling; and, the efficient use of resources.

The overall environmental impact across these categories will be mainly driven by the number of installation operators that finally decide to seek a derogation. The specific scale of impact per installation with a successful derogation will depend upon the selected emerging techniques, although any of these techniques would be expected to result in additional contributions to reducing industrial polluting emissions.

Social impacts

This measure is likely to result in **limited to no impacts** on employment across the EU. The measure may create jobs in research and development and engineering and constructions sectors. However, the expected low take-up of this measure would lead to a very small knock-on effect across these sectors, and overall employment impacts across the EU are not likely to be significant.

Measure 18: Amend requirements to allow more time (6 to 8 years) for operators to implement emerging techniques with Technology Readiness Level (TRL) 8-9 or stricter long-term Emerging Techniques Associated Emission Levels (ET-AELs) reflecting the expected environmental performance of emerging techniques. Applicable to Key Environmental Issues only.

Description of the measure and requirements for implementation

This measure would allow more time (6 to 8 years) for operators to implement emerging techniques with Technology Readiness Level (TRL) 8-9 or stricter long-term Emerging

Techniques Associated Emission Levels (ET-AELs) reflecting the expected environmental performance of these techniques. The measure would be applicable to Key Environmental Issues only could be introduced by amending IED provisions such as Article 21(3).

The industrial installation permit will be updated reflecting an ELV that is equal or lower to the ET-AELs after the operator has finalised the construction and commissioning of the emerging technique. This will lead to lower environmental impacts than using an article 15.5 derogation (where operator permit would go back to BAT-AEL reference after testing period).Operators have concerns related to data (e.g. on emissions) underlying emerging techniques, as there might be high uncertainty. This could result in challenges associated with deriving legally binding indicators such as ET-AELs. Past experience from BREF reviews shows that when these techniques are likely to have been used only in a few sites, then the adoption in BREF may be done with a long list of caveats (numerous applicability restrictions such as "this might not be applicable in plants of type X"). The EEB suggests that the data to derive a regulatory value/ performance standard should be more flexible (e.g. check the US MACT standard)[25].

Along these lines, in an interview with ESWET, they have shared concerns that "performance should be proven, not expected. The promise of extraordinary performance can be a source of [risk] if made mandatory by authorities. [For example,] in the case of waste management…there is no one-size-fits-all technology and the "best" option for a specific waste stream is not necessarily the best for another waste stream. In the case of non-recyclable waste treatment, several technologies actually rely on pre-sorted feedstock (e.g. gasification) while others do not (e.g. incineration) and they play different roles. Thus, the recognition of emerging techniques and resulting processes should not lead to imposing a restricted number of options which would disrupt the proper functioning of waste management systems". This feedback will be considered to mitigate any unintended consequences and retain the technology neutral principles whilst acknowledging advances with research and innovation.

Objectives:

The measure will aim to promote disruptive or significant achievements on environmental protection (rather than marginal improvements). This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of breakthrough technologies and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.

Implementation needs:

- Public authorities to establish a clear process for considering requests to have more time to implement emerging techniques. Public authorities will also need to consider other implementation challenges e.g. by definition, emerging techniques can deliver the same

[25] The Maximum Achievable Control Technology (MACT) standard in the USA is a level of control that was introduced by Title III of the 1990 Clean Air Act Amendments.

performance at lower costs and/or enhanced performance. Therefore, these ET-AELs might be expressed using ranges to cope with uncertainty, which may lead to overlaps with baseline BAT-AEL ranges.

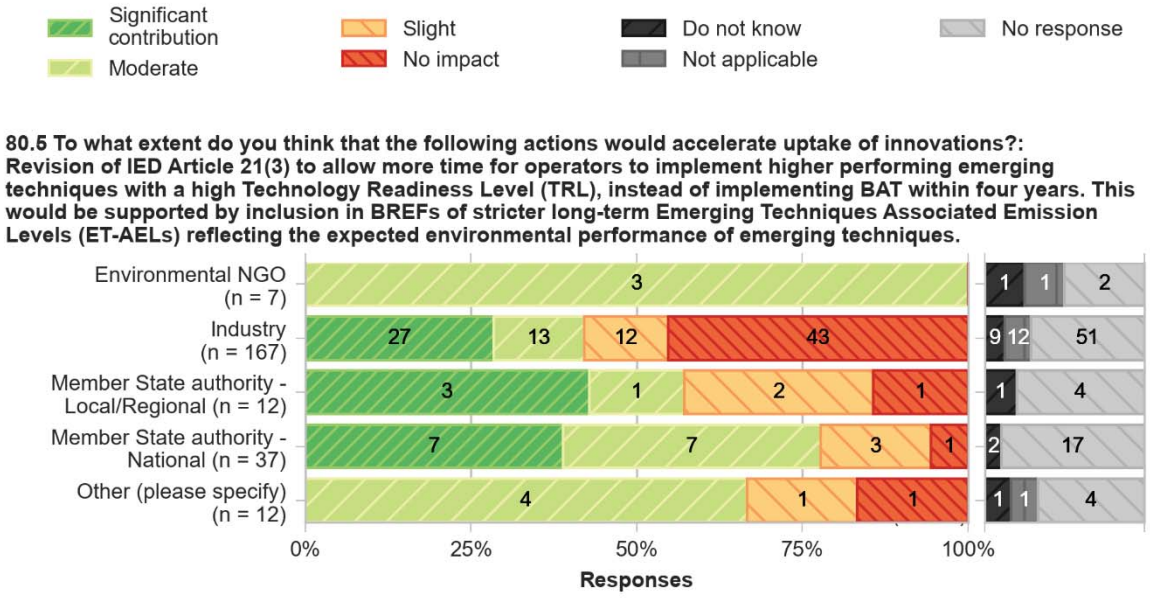
- Operators to provide a full justification report for requiring more time to implement emerging techniques.
- Public authorities and/or INCITE to contribute to reviewing these requests and reaching a decision. Member States (France and Spain) noted as part of a focus group that they would be keen for INCITE to support with reviewing these requests.

Assessing impacts

The economic, environmental and social impacts will depend on whether the measure leads to an increase in the uptake of emerging and innovative techniques by IED operators that may improve their enviornmental performance. This is uncertain.

The majority of stakeholders responding to the TSS perceived that at least moderate impacts on technology uptake by installations covered by the IED should be expected (Figure A8-15).

Figure A8-15: TSS responses.



Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, although this will depend upon the uptake of emerging techniques by IED

operators, and whether this would require earlier or higher capital investments and operating costs when compared to the baseline.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on the administrative burden on businesses, especially because businesses will need to provide a full justification for requiring more time to implement emerging techniques and update their permits accordingly. Details associated with implementing this measure are to be defined; however, we assume that IED operators will have to engage with some application process, similar with a permit review and/or a derogation application.

The evidence available and summarised earlier in this Annex suggests that applications for exemptions may require between 40 to 300 hours for IED operators to complete, submit and iterate with public authorities. That is, an operator that seeks an extension from meeting BAT-AELs whilst testing and/or developing emerging technique may spend between €1 100 and €8 550 in administrative costs, assuming an hourly labour cost of around €29 (Eurostat, 2020).

Although uncertain, based on the project team's expert opinion and consultation with stakeholders, it has been assumed that 5% - 10% of the installations may seek time allowance to implement emerging techniques, or between 2 600 - 5 200 IED installations every eight years (around a similar timetable of the BREF review process). This would include new and/or existing installations.

Over a 20-year period, therefore, between 260 and 520 installations may seek this derogation or time allowance each year, over and above the baseline. This would imply an average of €0.3 to €4 million in additional costs each year spread across the EU, with a central estimate of around €0.6 million each year.

Operating costs and conduct of business

This measure is likely to lead to **limited to weakly negative impacts** on the costs of doing business. The measure would not have a direct impact (requirement) on companies to invest more or less to comply with requirements. Rather, operators would seek an allowance to have more time to implement emerging techniques that best suit their installations whilst improving their environmental performance. We would expect that many of these techniques may have at least higher capital requirements although this is uncertain and would depend on a case-by-case basis.

Competitiveness and level playing field

This measure is likely to lead to **limited to no impacts** on competitiveness or the levelling the playing field. This measure provides flexibility to operators to take more time to invest on the relevant emerging technologies that are best suited to improve environmental protection at lowest cost for a given installation. Further, the carbon border adjustment mechanism may

mitigate any impacts on competitiveness resulting from carbon costs. In addition, this measure is unlikely to have any significant impacts on the level playing field in the EU.

Position of SMEs

This measure is likely to lead to **limited to no impacts** on the position of SMEs. Sectors with larger sites (and larger companies) such as chemicals or combustions units (power) might be more likely to seek more time to invest in emerging techniques.

Innovation and research

This measure is likely to lead to **weakly positive impacts** on innovation and research. The measure would likely encourage a smaller number of industrial operators to invest in research and development and testing of novel techniques in lieu of implementing BAT Conclusions for a period of time. It is possible, however, that this measure would encourage the adoption of existing knowhow (IP) from a supplier based in the EU or other industrial regions (USA or China). This would also generate opportunities for revenue generation for the industrial research and development sector.

Public authority impacts

This measure is likely to lead to **weakly negative impacts** on public authorities, especially for engaging in the review of requests from operators for time to implement emerging techniques. Detail associated with implementing this measure are to be defined; however, we assume that public authorities (MS competent authorities and/or INCITE) will have to engage with some process, similar with a permit review and/or a derogation application.

The burden of proof during this administrative process is on IED operators. However, public authorities also need to engage with the 'applications for the exemption' from IED operators. Based on the evidence available, a broad assumption was developed that public authorities would incur up to 50% of the time spent by operators in considering these applications and engaging in the process, that is, between 20 to 150 worker hours at an hourly labour cost of €29 (Eurostat, 2020).

As noted earlier (see administrative burden on businesses), it is assumed that over a 20-year period between 260 and 520 installations may seek this exemption each year, additional to the baseline. This would imply an average of €0.1 to €2 million in additional costs each year spread across public authorities in the EU, with a central estimate of around €0.3 million each year. These costs are, therefore, unlikely to be significant, although it will depend on the number of IED operators that finally decide to seek this exemption.

Other, potentially lower costs may be incurred earlier on to develop and establish a clear and consistent process for considering these requests across the EU.

Environmental impacts

Overall, this measure is likely to have **weakly positive impacts on the environment** when compared to the baseline, although these will depend upon the take up of this derogation by operators and the emerging techniques deployed, potentially earlier than otherwise expected in the baseline.

Climate

This measure is likely to lead to **limited positive impacts** on the climate, especially if GHG are included in the scope of the IED and BREFs. The scale of these impacts will depend upon the number of operators that seek these time allowance to implement emerging techniques and research and development trends.

Air quality and water quality

This measure is likely to lead to **weakly positive impacts** on air quality. The scale of these impacts will depend upon the number of operators that seek these time allowance to implement emerging techniques and research and development trends. However, the selected emerging techniques as part of these BREFs are likely to have higher environmental performance standards especially for emissions to air and water, than those identified in the baseline at any one point in time, thus leading to some reduction in polluting industrial emissions upon the implementation of BAT Conclusions.

Other environmental impacts

This measure is likely to lead to **weakly positive impacts** on soil quality or resources; waste production, generation and recycling; and the efficient use of resources. The scale of environmental impact across these categories will depend upon the number of operators that seek these time allowance to implement emerging techniques and research and development trends. Having said this, the selected emerging techniques as part of these BREFs are likely to have higher environmental performance standards than those identified in the baseline at any one point in time, thus leading to some reduction in polluting industrial emissions upon the implementation of BAT Conclusions.

Social impacts

This measure is likely to result in a **limited to weakly positive impact** on employment. The measure might create jobs in research and development, the engineering and constructions sectors, and regulatory affairs -to engage with any process seeking time allowances to implement emerging techniques-. However, expected increases in costs of doing business may put pressure on operators to identify efficiencies including but not only by reducing employment.

Measure 19: Establish shorter, up to 5-year BREF cycles focussed on defining stricter BAT-AELs based on recent innovations.

Description of the measure and requirements for implementation

This measure would design an agile BREF review process based on the same principles as the existing process, whilst incorporating changes to tools (e.g. digital, remote) and formats that facilitate faster and targeted revisions that are complementary to the baseline BREF process. This shorter process might be triggered by significant innovation and/or technological progress in a given sector and may be focused on a specific scope, e.g., only covering the most relevant KEIs.

This measure would establish shorter, up to 5-year BREF cycles, especially to target new installations and/or any major refurbishments or retrofits. Otherwise, that is, for the majority of baseline installations, the measure would not trigger a mandatory permit review.

Evidence suggests that there are not many greenfield or new sites. Therefore, the proposed measure is likely to have limited scope and/or potential impact, mostly linked to installation operators that may be considering significant transformation plans. A precise definition of 'significant' will need to be derived, potentially based on the fact that installation changes primary techniques (manufacturing paths/processes).

During a focus group for this study, Member States (Austria) and NGO representatives mentioned that this measure would be most effective if quicker BREF updates were to focus on Key Environmental issues.

Objectives:

The measure will aim to promote quicker adjustments to BAT-AEL based on recent ongoing innovation (by avoiding long periods with same standards) for new installations. This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of breakthrough technologies and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.

Implementation needs:

- EU (and MS authorities) to clarify, coordinate and establish an adjusted and quicker BREF process; the focus on key environmental issues or otherwise; and whether the process would trigger permit reviews and how.
- Operators to engage with BAT Conclusions only if they are considering major refurbishments and retrofits and/or investing in new installations.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, although this will depend on how the more rapid BREF review process

complements the existing BREF cycle and the number of installations that may be affected -e.g. new permits as well as major refurbishments only-.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on the administrative burden on businesses as a result of being involved in more frequent BREF reviews and more frequent permit reviews and updates when compared to the baseline.

A BREF review process for one sector may cost a total of between €3.5 and €21 million based on the data provided in the recent IED evaluation, and around 30% of these costs would be incurred by operators. Marginal and additional costs would be expected from increased frequency of BREFs; however, focusing on key environmental issues would reduce the cost of a single review and it is likely that operators would be less involved and more focussed.

If a complementary and more frequent BREF process were to be introduced, this could mean that there would be an additional BREF cycle for each sector in a period of 20 years, or 50% more BREF reviews at any point in time (e.g., if we assume that 60 BREF reviews are carried out in 20 years, we would expect this adjustment to lead to an additional 30 BREFs in this period). Total costs for operators would increase, therefore, by a maximum of 50% across the EU on average, although this is likely to be an upper bound, especially if synergies are identified. Alternatively, these rapid BREF reviews do not completely substitute the existing BREF schedule, but rather complement it when technological progress across sectors may warrant an update. In this case, these reviews may be very focussed or targeted and require lower input from stakeholders and thus, may be lower cost. There are uncertainties around the administrative implications of this measure. Given these options considered, it has been assumed that the BREF review costs that would be additional to the baseline over this period would range from 10% - 50%, with a central estimate of around 25% additional administrative burden.

This measure is targeting new installations and/or major refurbishments. It is unlikely that this measure would lead to any additional administrative costs associated with issuing new permits. However, this measure may require additional and/or more detailed permit reviews for those major refurbishments, assumed at a 40% of the baseline costs. The number of installations that will require major refurbishments, and thus may be affected by this measure is uncertain. In this context and based on the information available, it is assumed that around 10% of the baseline installations or 5 200 may be affected by this measure over 20 years, i.e., an average of 260 each year.

In total, this would mean around €0.4 to €13 million in additional costs each year, spread across IED installation operators in the EU, and a central estimate of around €3.2 million. These estimates depend on how the more rapid BREF review process complements the existing BREF cycle and the number of installations that may be affected.

Operating costs and conduct of business

This measure is likely to lead to **negligible impacts** on the costs of doing business, especially given that it is expected that only new installation operators or operators considering major refit/ retrofitting actions may require to review their permits as a result of updated BAT Conclusions through the proposed, quicker BREF process. For these relatively few installations, however, higher capital and operating costs would be expected when compared to the baseline, especially if quick BREF reviews lead to stricter or lower BAT-AELs. These are uncertain and would depend on the outcome of the BREF reviews and the number of installations that may be in scope.

Competitiveness and level playing field

This measure is likely to lead to **negligible impacts** on competitiveness and **no impact** on the levelling the playing field. This measure might slightly reduce the competitiveness of new industrial operators as it may result in marginally higher cost for environmental protection. These are unlikely to be significant in a global context and would likely be mitigated to some extent by the carbon border adjustment mechanism. This measure has no impact on level-playing field across EU.

Position of SMEs

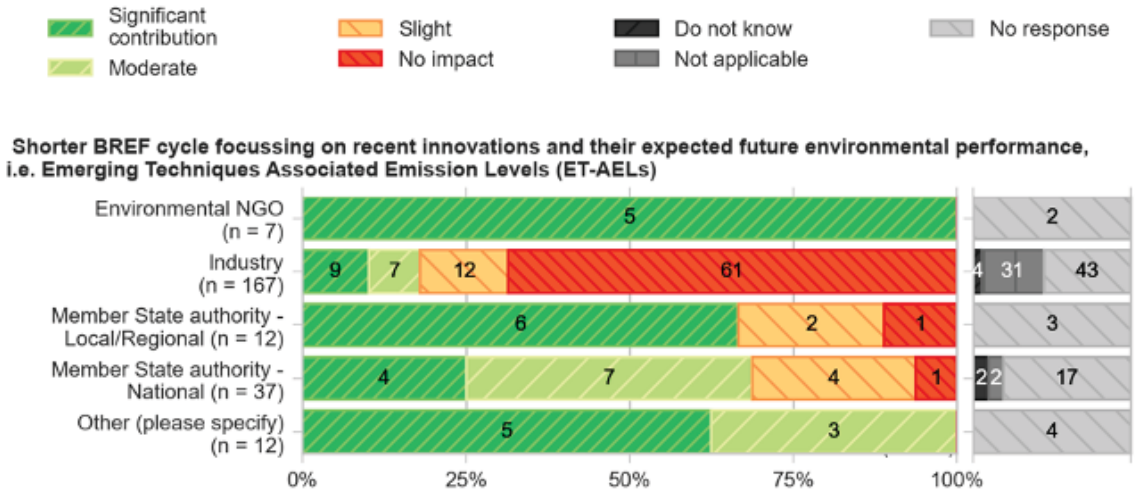
This measure is likely to have **no impacts** on the position of SMEs. In fact, if anything, some sectors with larger installations (and larger operators) such as chemicals or combustions units may be affected relatively more by this measure than others with smaller installations (and smaller operators).

Innovation and research

This measure is likely to lead to **limited to weakly positive impacts** on innovation and research. The measure would likely encourage a smaller number of industrial operators to invest in research and development and testing of novel techniques in lieu of implementing BAT Conclusions for a period of time. It is possible, however, that this measure would encourage the adoption of existing knowhow (IP) from a supplier based in the EU or other industrial regions (USA or China). This would also generate opportunities for revenue generation for the industrial research and development sector.

Non-industry respondents to the TSS for this study expect significant to moderate contributions towards innovation and research from the implementation of this measure (Figure A8-16). However, the majority of industrial stakeholders expect no impacts on innovation and research from this measure.

Figure A8-16: TSS responses



Public authority impacts

This measure is likely to lead to **weakly negative impacts** on public authorities as a result of being involved in more frequent or more demanding BREF processes when compared to the baseline.

A BREF review process for one sector may cost a total of between €3.5 and €21 million based on the data provided in the recent IED evaluation, and around 70% of these costs would be incurred by public authorities across the EU. Marginal and additional costs would be expected from increased frequency of BREFs; however, it is likely that they would be less involved and more focused. There is limited evidence to consider these synergies at this stage. Given these options considered (see administrative burden on businesses), it has been assumed that the BREF review costs that would be additional to the baseline over this period would range from 10% - 50%, with a central estimate of around 25% additional administrative burden.

This measure is targeting new installations and/or major refurbishments. It is unlikely that this measure would lead to any additional administrative costs associated with issuing new permits. However, this measure may require additional and/or more detailed permit reviews for those major refurbishments, assumed at a 40% of the baseline costs. The number of installations that will require major refurbishments, and thus may be affected by this measure is uncertain. In this context and based on the information available, it is assumed that around 10% of the baseline installations or 5 200 may be affected by this measure over 20 years, i.e., an average of 260 each year.

In total, this would mean around €1 to €22 million in additional costs each year, spread across public authorities in the EU, and a central estimate of around €5.3 million. These estimates

depend on how the more rapid BREF review process complements the existing BREF cycle and the number of installations that may be affected.

Environmental impacts

Overall, this measure is likely to have **weakly positive impacts on the environment** when compared to the baseline, although these will depend upon outcomes of the more rapid BREF review process and the number of installations that are affected by the resulting, likely stricter environmental requirements over time.

Climate

This measure is likely to lead to **limited to weakly positive impacts** on the climate, especially if GHGs are included in the scope of the IED and BREFs. The scale of these impacts will depend upon the BREF outcomes and research and development. This scale would also be limited by the triggers associated with the shorter BREF cycles, likely to focus primarily on new installations or those after major transformation.

Air quality and other environmental impacts

This measure is likely to lead to **limited to weakly positive impacts** on air quality; water quality and resources; soil quality or resources; waste production, generation and recycling; and the efficient use of resources.

The scale of environmental impact across these categories will depend upon the BREF outcomes and research and development. This scale would also be limited by the triggers associated with the shorter BREF cycles, likely to focus primarily on new installations or major refurbishments. Having said this, the selected emerging techniques as part of these BREFs are likely to have higher environmental performance standards than those identified in the baseline at any one point in time, thus leading to some reduction in polluting industrial emissions upon the implementation of BAT Conclusions.

Social impacts

This measure is likely to result in **limited impacts** on employment. The measure might create jobs in research and development and engineering and constructions sectors. However, the expected low take-up of this measure would lead to a very small knock-on effect across these sectors, and overall employment impacts across the EU are not likely to be significant.

Measure 20: Establish the INnovation Centre for Industrial Transformation & Emissions (INCITE) to monitor the Technology Readiness Level (TRL) and environmental performance (BAT-AEPLs) of emerging and breakthrough techniques. Recognition by INCITE of advanced techniques with TRL 8-9 (or improved environmental protection) would suggest an update of BAT conclusions.

Description of the measure and requirements for implementation

This measure would establish the INnovation Centre for Industrial Transformation & Emissions (INCITE) to monitor the Technology Readiness Level (TRL) and environmental performance of emerging and breakthrough techniques.

INCITE would identify candidate novel techniques and gather evidence on degree of maturity for advanced techniques with TRL 8-9 (or improved environmental protection). INCITE would suggest, where pertinent, an update of BAT conclusions upon approval from the relevant Technical Working Group.

This measure would also target all installations, new and existing. INCITE would be expected to have some powers to trigger a BREF review or update of BAT conclusions where pertinent. Nevertheless, these more frequent BREF reviews or BAT conclusion updates would likely affect a minority of installations at least in the shorter term.

Most stakeholders believe that the final design and resources assigned to INCITE will have an impact on its performance. The pilot project (innovation observatory) revealed that technology suppliers had no incentives or drivers to devote time, people or resources to its activities. Further, respondents to the TSS for this study also suggested that a wide range of stakeholders should be involved.

Eurofer stated that they would like to participate in INCITE, although industry participants shared concerns on the potential loss of technology neutrality. INCITE, however, should be expected to respond to ongoing innovation rather than focus on specific technologies and, therefore, it is expected that the principle of technology neutrality would be retained.

Participants of a focus group for this study (Eurofer and FuelsEurope) suggested that INCITE should not derive legally binding documents. The current measure proposed would provide INCITE with some powers to trigger a BREF review or update of BAT conclusions where pertinent. To this effect, FuelsEurope suggested that mid-term reviews should be justified by substantial evidence, and that identifying a small number of novel techniques may not be sufficient to warrant said reviews.

Objectives:

The measure will aim to accelerate the adoption, by operators, of lower emission standards (lower BAT-AELs) or lower cost for similar emission standards in a faster way (sooner than the next BREF review) by converting novel or emerging techniques into candidate BATs. This

measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of breakthrough technologies and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.

Implementation needs:

- EU to establish INCITE and clarify membership, resources, focus (including sectoral and/or whether this would only apply to key environmental issues) and the process for validation of environmental performance of emerging techniques and triggering permit reviews.
    - Member states (Austria) and NGOs mentioned at a focus group the need to focus these additional reviews solely on Key Environmental impacts.
    - Member States (Spain) suggested at a focus group that ETV system could provide support on validating environmental performance.
    - FuelsEurope suggested that mid-term reviews should be justified by substantial evidence and identifying a small number of novel techniques may not be sufficient to warrant said reviews.
- EU and MS authorities to clarify definitions of novel and emerging techniques as well as TRL status.
- Operators, technology providers and other stakeholders to participate in INCITE.
- Operators to take appropriate action as a result of changes to BAT conclusions.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative Economic impacts** when compared to the baseline, although this will depend on how the number of BREF reviews triggered by INCITE and/or BAT Conclusion updates, as well as the number of installations that may be affected; e.g. new permits as well as major refurbishments only.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on the administrative burden on businesses, especially from:

- More frequent and/or adjusted BREF reviews.
- More frequent permit reviews and updates to comply with new legally binding requirements.
- Annual administrative costs associated with operators' support to INCITE.

A BREF review process for one sector may cost a total of between €3.5 and €21 million based on the data provided in the recent IED evaluation, and around 30% of these costs would be incurred by operators. Marginal and additional costs would be expected from increased

frequency of BREFs; however, focusing on key environmental issues would reduce the cost of a single review and it is likely that the role of operators would be more focussed.

If a complementary and more frequent BREF process is triggered based on the outputs of the work carried out by INCITE, this could mean that additional BREF cycles for the pertinent sectors may be taken forward. In comparison to measure #19, a BREF review and/or update of BAT Conclusions would not take place periodically, but only when INCITE identifies a significant opportunity. That is, INCITE would provide a mechanism through which additional, more rapid and/or adjusted BREF reviews would only really take place if significant opportunities are identified. In this case, the project team experts considered that the additional workload resulting from this may range from 10% to 20% of the baseline, with a central estimate of around 15%. This is because only a few sectors are likely to have relevant ETs to trigger quicker, targeted and complementary BREF reviews. The measure would not have a narrow scope as it would target all installations; nevertheless, it is expected that the majority of sectors and associated installations are likely to continue to work within the baseline framework.

It is unlikely that this measure would lead to any additional administrative costs associated with issuing new permits. However, this measure may require more involved and/or detailed permit reviews for installations working in sectors targeted by INCITE, which is expected to cover around 15% of the existing installations or around 7 800 over a period of 20 years. This is uncertain. Permit reconsiderations and updates for these installations are assumed to be around 40% of the baseline costs, as these are expected to be significantly more targeted.

In total, this would mean around €0.5 to €9 million in additional costs each year, spread across IED installation operators in the EU, and a central estimate of around €3.2 million. These estimates depend on the outcomes of INCITE's work, how any BREF reviews that are triggered complement the existing BREF cycle and the number of installations that may be affected.

Additional annual costs to contribute to INCITE are expected to be significantly lower than this.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative to negative impacts** on the costs of doing business. The measure is likely to require earlier and higher investment by operators to comply with new candidate BATs and potentially lower BAT-AELs. Specifics would be dependent upon INCITE's work, updates of BAT, the number of operators affected, and subsequent action by operators. Therefore, it is challenging to estimate the additional capital and operating costs that may be incurred by IED installation operators.

Any estimation would require an understanding of the number of installations that would be required to invest earlier, more frequently and at higher cost in these new BAT (or BAT-AELs). This measure will likely impact 'heavy' industry (Iron & steel, organic chemicals or oil and gas refineries). Food and agricultural (e.g. IRPP) sectors do not often develop technologies so fast and thus is rather unlikely that INCITE would promote faster BREF cycles on those sectors.

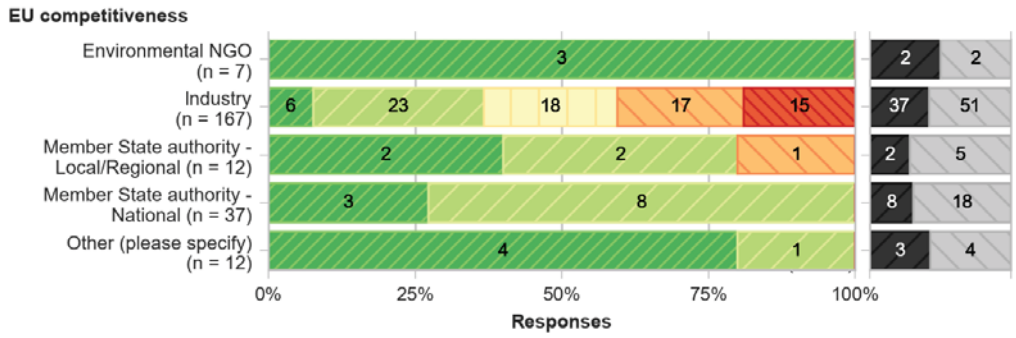
Additional capital expenditure (CAPEX) and operating expenditure (OPEX) will depend upon the selected novel technologies. Heavy industry affected by this measure is likely to require retrofits to existing installations (green field sites are not probable). Investments in these industrial installations are likely to be relatively higher than in other sectors (such as IRPP) can range from €0.5 to €200 million euro per site, based on expert opinion.

Competitiveness and level playing field

This measure is likely to lead to **unclear impacts** on competitiveness and **limited to no impacts** on levelling the playing field. On the one hand, this measure may reduce the competitiveness of EU industrial/ manufacturing companies by leading to substantial increases in the cost of doing business relative to competitors in the global context. The carbon border adjustment mechanism may mitigate impacts that are related with higher CO_2 emission abatement. In addition, other evidence would suggest that these changes could put the EU's industry in the front-foot of transformation, potentially gaining first-mover advantage.

These latter positive impacts may have been considered by stakeholders when responding to the TSS for this study (Figure A8-17). There is consensus amongst the Environmental NGOs and 'Other' stakeholders that strong contributions towards competitiveness should be expected from the implementation of this measure. In contrast, there are mixed views from industry.

Figure A8-17: TSS responses on EU competitiveness impacts of this measure



This measure is not expected to affect the EU's level playing field. There might be a few exemptions such as use of biobased fuels in EU as ETs since those have different prices and availabilities across European regions.

Position of SMEs

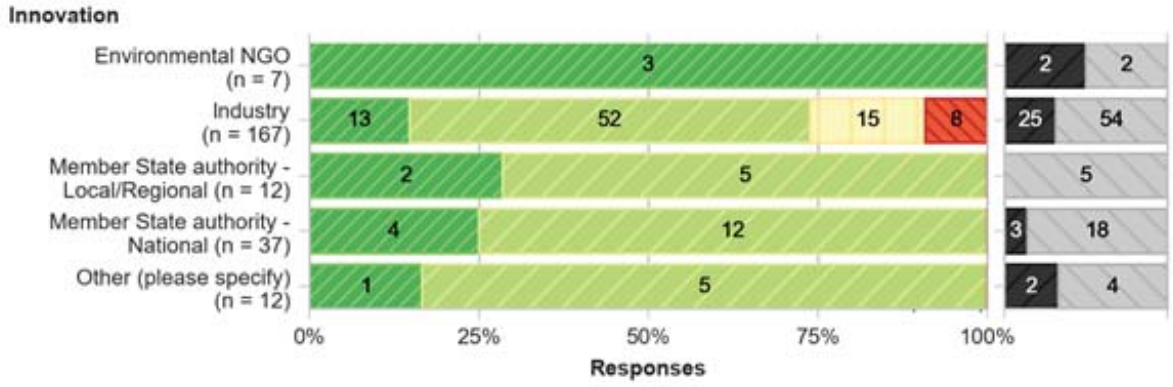
This measure is likely to lead to **limited to no impacts** on the position of SMEs. In fact, if anything, some sectors with larger installations (and larger operators) such as chemicals or combustions units may be affected relatively more by this measure than others with smaller installations (and smaller operators) such as food or slaughterhouses, where technology might develop at slower pace.

Innovation and research

This measure is likely to lead to **weakly positive impacts** on innovation and research. The measure would likely encourage a smaller number of industrial operators to invest in research and development and testing of novel techniques in lieu of implementing BAT Conclusions for a period of time. It is possible, however, that this measure would encourage the adoption of existing knowhow (IP) from a supplier based in the EU or other industrial regions (USA or China). This would also generate opportunities for revenue generation for the industrial research and development sector.

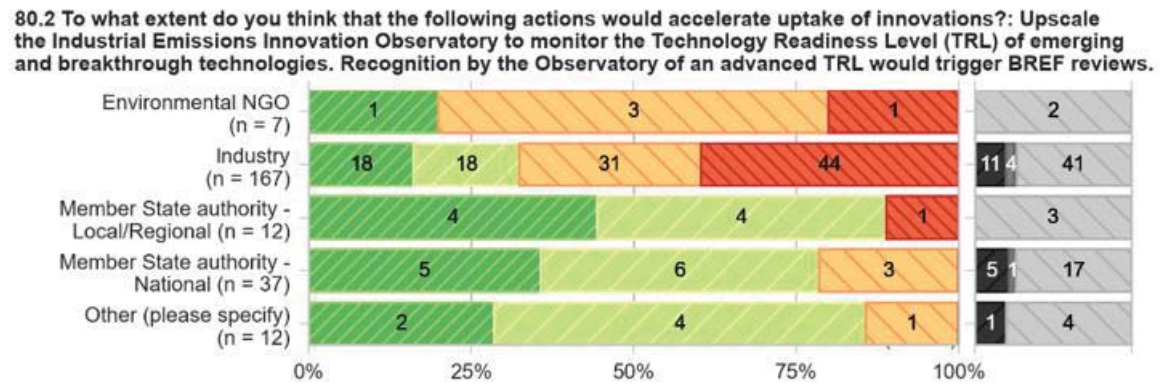
Stakeholders responding to the TSS for this study agree that a moderate contribution to innovation and research from establishing INCITE should be expected. Environmental NGOs believe that it will have a strong impact on innovation (Figure A8-18). A minority in the other stakeholder groups agree with this statement while the majority of stakeholders expect to see a moderate contribution to research and development across the EU. Only a very small number of industry stakeholders responded with no impact from this measure.

Figure A8-18: TSS responses



In addition, the majority of responses to the TSS (over 80%) support the measures considered herein are likely to lead to weakly positive impacts on research and innovation (Figure A8-19).

Figure A8-19: TSS responses



Public authority impacts

This measure is likely to lead to **weakly negative impacts** on public authorities, especially from:

- More frequent and/or adjusted BREF reviews.
- More frequent permit reviews to comply with new legally binding requirements.
- One-off and annual administrative costs associated with the set up and management of INCITE

A BREF review process for one sector may cost a total of between €3.5 and €21 million based on the data provided in the recent IED evaluation, and around 70% of these costs would be incurred by public authorities across the EU. Marginal and additional costs would be expected from increased frequency of BREFs; however, focusing on key sectors and environmental issues would reduce the cost of a single review and it is likely that the roles of public authorities would be more focussed.

If a complementary and more frequent BREF process is triggered based on the outputs of the work carried out by INCITE, this could mean that additional BREF cycles for the pertinent sectors may be taken forward. In comparison to measure #19, a BREF review and/or update of BAT Conclusions would not take place periodically, but only when INCITE identifies a significant opportunity. That is, INCITE would provide a mechanism through which additional, more rapid and/or adjusted BREF reviews would only really take place if significant opportunities are identified. In this case, the project team experts considered that the additional workload resulting from this may range from 10% to 20% of the baseline, with a central estimate of around 15%. This is because only a few sectors are likely to have relevant ETs to trigger quicker, targeted and complementary BREF reviews. The measure would not have a narrow scope as it would target all installations; nevertheless, it is expected that the majority of sectors and associated installations are likely to continue to work within the baseline framework.

It is unlikely that this measure would lead to any additional administrative costs associated with issuing new permits. However, this measure may require more involved and/or detailed permit reviews for installations working in the sectors targeted by INCITE, which is expected to cover around 15% of the existing installations or around 7 800 over a period of 20 years. This is uncertain. Permit reconsiderations and updates for these installations are assumed to be around 40% of the baseline costs, as these are expected to be significantly more targeted.

Costs for the Commission to set up INCITE

Additional costs to set up and manage INCITE are expected to be notable albeit lower than these.

Set up costs would depend on the approach to establishing INCITE. Costs could range from €0.5 million to €10 million (from setting up a virtual team within an existing organisation, to establishing an independent organisation with an address).

Operation costs would also vary.

Experience with the pilot project (innovation observatory)[26] shows that 75 person-days are required over two years to monitor innovation progress for one BREF (IED sector) and publish the relevant information.

The envisaged up-scaled INCITE will cover all current as well as new IED sectors rather than focus only on sectors for which the BREF is under review. Considering that there is a total of about 30 BREFs/IED activities and given economies of scale, this suggests a need for up to 1125 person-days per year (including overheads). This translates into five full-time equivalents.

Costs of the external contractor to run the pilot observatory were €160 000. We estimate a mark-up of 25%-50%, or €40 000 - €80 000, to capture additional costs incurred by public authorities as they contributed to the work carried out the contractors. This would imply total costs of €200 000 - €240 000 over three years and covering two sectors. These costs would increase more or less proportionately to the number of sectors that INCITE would be expected to monitor/ cover each year or over the 10 year period.

As a result, in total, this would mean around €1 to €11 million in additional costs each year, spread across public authorities in the EU, and a central estimate of around €4.5 million. These estimates depend on the outcomes of INCITE's work, how any BREF reviews that are triggered complement the existing BREF cycle and the number of installations that may be affected.

Environmental impacts

Overall, this measure is likely to have **weakly positive to positive impacts on the environment** when compared to the baseline, although these will depend on how the number of BREF reviews triggered by and/or BAT Conclusion updates, as well as the number of installations that may be affected -e.g. new permits as well as major refurbishments only.

Climate

This measure is likely to lead to **limited to no impacts** on the climate unless it is combined with other policy measures that enlarge/focus IED activity and BREF reviews on decarbonisation processes. Emerging techniques in the shorter term will target environmental performance associated with core IED pollutants (NO_X, dust, etc.). Co-benefits in the form of GHG emissions reduction are possible, but not every/many techniques to reduce IED pollutants do also reduce GHG. In addition, the scale of these impacts will depend upon the outcomes of the work by INCITE and any more frequent BREF reviews or actions triggered otherwise, as well as research and development.

Air quality and other environmental impacts

This measure is likely to lead to **positive impacts** on air quality, water quality and resources and soil quality or resources; and **weakly positive impacts** on waste production, generation and recycling; and the efficient use of resources.

[26] Assessment of the functionality and effectiveness of a novel techniques 'Innovation Observatory' to support concrete BREF review processes; Ricardo et al. (2020)

The scale of environmental impact across these categories will depend upon the outcomes of the work by INCITE and any more frequent BREF reviews or actions triggered otherwise, as well as research and development. Having said this, the selected emerging techniques as part of these BREFs are likely to have higher environmental performance standards than those identified in the baseline at any one point in time, thus leading to some reduction in polluting industrial emissions upon the implementation of BAT Conclusions.

Social impacts

This measure is likely to result in a **limited to weakly positive impacts** on employment. The measure might create jobs in research and development, the engineering and constructions sectors, and regulatory affairs -to engage effectively with permit reviews-. However, expected increases in costs of doing business may put pressure on operators to identify efficiencies including but not only by reducing employment.

Measure 21: Amend requirements to allow operators to have more time to implement BAT conclusions where deep transformation of industrial sectors is required. "Deep transformation" would refer to the adoption of completely different process routes and/or primary process techniques that facilitate a significant reduction in the emissions of pollutants and/or the use of energy, raw materials (i.e. secondary, or 'end-of-pipe' techniques would not qualify as 'deep transformation').

Description of the measure and requirements for implementation

This measure would provide more time (e.g. up to six years) to implement BAT conclusions, where deep transformation of industrial sectors is required, which could be introduced by amending IED provisions such as Article 21(3).

"Deep ,transformation" would refer to the adoption of completely different process routes and/or primary process techniques that facilitate a significant reduction in the emissions of pollutants and/or the use of energy, raw materials (i.e. secondary or 'end-of-pipe' techniques would not qualify as "deep transformation").

Industrial federations (e.g. Eurofer) that represent businesses that require deep transformation over the next 10 or more years find this policy measure attractive. In particular, they find that the transformation needs need to be considered and supported rather than hampered by the IED, and this measure could go some way in ensuring this. They also note that this measure could materialise in e.g. "the time extension of the current permit and/or continue with the existing BAT-AEL requirements for a certain period (in consistency with the timing indicated in the transition roadmap for the sector)".

Objectives:

The measure will aim to promote faster BAT-AEL reductions (and avoid having long periods with the same standards) for installations seeking a deep transformation, without imposing the need for widespread permit updates. This measure will, therefore, contribute to the general objective of stimulating a deep industrial and agro-industrial transformation through deployment of breakthrough technologies and, more specifically, ensure that the IED is fit for permitting and reviewing of permits of large industrial and agro-industrial installations for the upcoming transformation.

Implementation needs:

- EU (and MS authorities) to clarify, coordinate and establish a process to consider time allowances where deep transformation may be required. This may include the EU providing guidance as to how to approve/ justify these requests, especially given that permit writers may already be unclear as to when they need to update each permit. This guidance could provide ETS views on which processes can deliver significant GHG reductions.
- Operators to engage in a process with public authorities to provide proof that deep transformation may be required, thus warranting more time to implement BAT conclusions.
- Operators to take forward deep transformation plans.
- European Commission to establish rules to avoid abuse of this system by operators, including legal redress measures and the process requiring a "default to lower range of BAT-AEL" in any case, within a set period.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, although this will depend upon the number of successful applications for derogation from IED operators, and whether these derogations would facilitate the deep transformation of their industrial processes, which may require earlier or higher capital investments and operating costs when compared to the baseline.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on the administrative burden on businesses, especially associated with the process of seeking more time to implement BAT conclusions when a deep transformation is required by a given operator. The process would have to be defined more concretely; we would expect that a justification report supported by evidence would have to be developed by operators, similar in some ways to a permit review/ update.

The evidence available and summarised earlier in this Annex suggests that applications for exemptions may require between 40 to 300 hours for IED operators to complete, submit and

iterate with public authorities. That is, an operator that seeks an extension from meeting BAT-AELs where deep transformation is required may spend between €1 100 and €8 550 in administrative costs, assuming a hourly labour cost of around €29 (Eurostat, 2020).

Although uncertain, based on the project team's expert opinion and consultation with stakeholders, it has been assumed that 5% - 10% of the installations may seek time allowance to implement transformation change within their operations, or between 2 600 - 5 200 IED installations every eight years (around a similar timetable of the BREF review process). This would include new and/or existing installations.

Over a 20-year period, therefore, between 260 and 520 installations may seek this derogation each year, over and above the baseline. This would imply an average of €0.3 to €4 million in additional costs each year spread across the EU, with a central estimate of around €0.6 million each year.

Operating costs and conduct of business

This measure is likely to lead to **limited to no impacts** on the costs of doing business. Minor, new plants would need to invest on environmental protection (regardless of this regulatory change).

Competitiveness and level playing field

This measure is likely to lead to **weakly negative impacts** on competitiveness and **no impacts** on levelling the playing field. This measure provides flexibility to operators to take more time to adopt BAT conclusions whilst they implement deep transformative actions that seek to address longer term climate and environmental challenges and align with EU general objectives. Further, the carbon border adjustment mechanism may mitigate any impacts on competitiveness resulting from carbon costs. In addition, this measure is unlikely to have any significant impacts on the level playing field in the EU.

Position of SMEs

This measure is likely to lead to **limited to no impacts** on the position of SMEs. Sectors with larger sites (and larger companies) such as chemicals or combustions units (power) might be more likely to seek more time to invest in emerging techniques.

Innovation and research

This measure is likely to lead to **weakly positive impacts** on innovation and research. The measure would likely encourage a smaller number of industrial operators to invest in research and development and testing of novel techniques in lieu of implementing BAT Conclusions for a period of time. It is possible, however, that this measure would encourage the adoption of existing knowhow (IP) from a supplier based in the EU or other industrial regions (USA or China). This would also generate opportunities for revenue generation for the industrial research and development sector.

Public authority impacts

This measure is likely to lead to **limited to weakly negative impacts** on public authorities, especially associated with the process of reviewing and assessing applications from operators that seek more time to implement BAT conclusions when a deep transformation is required. The process would have to be defined more concretely; we would expect that a justification report supported by evidence would have to be developed by operators and reviewed and assessed by public authorities.

The burden of proof during this administrative process is on IED operators. However, public authorities also need to engage with the 'applications for the exemption or derogation' from IED operators. Based on the evidence available, a broad assumption was developed that public authorities would incur up to 50% of the time spent by operators to consider these applications and engaging in the process, that is, between 20 to 150 worker hours at an hourly labour cost of €29 (Eurostat, 2020).

As noted earlier (see administrative burden on businesses), it is assumed that over a 20-year period between 260 and 520 installations may seek this exemption each year, additional to the baseline. This would imply an average of €0.1 to €2 million in additional costs each year spread across public authorities in the EU, with a central estimate of around €0.3 million each year. These costs are, therefore, unlikely to be significant, although it will depend on the number of IED operators that require deep transformation and finally decide to seek this exemption.

Other, potentially lower costs may be incurred earlier on to develop and establish a clear and consistent process for considering these requests across the EU.

Environmental impacts

Overall, this measure is likely to have **weakly positive impacts on the environment** when compared to the baseline, although these will depend upon the take up of this derogation by operators and the type and depth of the transformation of their industrial processes, potentially earlier than otherwise expected in the baseline.

Climate

This measure is likely to lead to **weakly positive impacts** on the climate. The scale of these impacts will depend upon the number of operators that seek to delay their implementation of BAT consultations whilst they focus on deep transformation.

Air quality and other environmental impacts

This measure is likely to lead to **limited to weakly positive impacts** on air quality; water quality and resources; soil quality or resources; waste production, generation and recycling; and the efficient use of resources.

The scale of environmental impact across these categories will depend upon how whether deep transformation yields co-benefits across these environmental dimensions and the extent to which

the delay in implementing BAT conclusions is used to identify even more cost-effective industrial techniques.

Social impacts

This measure is likely to result in a **limited to weakly positive impact** on employment. The measure might create jobs engineering and constructions sectors, and regulatory affairs -to engage with any process seeking more time or derogation to implement BAT conclusions to focus on deep transformation-. However, expected increases in costs of doing business may put pressure on operators to identify efficiencies including but not only by reducing employment.

Measure 22: Establish a permit review obligation by 2030 that focusses on the capacity of the installations to operate in accordance with the EU's general zero pollution, circular economy and climate objectives.

Description of the measure and requirements for implementation

This measure would require operators of IED installations to produce Transformation Plans for consideration as part of this permit review process. The outputs of this review would be written into the updated permit. As an alternative, Transformation Plans could be integrated in the Environmental Management System (without the permit review), which would be audited without the engagement of public authorities.

The ambition is for this measure to encourage sharing information and planning actions that would contribute towards achieving the EU's general objectives, especially for climate. As part of the permit review process expected by 2030, some or all of the transformation plan will be entered into the permit.

For example, an operator of an IED installation proposes as part of its transformation plan to move from using gas-fired to renewable electricity by 2040. This would, therefore, be entered into the updated permit. This updated permit would provide a legal anchor and allow competent authorities to hold businesses accountable through monitoring, reporting and enforcement activities, increasing therefore the likelihood of implementation of the proposed measures.

The nature of the transformation plans is expected to change significantly by sector and installation. Therefore, there is no ambition to provide a detailed, one-size fits all template or even requirements. Rather, the intention is to promote the development of tailored plans that can increase the likelihood of operators taking actions that would contribute towards 2050 targets and avoiding a cliff-edge scenario in the late 2040's.

Some sectors, such as livestock production/ pigs and poultry, may be exempt from this measure as their contribution to direct decarbonisation are expected to be limited in comparison to other sectors.

Objectives:

The measure will encourage IED installations to align further with EU's general objectives, especially in relation with zero-pollution and decarbonisation. This measure will, therefore, contribute to the general objective of achieving carbon neutrality in the EU, and more specifically, support the decarbonisation of the (agro-)industrial sectors covered by the IED.

Implementation needs:

- The EU to clarify the requirements and process for setting and considering transformation plans e.g. via a Commission Decision addressing aims, objectives and expected contents possibly around 2030.
- Operators to develop, within a five-year timeframe, a transformation plan, seeking to align with and contribute to achieving EU general objectives.
- Competent Authorities and Operators to engage with the permit review process or Operators integrate Transformation Plans in EMS – without engaging public authorities.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **negative economic impacts** when compared to the baseline, although this will depend upon the number of permit reviews that are additional to the baseline, the extent to which operators and public authorities bring forward their efforts to transform IED operations, both in terms of planning and implementation, and any additional monitoring, reporting and enforcement requirements.

Administrative burden on businesses

This measure is likely to lead to **negative impacts** on administrative burden on businesses. Annual administrative costs for operators of IED installations are associated with:

- Engaging with the permit review.
- Producing the transformation plans (by most if not all operators). Whilst it is expected that a large number of sites will produce plans as a matter of business as usual, the timing of those plans is unclear and, to date, there is progress in developing sectoral roadmaps but there are a limited number of plans at installation level.
- Carrying out additional monitoring, reporting and enforcement activities.

This measure is focussed on existing installations, with the exception of the IRPP farming sites (which numbered approximately 20 000 [2015 figures], but is anticipated to grow if IED Measures 31-33 are adopted). Thus, around 32 000 IED installations (non-IRPP) of the present total 52 000 installations would require to review their permits and produce transformation plans by 2030. There is an uncertainty as to how many of these installations would already engage in a permit review during this period and, therefore, these costs would not be additional to the baseline in every case. It is, therefore, assumed that between 40%-100% of these costs could be additional to the baseline, although these may represent an upper bound.

Transformation Plans are likely to yield one-off administrative costs. These costs would depend upon the level of preparation by IED operators in the baseline. It is likely that some operators already have developed plans and/or have started considering how they might need to transform to adhere to the EU's environmental objectives. It has been assumed that producing a plan could require between 40 to 300 worker hours, in line with other activities that require effort from operators to produce and present evidence to public authorities. That is, operators may spend between €1 100 and €8 550 in administrative costs to produce these plans, assuming an hourly labour cost of around €29 (Eurostat, 2020). These additional costs would affect 32 000 installations and could, therefore, range between €3 million to €22 million each year, on average, over the period of 20 years, with a central estimate of €4 million.

Further, these plans would bring additional effort required for operators in activities such as monitoring and reporting and hosting inspections. The scale of this additional effort is uncertain, however, an additional 5% over the baseline is assumed.

As a result of this additional burden from the additional permit reviews and updates, producing the transformation plans, increasing effort on monitoring and reporting and inspections, this measure could imply an additional cost of €5 million to €140 million each year, on average, over the 20-year period, and a central estimate of around €50 million. These estimates are highly dependent on the extent to which these administrative activities are partially or completely to the baseline, especially for producing transformation plans and carrying out the permit reviews.

The alternative, i.e. integration of the Transformation Plans with the EMS would result in significant reduction in administrative costs – while costs of preparing the plans will remain stable (€4 million/year), operators will not need to face the permit review process. Monitoring, data management and inspection costs will be integrated with the EMS obligations, leaving the total admin costs for the operators at the €20 million/year.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. Operators of IED installations are already committed to transforming their business under the climate neutrality plan. However, these plans may encourage more ambition and/or the earlier introduction of transformative measures, which could require bringing forward higher levels of capital and operating expenditure. This is, however, uncertain and dependent upon technological progress and other exogenous factors.

Competitiveness and level playing field

This measure will likely lead to **limited to no impacts** on competitiveness, and **weakly positive impacts** on levelling the playing field. This measure alone is unlikely to lead to such significant costs that would impair the competitiveness of businesses in a global context, although it would depend to a large extent on the ambition of the transformation plans. The measure will result in a more consistent approach across the EU when compared to the baseline, although a tailored (and thus differential) approach in developing and implementing these plans is expected.

Position of SMEs

This measure is likely to lead to **weakly negative impacts** on the position of SMEs. Transformation plans are expected to be tailored to the installations' circumstances; however, producing these plans will have fixed costs that may be disproportionately affect SMEs when compared to larger businesses (i.e., costs per employee may be significantly higher for SMEs than larger businesses). This remains uncertain.

Innovation and research

This measure is likely to have **limited direct impacts** on research and development, even though developing transformation plans may encourage businesses to consider new and innovative techniques for deployment.

Public authority impacts

This measure will likely lead to **negative impacts** on public authorities. Competent Authorities would engage with the permit reviews, which would include the review and consideration of the transformation plans developed by IED operators, and potentially more resources may be devoted to inspection and other compliance activities that would check that the transformation plans are being implemented by operators in line with the established plans.

As noted earlier (see administrative burden on businesses), this measure is focussed on existing installations, assumed at 52 000, all of which would require to review their permits and produce Transformation Plans by 2030. There is an uncertainty as to how many of these installations would already engage in a permit review during this period and, therefore, these costs would not be additional to the baseline in every case. It is, therefore, assumed that between 40%-100% of these costs could be additional to the baseline, although these may represent an upper bound.

Operators would be required to produce transformation plans and increase their monitoring and reporting efforts. Public authorities would need to engage with this increase in information exchange and compliance requirements. The impact on costs is uncertain, but it is assumed that an additional 10% over baseline costs is likely, especially for managing the information received, maintaining systems and leading inspections.

As a result of this additional burden from the additional permit reviews and updates, reviewing transformation plans and managing the additional information received from operators and leading more complex inspections, this measure could imply an additional cost of €4 million to €90 million each year, on average, over the 20-year period, and a central estimate of around €50 million. These estimates are highly dependent on the extent to which these administrative activities are partially or completely to the baseline, especially for producing transformation plans and carrying out the permit reviews.

The alternative, i.e. integration of the Transformation Plans with the EMS would leave public authorities with no costs as they will be relieved from the permit review task. Verification and compliance with the Transformation Plans will be left to the EMS auditors.

Environmental impacts

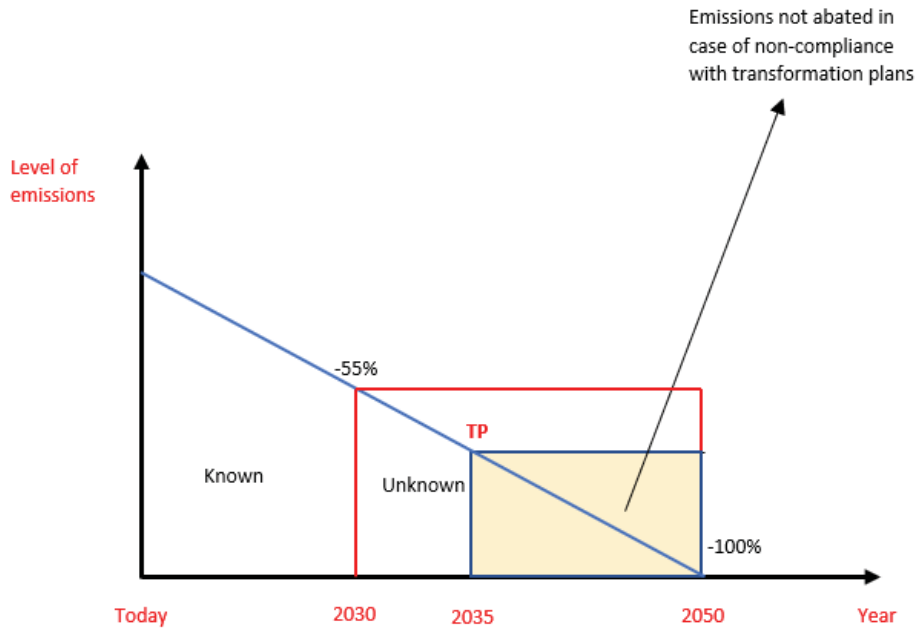
Overall, this measure is likely to have **positive impacts on the environment** when compared to the baseline, although these will depend on the ambition of the transformation plans and how rapid these lead to positive changes in the way businesses operate and their environmental performance.

Climate

This measure will likely lead to **weakly positive to positive impacts** on climate. Assessing the scale of impact is, however, complex given the uncertainty inherent to tailored transformation plans.

The E-PRTR data provides a starting point for GHG emissions so far. Further, the fit for 55 programmes developed by DG CLIMA[27] provide a projection for how emissions may evolve into the future. Figure A8-20 illustrates how transformation plans may contribute towards achieving the EU's climate objectives.

Figure A8-20: Emissions reductions via Transformation Plans



The level of emissions is set on the y-axis, while the years are represented on the x-axis. The graph thus shows how the level of greenhouse gas emissions is expected to change over the years, considering the EU climate obligations to be delivered through the 'EU Fit for 55' package of proposals[28]. The emissions' reduction target of 55% by 2030 with respect to 1990

[27] The fit for 55 programmes
[28] https://EU.europa.eu/info/sites/default/files/chapeau_communication.pdf

levels considered in the EU ETS inception IA[29] is 'known', and the 2050 climate neutrality target is added. The remainder 45% of emissions ('unknown') are to be addressed ahead of 2050 and, therefore, transformation plans could play a part in contributing to emissions reductions in the (agro-)industry. The yellow square would, therefore, represent the upper bound of greenhouse gas emissions that would not be abated if industry were not to comply with the transformation plans.

Evidence from previous policy targets suggests that without multiple actions that would contribute to achieving them, including in this case the requirement to produce and implement transformation plans by IED installation operators, it is possible that Member States are unable to reach the established targets.

This measure would, therefore, contribute to increasing the likelihood that the EU's climate objectives are indeed achieved. The measure is not expected, however, to reduce emissions against a Fit For 55 baseline, but rather reduce the risk of not reaching the targets.

For example, seven MS failed to comply with air quality pollution legislation[30] (roughly ¼ of EU). The project team is considering how this evidence may be used to forecast emissions that may not abated in the absence of transformation plans – the yellow section in the figure above.

Further indirect benefits may be expected from the information exchange and process of developing the content of the plan, such as identifying trends and gaps in different sectors. For example, this information could be used to urge countries lagging behind to take further action.

Air quality

This measure is likely to result in a **weakly positive to positive impact**s on air quality, by complementing existing (EU ETS) market incentives thus contributing to further reductions in GHG emissions from the (agro-) industrial activities. The extent to which further GHG emission reductions would accrue will depend on the transformation plans and associated ELVs.

Other environmental impacts

This measure will likely have a **weakly positive to positive impacts** on water quality and resources; soil quality and resources; waste production, generation and recycling; and the efficient use of resources, as transformation plans will be produced in accordance with the EU's general zero pollution, circular economy and climate objectives.

Social impacts

This measure specifically is likely to result in a **limited to weakly positive impacts** on employment. Even though Member State Competent Authorities would face additional review obligations, this is not expected to require significant changes to employment when compared to the baseline.

[29] https://EU.europa.eu/info/law/better-regulation/have-your-say/initiatives/12660-Climate-change-updating-the-EU-emissions-trading-system-ETS-_en

[30] https://eeb.org/half-of-eu-governments-fail-to-deliver-a-plan-to-cut-air-pollution/

Summary of Problem Area 2 measures

For the measures presented in problem area 2, **Table A8-14** summarises the Economic, environmental and social impacts of the measures using the qualitative ratings. Overall, these policy measures would yield limited to negative economic impacts in the shorter to medium term, positive environmental impacts and limited social impacts. These impacts have been assessed using a qualitative scoring approach and a summary is provided below. This suggests that, as a response to these policies, IED operators may incur some direct economic costs to improve their environmental performance through the development, testing and implementation of more innovative techniques and technologies and/or transformative measures.

Table A8-15 similarly uses qualitative ratings to summarise costs and benefits for measures in problem area 2. Overall, it appears that expected costs and benefits associated with the six measures retained to encourage the adoption of innovative techniques appear are balanced. The benefits are largely uncertain as they depend on the outcomes of technical processes and investment decisions by operators. In this case, the analysis primarily qualitative.

Table A8-14: Summary of economic, environmental and social impacts-measures in Problem Area2

Policy measures	Economic impacts	Environmental impacts	Social impacts (employment focus)
#17	×	✓	O
#18	×	✓	O
#19	×	✓	O
#20	×	✓✓	✓
#21	×	✓	O
#22	××	✓✓✓	✓
#22 alternative	×	✓✓✓	✓

Finally, measure #20 is likely to be more balanced than measure #19, especially as it could be more efficient in delivering additional environmental protection. Measure #22 is considered an alternative to measure #21, and it is not only likely to be more favourably balanced but also the scale of the potential positive impacts that this measure could have are likely to be significantly higher than for measure #21.

Table A8-15: Summary of costs and benefits for measures in problem area 2, with central estimates of administrative costs for businesses and public authorities shown

Policy measure	Administrative costs – businesses (€m/yr)	Administrative costs – public authorities (€m/yr)	Overall costs	Overall benefits
#17	0.4	0.2	✗	✓
#18	0.6	0.3	✗	✓
#19	3.2	5.3	✗	✓
#20	3.2	4.5	✗	✓✓
#21	0.6	0.3	✗	✓
#22	50	50	✗✗	✓✓✓
#22 alternative	20	0	✗	✓✓✓

Problem Area 3: The IED has not been effective at addressing the use of hazardous chemicals, resource efficiency or the circular Economy

There are four measures shortlisted to address the problems, drivers and consequences associated with this problem area. For example, the IED's design and implementation to date have not prioritised resource efficiency and, as a result, the IED has not been effective in contributing to improving resource efficiency and the circular Economy.

We have structured these measures based on the specific problems they are trying to tackle and provide a description, outline the requirements for implementation and a rapid assessment of their impacts. Following this, we provide an overview of the economic, environmental, and social impacts supported by evidence.

Measure 23: Introduce an option for Technical Working Group (TWG) to set either binding resource efficiency and circular economy BAT-AEPLs or indicative performance levels.

Description of the measure and requirements for implementation

The binding nature of BAT-AELs is specified in IED Article 15(3):

> *The competent authority shall set emission limit values that ensure that, under normal operating conditions, emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions referred to in Article 13(5) through either of the following:*
>
> *(a) setting emission limit values that do not exceed the emission levels associated with the best available techniques. Those emission limit values shall be expressed for the same or shorter periods of time and under the same reference conditions as those emission levels associated with the best available techniques; or*
>
> *(b)(b) setting different emission limit values than those referred to under point (a) in terms of values, periods of time and reference conditions.*
>
> *Where point (b) is applied, the competent authority shall, at least annually, assess the results of emission monitoring to ensure that emissions under normal operating conditions have not exceeded the emission levels associated with the best available techniques.*

This is complemented by a possibility for derogation in cases of disproportionately higher costs compared to the environmental benefits due to the geographical location or the local environmental conditions of the installation concerned; or the technical characteristics of the installation concerned, in Article 15(4).

The measure proposed here intends to bring the status of the BAT-AEPLs (other than BAT-AELs)[31] in line with this of BAT-AELs, i.e. to set the same requirements for associated consumption, reuse/recovery/recycling, level of substitution of primary materials and fuels by secondary sources/renewables, and other environmental performance levels. It would be made possible for the BREF TWG to determine binding BAT-AEPLs, to be transposed into respectively consumption limit values, reuse/recovery/recycling limit values, substitution limit values or environmental performance limit values in the permits or in the general binding rules. This could be done, e.g. by amending article 15(3) to include (all) environmental performance levels associated with BAT.

However, similar to emission KEIs covered by BREFs, there is a possibility to set indicative resource efficiency and circular Economy levels, e.g. when there is large variability in the data due to important differences in products manufactured, or when one KEI is much more important than another (like in the case for NO_X and CO emissions in many processes). That is, it is a decision of the BREF TWG, case by case per individual KEI, to either determine a BAT-AEPL that is binding, or determine a non-binding indicative/target level.

The inclusion of BAT-AEPLs in Article 15(3) would raise the question whether BAT-AEPLs would be subject to a derogation procedure such as contained in Article 15(4) also apply to BAT-AEPLs.

Concerning the existing BAT-AEPLs derived under the IED (or under the IPPCD), there are two main options to consider, the first one being preferred:

1. Similar to the BAT-AELs derived under the IPPCD, when this directive was replaced by the IED, the existing IED BAT-AEPLs would not be given this explicitly binding status (in the same manner as BAT-AELs). Only a review of a BREF and its BAT conclusions would render the BAT-AEPLs binding.
2. Existing BAT-AEPLs would become binding in the same manner as BAT-AELs via the update of the IED, immediately (4 years after publication of the BAT conclusions), or after a certain transition period.

Objectives:

- More circular resources (i.e. renewables and secondary raw materials).
- More level playing field, more consistent/homogeneous implementation.
- Increased importance of BAT-AEPLs other than BAT-AELs.

This measure will, therefore, contribute to the general objective of transforming the EU into a circular Economy and, more specifically, contributing towards the transition to a more circular Economic model for the EU in the short-to-medium term.

Implementation needs:

[31] From here on, when discussing the consideration if binding BAT-AEPLs, it is implied that this concerns those other than BAT-AELs, except where otherwise mentioned.

- EU to introduce changes, e;g. to article 15(3) of the IED legislation, to include similar requirements for BAT-AEPLs other than BAT-AELs, see description above. This will require monitoring and reporting of other environmental performance levels in the same manner as for the emission levels.
- EU to produce guidance for competent authorities and installation operators on how to interpret and implement BAT-AEPLs other than BAT-AELs, where necessary.
- All stakeholders to continue, and potentially increase attention, for data collection and analysis on consumption, reuse/recycling, and other environmental performance levels during the information exchange.
- There may also be a prerequisite to expand the IED operator obligations in article 11 −currently referring to pollution, waste and energy efficiency−, with water and materials efficiency. Furthermore, requirements for resource efficiency and environmental performance limit values could be added to the current permit conditions in article 14(1).

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, although this will depend upon the take up of binding BAT-AEPLs.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses. IED operators are likely to be affected by increased administrative burden from more elaborate data monitoring and reporting, collection and validation within the BREF process, in preparation of permit reconsiderations and/or updates and engaging with inspection activities.

For example, this may include more compliance monitoring to prove that the installation operates within quantitative boundaries of the permit (environmental performance limit values such as resource consumption limit values or substitution levels of primary raw materials and non-renewables) and more reporting to feed into the BREF information exchange and/or national and EU databases on industrial resource consumption.

These increases in burden will be marginal. This is because the BAT-AEPLs set in BAT conclusions are already the reference for setting the permit conditions according to article 14(3), and because, generally, recent BAT conclusions already include specific plans to monitor and manage resource efficiency of water, energy and certain materials (including chemicals) that are relevant for the sector.

Other measures or initiatives that aim to lighten the administrative burden through more harmonized and user-friendly reporting requirements and tools (e.g. more coherence between E-PRTR and BREF information exchange) could also limit the increase in administrative burden.

No significant changes in long term (2050 vs. 2025) to be expected: once introduced, monitoring and reporting obligations will remain similar.

These additional administrative activities would generally make existing processes more resource intensive, thus increasing their unit costs. It is challenging to make a quantitative estimate of this additional burden. This depends on:

- The burden per binding BAT-AEPL set, but also on the number of BAT-AEPLs for an activity/sector, which can vary between sectors. The mere introduction of binding BAT-AEPLs itself could also change the number of BAT-AEPLs set, due to increased importance of, and thus interest in, resource efficiency data and quantitative information on the use of renewable and secondary resources.
- The baseline of installations located in a country/region where BAT-AEPLs are already implemented as binding is unclear. Responses to the TSS indicate that in many MSs they are used as (non-binding) benchmark values. Even in the latter case, here will be little to no additional administrative burden because the information collection and sharing with the competent authority is already part of the permitting process.
- The baseline of installations that have resource efficiency and circular Economy performance that is within the range of already set BAT-AEPLs. The 'Assessment of BAT conclusions implementation in IED Permits' study commissioned by DG ENV might provide better insight in this.
- The administrative burden associated with any derogation procedure will presumably be at least as significant than that of the permitting itself.

Expert-based assumptions, developed through engaging with stakeholders, suggests that in the baseline:

- 40% of operators are already subject to a binding implementation of BAT-AEPLs by competent authorities, or there is no BAT-AEPLs for their activities, meaning there is no increase in administrative burden for these businesses;
- 40% of operators are currently subject to permit conditions for which the BAT-AEPLs were used as benchmark/target values, meaning there would be only a minor increase in administrative costs due to increased permit application, compliance reporting and inspection;
- 20% of operators are currently either not subject to any permit conditions based on the BAT-AEPLs, or would need to apply for an article 15(4)-like derogation, meaning the increase in administrative costs could be significant.

Based on this evidence, it is assumed that at least 25% of the IED operators or around 13 000 operators may consider setting BAT-AEPLs as part of their baseline permit reviews, that is, no additional permit reviews would be expected. Nevertheless, these permit reviews and associated

sectoral BREF reviews may require more effort from operators as a result of this measure. Further, when permit conditions are set based on BAT-AEPLs, effort from operators on monitoring, reporting and compliance-related activities may also increase.

It is assumed that when these 13 000 operators engage in permit reviews, they would be doing so in an environment where the status of the BAT-AEPLs (other than BAT-AELs) is more aligned with this of BAT-AELs and the additional effort required would be 5% more than in the baseline. Similarly, the contribution of operators to the BREF process may also increase around 5%, and an additional 5% of administrative costs may also be incurred due to more demands on monitoring, reporting and supporting public authority-led inspections.

As a result, additional administrative costs could reach between €0.3 million and €11 million each year, on average, with a central estimate of around €7 million each year over a period of 20 years. These costs are estimated to be an upper bound and highly uncertain, as they generally depend on the final number of IED installations affected by binding BAT-AEPLs over the baseline.

Industry responses to the TSS suggest that a one-size-fits-all approach would not be welcome and point to the complexity of implementation and compliance, increasing administrative costs. Respondents also pointed to the IED Article 9 exemptions, to a court ruling that inhibits energy efficiency requirements to be set in permits to avoid double regulation, and to voluntary energy efficiency agreements at national level.

Finally, in the TSS, industry was also asked about the impact of binding BAT-AEPLs on employment, consumer prices, EU competitiveness, EU market share and trade with third countries. More than 75% of industry indicated a significant reduction or reduction for these parameters (and increase for consumer prices). This could be due to increased administrative costs or, rather, to additional operating costs. The latter seems more probable.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. For those cases where BAT-AEPLs other than BAT-AELs are, at this time, not implemented as binding in the same way as BAT-AELs, often additional investments would be needed to ensure complete compliance (i.e. without any exception, apart from OTNOC) to these BAT-AEPLs.

Because these investments are mainly aimed at resource efficiency, they might sometimes lead to reductions in operational costs. It can be expected that some of the techniques used/installed to meet the BAT-AEPLs will pay back over time, within their Economic lifetime. However, this might not be the case for the substitution of fossil and primary resources by renewable and secondary ones.

The long-term trend is hard to anticipate. This will depend in large part on whether the investment costs decline due to technological advances, and the evolution of resource costs. This may be relevant for long-term comparison, e.g. if the cost of water were to double by 2050,

techniques saving water would pay back much quicker. For example, the total cost of the energy system per unit of final consumption is expected to increase 2,0% per year between 2010 and 2030, and 0,8% per year between 2030 and 2050. On the other hand, if costs of primary resources and materials typically used in infrastructure (steel, cement, polymers, etc.) go up, the investment cost would rise more than the potential operational savings.

A quantitative assessment would require a clear understanding of the share of installations that exceed BAT-AEPLs, and what number of BAT-AEPLs they exceed. Combined with information on average investment costs and operational costs or gains. These can vary widely, and there is no reliable data on the specific costs related to binding BAT-AEPLs, as compared to non-binding BAT-AEPLs. It would not be accurate to extrapolate costs associated with the historic change of the BAT-AEL status, because much more than emissions, resources already come at a cost to operators, which causes them to already limit their consumption to a certain extent.

Industry was asked in the TSS about the impact of binding BAT-AEPLs on employment, consumer prices, EU competitiveness, EU market share and trade with third countries. More than 75% of industry indicated a significant reduction or reduction for these parameters (increase for consumer prices). This could be due to increased administrative costs or, rather, to additional operating costs. The latter seems to be more probable.

Competitiveness and level playing field

The implementation of this measure is likely to have **limited to no impacts** on competitiveness. The cost of doing business might, in some cases, go up (see 'operating costs and conduct of businesses (industry)' above). However, there is no strong indication this would have a significant effect on competitiveness. On the contrary, if one compares with the (absent) effect of the binding BAT-AELs under the IED on competitiveness, it could be expected that there will be no or only a limited impact from the updated BAT-AEPL status. What distinguishes BAT-AEPLs on resource consumption is that they limit resource consumption, and therefore operational costs for these resources. This might, however, probably not be the case for the substitution of fossil and primary resources by renewable and secondary ones,

This measure is likely to have **limited to weakly positive impacts** on levelling the playing field. The measure is primarily aimed at promoting a more level playing field in the EU, so there will be a positive impact for this aspect. This is further emphasized by the many responses from all stakeholder groups that point to the oft-occurring cross-media effects between emission control and resource consumption. One could argue that there is currently a risk that a level playing field is not respected, when only emission levels are binding, and thus implemented similarly, while resource efficiency levels are not.

Position of SMEs

This measure is likely to lead to **weakly negative impacts** on the position of SMEs. Although the increased administrative burden for industry will be larger for large and complex installations in absolute terms, relative to the number of employees or turnover, the increased burden will be

larger for SMEs. This is because the additional administrative and operational impacts, including but not only associated with monitoring and reporting, demonstrating compliance, and achieving permit limit values include a significant shared of fixed effort.

Innovation and research

This measure may have a **weakly positive impact** on research and development. The IED evaluation concluded that the IED, BREFs and BAT conclusions have stimulated innovation, the BAT conclusion being indicated as the most important driver (more so than requirement to hold permit, monitoring and reporting requirements, enforcement, and the emerging techniques chapters of BREFs). Similar to the effect caused by the strictly binding BAT-AELs set under the IED, an updated strictly binding status of BAT-AEPLs would further drive innovation efforts. However, the magnitude of this impact is uncertain, not only because BAT-AEPLs are already implemented in this way in some Member States.

Public authority impacts

This measure is likely to have a **weakly negative impact** on public authorities. There are some cases where BAT-AEPLs other than BAT-AELs are presently not implemented as binding in the same way as BAT-AELs. Thus, for these cases, additional administrative efforts by public authorities would be needed for setting environmental performance levels in general binding rules or in individual permits that do not exceed the BAT-AEPLs, enforcing them, collecting and checking data during the BREF process.

If the possibility of derogations is included in the legislation, this could also lead to additional derogations, meaning more administrative efforts from public authorities as well. The administrative costs associated with derogations are assumed to be at least as significant as that of the permitting itself.

As set out earlier (see administrative burden on businesses), it is assumed that at least 25% of the IED operators or around 13 000 operators may consider implement measures for operators to achieve the required BAT-AEPLs as part of their baseline permit reviews, that is, no additional permit reviews would be expected. Nevertheless, these permit reviews and associated sectoral BREF reviews may require more effort from operators as a result of this measure. Further, when permit conditions are set based on BAT-AEPLs, effort from operators on monitoring, reporting and compliance-related activities may also increase.

Based on this evidence, it is assumed that when these 13 000 operators engage in permit reviews, they would be doing so in an environment where the status of the BAT-AEPLs (other than BAT-AELs) is more aligned with this of BAT-AELs and the additional effort required from public authorities would be 5% more than in the baseline. Similarly, the contribution of public authorities to the BREF process may require around 5% more effort, and an additional 5% of administrative costs may also be incurred due to more demands on maintaining information and systems, and leading and managing inspections.

As a result, additional administrative costs could reach between €0.7 million and €8 million each year, on average, with a central estimate of around €6 million each year over a period of 20 years. These costs are estimated to be an upper bound and highly uncertain, as they generally depend on the final number of IED installations affected by binding BAT-AEPLs over the baseline.

The responses to the TSS also indicate that competent authorities expect an increase in administrative costs from clarifying the status of BAT-AEPLs. On a scale of -1 to 1 (reflecting answers ranging from >15% decrease to >15% increase), the score for compliance, enforcement and inspection are between 0.4 and 0.5 for national authorities, while between 0 and 0.2 for local/regional authorities. The score for permitting is between 0.2 and 0.3 for both national and local/regional authorities.

Environmental impacts

Overall, this measure is likely to have **limited to weakly positive impacts on the environment** when compared to the baseline, although these will depend upon the additional take up of binding BAT-AEPLs and the associated ambitions.

Climate

This measure may result in a **weakly positive impact** on climate. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges.

Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances. Mainly BAT-AEPLs on energy consumption and on consumption of materials with inherently large ecological footprint will have an indirect impact on emissions of GHGs. This is true especially in longer term if energy and materials consumption AEPLs are derived for more sectors.

Air quality

This measure is likely to result in a **limited to no impact** on air quality. The implementation of this measure will have no significant impact on air quality. There may be indirect benefits from reduced consumption of energy or materials.

Water quality and resources

This measure is likely to result in a **limited to no impact** on water quality. A significant impact on water quantity is expected. The report 'Summary on IED contribution to water policy' (Ricardo, 2018) describes a number of water consumption or effluent AEPLs derived under the IPPCD or IED. Making the AEPLs binding in future revisions will impact water consumption. This is true especially in longer term if water consumption AEPLs are derived for more sectors. However, this is not taken into account for the effect and robustness below, because this aspect is already covered by the area 'Efficient use of resources' below

Soil quality or resources

There is **no significant impact** on releases to soil from the implementation of this measure.

Waste production, generation, and recycling

This measure may lead to **weakly positive impacts** on waste production, generation, and recycling. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges. Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances.

Mainly BAT-AEPLs on waste generation or material reuse/recycling will have an impact. This is true especially in longer term if waste generation or recycling/reuse AEPLs are derived for more sectors. Furthermore, at the Economy level, impacts on waste production, generation and recycling is closely linked to impacts on efficient use of resources. Reducing, recycling or reuse of waste or by-products in the own installation or sector, or in another installation or sector, improves material resource efficiency at the Economy level. Impacts for individual installations or even sectors can however vary significantly.

Efficient use of resources

This measure is likely to have **weakly positive to positive impacts** on the efficient use of resources. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges. Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances (e.g. higher resource consumption, lower level of substitution of primary materials and fossil energy sources).

As highlighted previously (see administrative burden on businesses), resource efficiency measures are likely to have been implemented by operators for Economic reasons. This was also stated by many industry respondents in the TSS. On the contrary, specifically for water consumption, evidence provided by an NGO stakeholder suggested that there is potential for improvement, highlighting that cooling in energy generation using around 18% of total water consumed in Europe. Furthermore, industry consumes large amounts of electricity (35%-40%), which puts additional pressure on water resources both directly and indirectly (Use of freshwater resources in Europe — European Environment Agency (europa.eu)). The NGO stakeholder also reported a lack of water fees for the coal industry in a number of Member States, thereby lacking incentives for the efficient water use.

In addition, this measure may have an impact on the substitution of fossil and primary resources by renewable and secondary ones, which does not appear as advanced in the baseline. An important restriction for setting (ambitious) binding BAT-AEPLs or resource substitution is that

availability of secondary resources, i.e. by-products or (former) waste, changes over time. If BAT-AEPL ranges are too high or too narrow, compliance would become an issue if insufficient alternative recovered, recycled or renewable materials are available on the market. For example, in the cement focus group, it was highlighted that it is expected that availability of by-products both from iron and steel blast furnaces and from coal-fired power plants will sharply decrease due to decarbonisation trends.

The BAT-AEPLs other than BAT-AELs are in the BREF process already derived in the same manner as the BAT-AELs, although not all of the resources consumed were considered KEI in all BREFs, and fewer BAT-AEPLs have been derived per BREF/sector, compared to BAT-AELs. In longer term, it can be expected that improved monitoring and reporting and data collection efforts will lead to more BAT-AEPLs on specific resource consumption or substitution of primary or fossil resources.

The evidence available to quantify these impacts is limited. In fact, there is no reliable data on the share of primary, natural resources used by (heavy) industry covered by BAT-AEPLs. However, it is expected that in most/all sectors there are either no BAT-AEPLs, or only one or a few BAT-AEPLs which are typically restricted to specific processes and materials or types of residues/waste, or to water or energy efficiency, as described in the reports 'IED Contribution to the circular Economy' and 'Summary on IED contribution to water policy'. It is, therefore, assumed that this share is low, and a high-level estimate based on expert judgment would suggest that binding BAT-AEPLs could reduce energy consumption levels on average by up to 20% for those processes/resources covered by BAT-AEPLs. This would mean that the BAT-AEPLs could reduce energy consumption by heavy industry by up to 10%.

Similarly for water, consumption levels would decrease on average by up to 20% for those processes/resources covered by BAT-AEPLs, and thus by up to 4% overall for IED industry. For material consumption and waste generation, this is too difficult to estimate based on available data, but it could be assumed that the improvements are smaller compared to energy and water because of a higher diversity. These impacts can vary significantly per sector, depending on the share of resource consumption covered by BAT-AEPLs, and on the untapped potential for lowering the specific resource consumption or increasing substitution or primary or fossil input. As mentioned above, the long term impact may be larger, due to a possible increase in BAT-AEPLs and benchmark levels derived because of better data monitoring and reporting.

In the TSS, depending on the type of natural resource, 75%-80% of industry responded that binding BAT-AEPLs would not impact resource management, while 80%-100% of Environmental NGOs responded that they would lead to a significant improvement. Public authorities' responses were in between, about half of them expecting a moderate to significant improvement. Respondents from all stakeholder groups refer to the non-binding implementation in many cases, some pointing absence from article 15(3) requirements, the article 9 exemptions, to a court ruling that inhibits energy efficiency requirements to be set in the permit to avoid double regulation, and to voluntary energy efficiency agreements at national level.

Social impacts

This measure is likely to result in a **limited to no impact** on employment. In general, progression towards a more circular Economy causes sectors that produce and process raw materials to decline in size, while the recycling and repair sectors will experience additional growth. The overall effect on employment across all sectors is unclear/ambiguous, but the effect for IED installations, which typically belong to sectors that produce and process raw materials will be negative.

Measure 24: Introduce an option for Technical Working Group (TWG) to set resource efficiency and circular economy benchmark levels, in addition to binding BAT-AEPLs and indicative levels.

Description of the measure and requirements for implementation

This measure expands on measure #23, an alternative, with the inclusion of a definition of 'benchmark levels' in the IED. An IED article will require that the operators' EMS shall address (at least) those KEIs for which benchmark levels have been derived. This includes monitoring of the installation's performance, comparing to and checking against the benchmark levels, and setting up actions for continuous improvement of the performance. The requirements for such EMS, and more specifically for its provisions on a RE & CE plan and a CMS, are described in measure (25).

Compared to measure #23, this provides a BREF TWG more options, to derive either:

- BAT-AEPLs, which would be binding through permit conditions or general binding rules;
- Benchmark levels (associated with BAT), for which the inclusion in the EMS is obligatory. These can be chosen e.g. when there is large variability in the data due to important differences in products manufactured, or when one KEI is much more important than another;
- 'indicative' resource efficiency and circular Economy levels, which should be the least preferred option for a TWG because their legal status would not be set in the IED or the BREF guidance.

The introduction of benchmark levels creates an opportunity to improve implementation of past BAT-AEPLs derived under the IED, or possibly even under the IPPCD. They can, retroactively, be assigned the status of benchmark levels, meaning it would become obligatory to address them in the EMS, which would incentivise operators to investigate further improvement potential. Any review of a BREF and its BAT conclusions could then either reconsider and update the benchmark levels, or convert them into binding BAT-AEPLs if this is deemed preferable by the TWG.

Objectives:

- More circular resources (i.e. renewables and secondary raw materials).
- More level playing field, more consistent/homogeneous implementation.
- Increased importance of BAT-AEPLs other than BAT-AELs and of benchmark levels.

This measure will, therefore, contribute to the general objective of transforming the EU into a circular Economy and, more specifically, contributing towards the transition to a more circular Economic model for the EU in the short-to-medium term.

Implementation needs:

- EU to introduce changes to article 15(3) of the IED legislation to include similar requirements for BAT-AEPLs other than BAT-AELs, see description above. This will require monitoring and reporting of other environmental performance levels in the same manner as for the emission levels.
- EU to produce guidance for competent authorities and installation operators on how to interpret and implement BAT-AEPLs other than BAT-AELs, where necessary.
- EU to introduce an article in the IED setting the legal status of benchmark levels (associated with BAT), and their obligatory inclusion in the operator EMS.
- EU to update the BREF guidance to include benchmark levels (associated with BAT).
- All stakeholders to continue, and potentially increase attention, for data collection and analysis on consumption, reuse/recycling, and other environmental performance levels during the information exchange.
- There may also be a prerequisite to expand the IED operator obligations in article 11 −currently referring to pollution, waste and energy efficiency−, with water and materials efficiency. Furthermore, requirements for resource efficiency and environmental performance limit values could be added to the current permit conditions in article 14(1).

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, although this will depend upon the take up of binding BAT-AEPLs and the additional number of operators that would now have benchmark levels (associated with BAT) included in their EMS.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses. Similar to measure #23, IED operators are likely to be affected by increased administrative burden from more elaborate data monitoring and reporting, collection and

validation within the BREF process, in preparation of permit reconsiderations and/or updates and engaging with inspection activities.

The additional administrative activities would generally make existing processes more resource intensive, thus increasing the burden. A similar magnitude of administrative costs for operators would be expected when compared to measure #23, although there might be differences in terms of how the operators would be affected. Compared to measure #23:

- There would be no or only a negligible difference in permit review costs, because both BAT-AEPLs and benchmark levels would be part of a permit review following a new or reviewed BREF. The introduction of benchmark levels would not significantly increase or decrease the unit administrative cost compared to BAT-AEPLs.
- There would be a minor increase in the costs of reviewing BREFs or developing a new BREF. The degree of information collection will approximately be the same for BAT-AEPLs and benchmark levels, but there will be an increase in TWG exchanges to discuss whether a BAT-AEPL or a benchmark level is the most appropriate.
- Inspection costs would remain similar, or there might be a minor increase. Demonstrating compliance with benchmark levels is similar to BAT-AEPLs, but a larger effort may be required to demonstrate continuous improvement (e.g. when a benchmark level is not achieved).
- Costs for managing information and reporting would remain similar, or there might be a minor increase. It is expected that the level of CBI issues and requirements will be similar for BAT-AEPLs and benchmark levels.
- It can, however, be expected that this option of benchmark levels (measure #24) will lead to a larger share of natural resources being covered by either benchmark levels or BAT-AEPLs, compared to the option of only having BAT-AEPLs (measure #23). This will require additional effort and, thus, result in higher costs.

These differences translate into a relatively higher unit burden, when compared to measure #23. In particular, additional costs incurred by operators during permit reconsiderations and updates, BREF reviews, monitoring and reporting, and engaging with inspections could add 7% to the baseline. In addition, a higher number of installations are likely to be affected as a result of having introduced a more flexible approach to addressing resource efficiency, instead of the all or nothing approach of measure #23. It is assumed that around 40% of the existing installations, or 20 800, may be affected over a period of 20 years.

As a result, additional administrative costs when compared to the baseline could reach between €0.6 million and €25 million each year over the 20-year period, on average, with a central estimate of around €16 million each year. These costs are estimated to be an upper bound and highly uncertain, as they generally depend on the final number of operators affected by this measure.

Finally, other measures or initiatives that aim to lighten the administrative burden through more harmonized and user-friendly reporting requirements and tools (e.g. more coherence between E-PRTR and BREF information exchange) could also limit the increase in administrative burden.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. For those cases where BAT-AEPLs other than BAT-AELs are, at this time, not implemented as binding in the same way as BAT-AELs, often additional investments would be needed to ensure complete compliance (i.e. without any exception, apart from OTNOC) to these BAT-AEPLs. Because these investments are mainly aimed at resource efficiency, they might sometimes lead to reductions in operational costs. It can be expected that some of the techniques used/installed to meet the BAT-AEPLs will pay back over time, within their Economic lifetime. However, this might not be the case for the substitution of fossil and primary resources by renewable and secondary ones. Benchmark levels would also trigger additional investments in many cases, though these might be smaller and more balanced compared to those for binding BAT-AEPLs.

The long-term trend is hard to anticipate. This will depend in large part on whether the investment costs decline due to technological advances, and the evolution of resource costs. This may be relevant for long term comparison, e.g. if the cost of water had doubled in 2050, techniques saving water would pay back much quicker. For example, the total cost of the energy system per unit of final consumption is expected to increase 2.0% per year between 2010 and 2030, and 0.8% per year between 2030 and 2050. On the other hand, if costs of primary resources and materials typically used in infrastructure (steel, cement, polymers, etc.) go up, the investment cost would rise more than the potential operational savings.

A quantitative assessment would require a clear understanding of the share of installations that exceed existing and future BAT-AEPLs and future benchmark levels, and what number of BAT-AEPLs or benchmark levels they exceed; Combined with information on average investment costs and operational costs or gains. These can vary widely, and there is no reliable data on the specific costs related to binding BAT-AEPLs and benchmark levels, as compared to non-binding BAT-AEPLs. It would not be accurate to extrapolate costs associated with the historic change of the BAT-AEL status, because much more than emissions, resources already come at a cost to operators, which causes them to already limit their consumption to a certain extent.

Industry was asked in the TSS about the impact of binding BAT-AEPLs on employment, consumer prices, EU competitiveness, EU market share and trade with third countries. More than 75% of industry indicated a significant reduction or reduction for these parameters (increase for consumer prices). This could be due to increased administrative costs or, rather, to additional operating costs. The latter seems to be more probable.

Competitiveness and level playing field

The implementation of this measure is likely to have **limited to no impacts** on competitiveness. The cost of doing business might, in some cases, go up (see ‘operating costs and conduct of

businesses (industry)' above). However, there is no strong indication this would have a significant effect on competitiveness. On the contrary, if one compares with the (absent) effect of the binding BAT-AELs under the IED on competitiveness, it could be expected that there will be no or only a limited impact from the updated BAT-AEPL status, nor from the benchmark levels. What distinguishes BAT-AEPLs and benchmark levels on resource consumption is that they limit resource consumption, and therefore operational costs for these resources. This might however probably not be the case for the substitution of fossil and primary resources by renewable and secondary ones.

This measure is likely to have a **limited to weakly positive impact** on levelling the playing field. The measure is primarily aimed at promoting a more level playing field in the EU, so there will be a positive impact for this aspect. This is further emphasized by the many responses from all stakeholder groups that point to the often occurring cross-media effects between emission control and resource consumption. One could argue that there is currently a risk that a level playing field is not respected, when only emission levels are binding, and thus implemented similarly, while resource efficiency levels are not. However, compared to the measure with only the option of binding BAT-AEPLs (measure #23), the positive impact on the level playing field might be smaller or less certain in case the TWG chooses more often for benchmark levels instead of binding BAT-AEPLs.

Position of SMEs

This measure is likely to lead to **weakly negative impacts** on the position of SMEs. Although the increased admin burden for industry will be larger for large, complex installations in absolute terms, in terms relative to the number of employees or turnover, the increased burden will be larger for SMEs. The reason is that there monitoring and reporting, to support the permit limit values or inclusion in the EMS and to demonstrate compliance, includes a certain fixed amount of effort.

Innovation and research

This measure may have a **weakly positive impact** on research and development. The IED evaluation TSS showed that a majority of stakeholders (>75%) somewhat or strongly agree that the IED, BREFs and BAT conclusions have stimulated innovation, the BAT conclusion being indicated as the most important driver (more so than requirement to hold permit, monitoring and reporting requirements, enforcement, and the emerging techniques chapters of BREFs). Similar to the effect caused by the strictly binding BAT-AELs set under the IED, an updated strictly binding status of BAT-AEPLs would further drive innovation efforts, as would inclusion of benchmark levels in the EMS. However, it has to be kept in mind that in certain Member States, the BAT-AEPLs are already implemented as binding.

Public authority impacts

This measure is likely to have a **weakly negative impact** on public authorities. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the

same way as BAT-AELs, additional administrative efforts by public authorities would be needed for either i) setting environmental performance levels in general binding rules or in individual permits that do not exceed the BAT-AEPLs, enforcing them, collecting and checking data during the BREF process; or ii) enforcing the inclusion of benchmark levels in the EMS and collecting and checking data during the BREF process.

If the possibility of derogations is included in the provision, it is expected that this would lead to additional derogations, however less than would be the case when there would only be an option for binding BAT-AEPLs (measure 23), meaning more administrative efforts from public authorities as well. Indeed, where it is not possible to derive BAT-AEPLs that could be implemented in the permits without frequent derogations, the TWG would be expected to opt for setting benchmarks. Similar to the administrative burden for businesses, the administrative costs per derogation will presumably be at least as significant as that of the permitting itself.

These additional administrative activities would generally make existing processes more resource intensive, thus increasing the burden. A similar magnitude of administrative costs for public authorities would be expected when compared to measure #23, although there might be differences in terms of how the public authorities may be affected (see administrative burden on businesses, as these differences would be analogous).

At a high-level, these differences translate into a relatively higher unit burden, when compared to measure #23. In particular, additional costs incurred by public authorities during permit reconsiderations and updates, BREF reviews, monitoring and reporting, and engaging with inspections could add up to 7% to the baseline. In addition, a higher number of installations are likely to be affected as a result of having introduced a more flexible approach to addressing resource efficiency, instead of the all or nothing approach of measure #23. It is assumed that around 40% of the existing installations, or 20 800, may be affected over a period of 20 years.

As a result, additional administrative costs for public authorities when compared to the baseline could reach between €1 million and €17 million each year over the 20-year period, on average, with a central estimate of around €12 million each year. These costs are estimated to be an upper bound and highly uncertain, as they generally depend on the final number of operators affected by this measure.

The TSS indicates that competent authorities expect a significant increase in administrative costs from binding BAT-AEPLs. On a scale of -1 to 1 (reflecting answers ranging from >15% decrease to >15% increase), the score for compliance, enforcement and inspection are between 0.4 and 0.5 for national authorities, while between 0 and 0.2 for local/regional authorities. The score for permitting is between 0.2 and 0.3 for both national and local/regional authorities.

Environmental impacts

Overall, this measure is likely to have **limited to weakly positive impacts on the environment** when compared to the baseline, although these will depend upon the additional take up of

binding BAT-AEPLs and the inclusion of benchmark levels in the EMS, as well as their environmental ambitions.

Climate

This measure may result in a **weakly positive impacts** on climate. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges, or work on continuous improvement in case of benchmark levels. Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances. Mainly BAT-AEPLs and benchmark levels on energy consumption and on consumption of materials with inherently large ecological footprint will have an indirect impact on emissions of GHGs. This is true especially in longer term if energy and materials consumption BAT-AEPLs and benchmark levels are derived for more sectors.

Air quality

This measure is likely to result in a **limited impacts** on air quality. The implementation of this measure may have indirect benefits on air quality resulting from reduced consumption of energy or materials.

Water quality and resources

This measure is likely have **limited to weakly positive impacts** on water quality and resources. The report 'Summary on IED contribution to water policy' (Ricardo, 2018) describes a number of water consumption or effluent BAT-AEPLs derived under the IPPCD or IED. Making the BAT-AEPLs benchmark levels or making these binding in future revisions will impact water consumption. This is true especially in longer term if water consumption BAT-AEPLs are derived for more sectors.

Soil quality or resources

There is **no significant impact** on releases to soil from the implementation of this measure.

Waste production, generation, and recycling

This measure may lead to **weakly positive to positive impacts** on waste production, generation, and recycling. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges, or work on continuous improvement in case of benchmark levels. Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances.

Mainly BAT-AEPLs and benchmark levels on waste generation or material reuse/recycling will have an impact. This is true especially in longer term if waste generation or recycling/reuse BAT-AEPLs and benchmark levels are derived for more sectors. Furthermore, at the economy level, impacts on waste production, generation and recycling is closely linked to impacts on

efficient use of resources. Reducing, recycling or reuse of waste or by-products in the own installation or sector, or in another installation or sector, improves material resource efficiency at the economy level. Impacts for individual installations or even sectors can however vary significantly.

Efficient use of resources

This measure is likely to have a **weakly positive to positive impact** on the efficient use of resources. For those cases where BAT-AEPLs other than BAT-AELs are at this time not implemented as binding in the same way as BAT-AELs, tightening the provisions in the IED will cause that a larger part of installations stay within the BAT-AEPL ranges. Only derogations that meet the criteria of Article 15(4) or 15(5) will potentially lead to lower environmental performances (e.g. higher resource consumption, lower level of substitution of primary materials and fossil energy sources).

As highlighted previously (see administrative burden on businesses), resource efficiency measures are likely to have been implemented by operators for Economic reasons. This was also stated by many industry respondents in the TSS. On the contrary, specifically for water consumption, evidence provided by an NGO stakeholder suggested that there is potential for improvement, highlighting that cooling in energy generation using around 18% of total water consumed in Europe. Furthermore, industry consumes large amounts of electricity (35-40%), which puts additional pressure on water resources both directly and indirectly[32]. The NGO stakeholder also reported a lack of water fees for the coal industry in a number of Member States, thereby lacking incentives for the efficient water use.

In addition, this measure may have an impact on the substitution of fossil and primary resources by renewable and secondary ones, which does not appear as advanced in the baseline. An important restriction for setting (ambitious) binding BAT-AEPLs or resource substitution is that availability of secondary resources, i.e. by-products or (former) waste, changes over time. If BAT-AEPL ranges are too high or too narrow, compliance would become an issue if insufficient alternative recovered, recycled or renewable materials are available on the market. For example, in the cement focus group, it was highlighted that it is expected that availability of by-products both from iron and steel blast furnaces and from coal-fired power plants will sharply decrease due to decarbonisation trends.

The BAT-AEPLs other than BAT-AELs are in the BREF process already derived in the same manner as the BAT-AELs, although not all of the resources consumed were considered KEI in all BREFs, and fewer BAT-AEPLs have been derived per BREF/sector, compared to BAT-AELs. In longer term, it can be expected that improved monitoring and reporting and data collection efforts will lead to more BAT-AEPLs on specific resource consumption or substitution of primary or fossil resources.

[32] Use of freshwater resources in Europe — European Environment Agency (europa.eu

The evidence available to estimate these impacts in a quantitative manner is limited. In fact, there is no reliable data on the share of primary, natural resources used by (heavy) industry covered by BAT-AEPLs. However, it is expected that in most/all sectors there are either no BAT-AEPLs, or only one or a few BAT-AEPLs which are typically restricted to specific processes and materials or types of residues/waste, or to water or energy efficiency, as described in the reports 'IED Contribution to the circular Economy' and 'Summary on IED contribution to water policy'. It is therefore assumed that this share is low, and a high-level estimate based on expert judgment would suggest that binding BAT-AEPLs could reduce energy consumption levels on average by up to 20% for those processes/resources covered by BAT-AEPLs. This would mean that the BAT-AEPLs could reduce energy consumption by heavy industry by up to 10%.

Similarly for water, consumption levels would decrease on average by up to 20% for those processes/resources covered by BAT-AEPLs, and thus by up to 4% overall for IED industry. For material consumption and waste generation, this is too difficult to estimate based on available data, but it could be assumed that the improvements are smaller compared to energy and water because of a higher diversity. These impacts can vary significantly per sector, depending on the share of resource consumption covered by BAT-AEPLs, and on the untapped potential for lowering the specific resource consumption or increasing substitution or primary or fossil input. As mentioned above, the long term impact may be larger, due to a possible increase in BAT-AEPLs and benchmark levels derived because of better data monitoring and reporting.

In the TSS, depending on the type of natural resource, 75%-80% of industry responded that binding BAT-AEPLs would not impact resource management, while 80%-100% of Environmental NGOs responded that they would lead to a significant improvement. Public authorities' responses were in between, about half of them expecting a moderate to significant improvement. Respondents from all stakeholder groups refer to the non-binding implementation in many cases, some pointing absence from article 15(3) requirements, the article 9 exemptions, to a court ruling that inhibits energy efficiency requirements to be set in the permit to avoid double regulation, and to voluntary energy efficiency agreements at national level.

Social impacts

This measure is likely to result in a **limited to no impact** on employment. In general, progression towards a more circular economy causes sectors that produce and process raw materials to decline in size, while the recycling and repair sectors will experience additional growth. The overall effect on employment across all sectors is unclear/ambiguous, but the effect for IED installations, which typically belong to sectors that produce and process raw materials will be negative.

Measure 25: Require operators to incorporate a Resource Efficiency and Circular Economy Plan and Chemical Management System at the installation level as separate sections of their Environmental Management System. Expand the scope of monitoring and reporting to cover resource efficiency techniques, indicators and performance levels, as well as the use of hazardous chemicals and the level of substitution for safer alternatives.

i. Resource Efficiency and Circular Economy Plan

Description of these components of the measure and requirements for implementation

This measures proposed that a Resource Efficiency and Circular Economy plan is developed by installation operators to manage and continuously improve their installation's performance. The plan would be a section/chapter of the (through IED or BAT conclusions) imposed EMS. It would consider:

(i) Operator's measures that improve in-house resource efficiency (water, materials and energy consumption and use); this would include monitoring of specific consumption levels, recovery/re-use rates, and other relevant indicators/parameters.

(ii) Choices made by the operator of an IED installation that demonstrably affect environmental performance:

- upstream, reducing the environmental footprint associated to the plant's feedstock and resources, and/or
- downstream, reducing the environmental impacts associated with the treatment of the plant's waste and the use of by-products of the production process, in the same or in other sectors.

In the BAT conclusions, a number of BATs (in particular, but not necessarily limited to, those without binding quantitative levels) could be earmarked as being implementable through the RE/CE plan (or the EMS in general), making these BATs operational and ensuring the continuous improvement for the KEIs that the BAT addresses. Not being able to meet an indicative benchmark could be a trigger to consider the KEI in the plan, explaining why the benchmark cannot be met, and a range of actions with quantitative targets for continuous improvement.

To support the monitoring and reporting of the in-house resource efficiency, article 14(1) would be amended to include monitoring and reporting to the competent authority on (primary, renewable and secondary) resource consumption.

Objectives:

The measure will aim to improve the effectiveness of the IED in contributing to resource efficiency and the circular economy and incentivising operators to reflect on their supply chain environmental impacts. This measure will, therefore, contribute to the general objective of

transforming the EU into a circular economy and, more specifically, contributing towards the transition to a more circular economic model for the EU in the short-to-medium term.

Implementation needs:

The EMS is already a standard requirement (BAT 1) in all BAT conclusions and is tailored to each industrial sector. The requirement for an installation operator's RE & CE plan can be part of such EMS.

Reporting on measures for improving internal resource efficiency in relation to their expected environmental benefits, and on environmentally sound choices on plant's feedstock and wastes or by-products, is not as straightforward as reporting emissions (concentrations or loads). Therefore, generic, horizontal provisions could be laid down in the Directive itself to include EMS targets and ambitions as part of the permit conditions and, therefore, become legally binding for operators for all IED activities (or for a selection, when 'light' tailored permitting procedures would be introduced for certain activities such as livestock farming). Moving the EMS requirement to the IED itself would make it more prescriptive, compared to BAT conclusions (for individual sectors), as the BAT conclusions are a reference for setting permit conditions and leave some flexibility in implementation. Such provisions could include, for instance, previously identified harmonised indicators on resource efficiency and specific consumption, which would serve as a basis of comparison between installations from a same sector. These generic provisions could then further be specified in the BATCs for each sector of activity.

The measure's practical and formal implementation could be approached in a way that allows for flexibility in terms of promoting the inclusion of operator's measures proposed to realise both voluntary pledges and mandatory commitments with respect to resource efficiency and the substitution of primary and non-renewable resources. The plan could start from a basis of a series of voluntary measures and strategies to improve an installation's resource efficiency performance. These measures should cover previously agreed domains that were identified as being key for increasing a sector's performance with respect to resource efficiency and the use of secondary and renewable resources, for which harmonized indicators have been identified, proportionality of costs has been verified, and potential environmental gains have been demonstrated to be significant. Operators could be allowed to propose relevant parameters to be monitored and reported, or to select such parameters from a sector-specific list. After approval of the proposed or selected parameters by the permitting authorities, their monitoring and reporting on progress and outcomes could become mandatory, as under IED Art. 14 (1)(d). The parameters that operators may be able to report to competent authorities should be clarified, taking into account potential concerns over CBI.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative Economic impacts** when compared to the baseline, although this will depend upon the number of operators that would introduce the proposed chapters into their EMS and the extent to which this is additional to the baseline.

Administrative burden on businesses

This measure is likely to lead to **negative impacts** on administrative burden on businesses. The introduction of an operator RE/CE Plan under the EMS requires efforts to elaborate and submit such plan, implement the corresponding mandatory and/or voluntary reporting and monitoring requirements, and to obtain more specific insights in, and knowledge of the complete production chain of which the installation's activities form part.

The scale of these costs would vary according to the installation's context and sectoral priorities with respect to resource efficiency, and the extent to which this is already being considered. In fact, recent BAT conclusions already include specific plans to monitor and manage in-house resource efficiency of water, energy and certain materials (including chemicals) that are relevant for the sector.

Based on the evidence available expert input, it is assumed that between 40 to 200 hours may be required to develop an RE/CE plan, maintain it and monitor and report on it once every two years. This is broadly equivalent to up to 10% of an FTE or spending between €1 150 and €5 700 every two years.

It is assumed that around 20% of the IED installations or 10 400 could be targeted by this measure. As a result, this would imply that the additional administrative costs would range from €6 million to €30 million each year, on average, over a 20-year period, with a central estimate of €9 million. This is uncertain and depends upon the number of installations affected and their level of preparedness in the baseline.

In the TSS, 75% of industry responded that establishing a RE/CE plan would increase administrative costs by more than 5%, about 35% even see an increase of more than 15%, around 20% expects no impact, and a few % of industry respondents even expect a decrease. While in the TSS around 75% of industry were against a mandatory monitoring and reporting on measures and choices that improve resource-efficiency (75% of public authorities and 85% of NGOs were in favour), some industry respondents (particularly in the chemicals sector) mentioned that resource management in-house, whether or not through certified EMS schemes, is already common practice in industry/their sector. Some mention that their EMS also includes operator choices that have an upstream or downstream impact. Reporting of this information to public authorities seems much less common. Some respondents express their concerns of leaking CBI because of the proposed reporting requirements, and state that reporting should be only towards public authorities, and not in the public domain. Requiring a more formal RE/CE plan would

thus in some sectors likely not lead to a significant increase in administrative burden (varying by sector). Reporting to public authorities on the other hand, could increase the administrative burden.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. The measure of extending the scope of monitoring and reporting to cover resource efficiency improvements is meant to lead to the voluntary and/or mandatory implementation of initiatives that allow decreasing the consumption of resources per unit of production output, both in-house and upstream or downstream of the production chain. Even in case the measure is conceived as a merely indirect incentive to improve resource efficiency, all available resource efficiency optimization strategies are likely to increase operating costs (at least in short term due to required investments) and change conduct of business at plant level. In the TSS responses, there were no clear links made between an RE/CE plan and increase of operating costs.

The substantive compliance costs are expected to vary greatly according to the installation's specific context and the proposed sectoral priorities with respect to resource efficiency.

Competitiveness and level playing field

This measure would likely lead to **unclear impacts** on competitiveness of businesses. On the one hand, operating costs and conduct of business are affected negatively, that is, it becomes more costly to conduct business in the EU-27. On the other hand, increased transparency on resource efficiency performance generates confidence, facilitates cross-sectoral and cross-value chain collaboration, and might lead to efficiency-based cost reductions. There are concerns in certain sectors that sharing of data that is considered to be CBI (e.g. amounts and types of products, specificities of production processes) can negatively impact competitiveness. These concerns were also echoed in the TSS responses. If procedures and practices to monitor and report on RE/CE, while protecting legitimate CBI claims, are further developed and strictly maintained and controlled, the overall direction of the impact might be(come) more positive.

This measure would likely lead to **weakly positive impacts** on levelling the playing field. Increased transparency on resource efficiency performance generates confidence, facilitates cross-sectoral and cross-value chain collaboration, and might lead to efficiency-based cost reductions. Sectors mainly consisting of SMEs (e.g. IRPP, SF, galvanizing sector of FMP), might be disproportionally affected by resource efficiency strategies and requirements that are cost and/or capital intensive.

If CBI issues can be solved satisfactorily and all industrial sectors in the EU that are part of global, resource-intensive production chains have been included into the expanded scope of the IED, a more level playing field with respect to industrial resource efficiency strategies can be secured, increasing opportunities for best players

Position of SMEs

This measure is likely to lead to **weakly negative impacts** on the position of SMEs. Sectors mainly consisting of SMEs (e.g. IRPP, SF, galvanizing sector of FMP), might be disproportionally affected by resource efficiency strategies and requirements that are costly and/or capital intensive. The introduction of an operator RE/CE Plan under the EMS requires effort to elaborate and submit such plan, to implement the corresponding mandatory and/or voluntary reporting and monitoring requirements, etc. The undertaking of such efforts might have a substantial fixed component thus becoming disproportionally challenging for SME's. In fact, 78% of SMEs cite complex administrative procedures as the biggest obstacle to operating in the Single Market. That said, 25% of EU SMEs work on green products or services, and might particularly benefit from increased resource efficiency and circular Economy measures by (potential) industrial clients.

Innovation and research

This measure may have a **positive impact** on research and development. Strategies for increasing resource efficiency that consider process technologies, ecodesign and cross-sectoral collaboration (e.g. industrial symbiosis) strongly rely on innovation and research.

Public authority impacts

This measure will likely have **negative impacts** on public authority. The management of CBI issues and the evaluation and control of RE/CE plans of EU industrial installations will impact administrative, compliance and enforcement activities. The public authority impacts could be limited somewhat by private auditing companies contracted by the operators which perform the evaluation of the RE/CE plans, similar to existing practices in IED installations which currently have a 'BAT 1' EMS or a more elaborate certified EMS. This would be checked by public authorities.

The scale of these costs would vary according to the installation's context and sectoral priorities with respect to resource efficiency, and the extent to which this is already being considered. In fact, recent BAT conclusions already include specific plans to monitor and manage in-house resource efficiency of water, energy and certain materials (including chemicals) that are relevant for the sector.

Based on the evidence available expert input, it is assumed that between 40 to 200 hours may be required to develop an RE/CE plan, maintain it and monitor and report on it once every two years. This is broadly equivalent to up to 10% of an FTE or spending between €1 150 and €5 700 every two years.

It is assumed that around 20% of the IED installations or 10 400 could be targeted by this measure. As a result, this would imply that the additional administrative costs would range from €6 million to €30 million each year, on average, over a 20-year period, with a central estimate of

€9 million. This is uncertain and depends upon the number of installations affected and their level of preparedness in the baseline.

In addition, authorities might be required to define and identify priority domains and key parameters that determine a sector's performance with respect to resource efficiency, and to analyse the significance of the potential, corresponding environmental gains.

The responses are similar to administrative costs for industry, but even more outspoken, although only a small number of public authority responses actually answered this question, 5 out of 12 for local/regional authorities, and 16 out of 37 for national authorities. More than 75% see an increase of more than 5% administrative costs, 20% (local/regional) – 45% (national) even see an increase above 15%. No respondents expect a decrease of 5% or more.

Environmental impacts

Overall, this measure is likely to have **weakly positive to positive environmental impacts** when compared to the baseline, although this will depend upon the number of operators that would introduce the proposed chapters into their EMS and the extent to which this is additional to the baseline.

Climate

This measure will likely have **positive impacts** on climate. The RE & CE plans aim to decrease the consumption of resources per unit of production output, both in-house and upstream or downstream of the production chain. These resources include fossil energy carriers that give rise to GHG emissions. Whilst the IED does not have an explicit focus on emissions of GHGs (owing to provisions made in Article 9 of the IED), it is likely that adopting resource efficiency-oriented measures will have knock-on impacts towards GHG emissions. This will affect particularly industrial installations of which the GHG emissions represent a significant share of total emissions from the most energy-intensive production chains. On the other hand, even assuming that no improvements are achieved regarding to the levels of resource consumption, the substitution of primary, fossil and other non-renewable resources by secondary raw materials or renewables can potentially bring considerable environmental benefits, including on climate change. However, proposals for substitution should consider the risks and cross-media effects associated to the use of renewables and of secondary raw materials, waste or by-products.

Air quality

This measure is likely to result in a **limited to no impact** on air quality. The RE & CE plans mainly target the consumption of primary resources per unit of production output, rather than end-of-pipe emissions. Reduced resource consumption will only indirectly affect air quality. Initiatives of substitution of primary, fossil and non-renewable resources can affect other environmental aspects such as air quality both positively and negatively, and should be accompanied by solid evidence on the effects on air quality.

As an example, in the focus group on the cement sector, it was mentioned that there are cases with increased heavy metals emissions to air which could be linked with waste feedstock quality in some cases, even with unchanged quantities/shares of waste as feedstock, while in other cases further investigation to show such link would be needed. During the focus group, it was mentioned that a RE/CE plan could improve air emissions because it can address the trade-off between resource efficiency or use of secondary raw materials and emissions or energy efficiency.

Further information was retrieved from the report 'Abfallströme Zur Verbrennung' by the Austrian UBA (2021) which identifies, based on analysis of emissions from 2009 to 2018, that waste incineration plants, which incinerate the largest proportion of waste (around 70 %), contribute least to the pollutant loads emitted, compared to co-incineration and cement plants. A possible explanation given in the report for the low emissions from waste incineration plants is that the emissions from these plants are effectively reduced due to efficient flue gas treatment systems. In the cement plants, relevant pollutant emissions may also result from the raw materials used, but no information on their pollutant content was available at the time of the evaluation. Emissions of cadmium and thallium were found to be higher in co-incineration plants where relevant amounts of sewage sludge and paper fibre residues are burned. Increased mercury levels have been observed in some cement plants where large quantities of substitute fuels are used. However, based on the available data, it was not possible to determine whether there was a causal link. The composition of waste streams under the same code numbers can sometimes vary a great deal.

Water quality and resources

This measure is likely to result in a **limited to no impact** on water quality and resources. The RE & CE plans mainly target the consumption of resources per unit of production output, including water. However, this is not taken into account here, because this aspect is already covered by the area 'Efficient use of resources' below. Reduced water consumption will positively impact the availability of water resources but is not likely to affect water quality.

Soil quality or resources

This measure is likely to result in a **weakly positive impact** on soil quality and resources. The RE & CE plans mainly target the consumption of resources per unit of production output, rather than end-of-pipe emissions to soil. Reduced resource consumption will only indirectly affect soil quality or resources.

Waste production, generation, and recycling

This measure may lead to **positive impacts** on waste production, generation, and recycling. The introduction of RE & CE plans aims to decrease the consumption of resources per unit of production output, both in-house and upstream or downstream in the production chain. This includes material resources. The use of materials can be:

(i) minimized, by producing less waste per unit of production output
(ii) eliminated, referring particularly to the use of toxic and hazardous substances, which might reduce the hazardousness and increase the recyclability of the installation's production residues
(iii) substituted, e.g. by recycled, waste-based, or less resource intensive materials, or
(iv) better managed, by implementing measures that reduce material losses over the production process.

These strategies will particularly affect industrial installations where material use represents a significant share of total raw material footprint of the most material-intensive production chains.

Efficient use of resources

The implementation of this measure will likely result in **positive impacts** on the efficient use of resources. The measures of introducing RE & CE plans specifically targets resource efficiency, both in-house and upstream or downstream of the production chain. During the cement focus group, it was also mentioned that RE & CE plans should address trade-offs between material resource efficiency or use of secondary raw materials and energy efficiency. The impact on efficient use of resources was not directly addressed in the TSS. Some products manufactured by IED installations are strictly regulated by product regulations, limiting the potential for actions that improve downstream impact. The example of fertilising products was mentioned in a TSS position paper.

It is difficult to quantitatively assess the impact, certainly on a global level. Fragmented and anecdotal evidence exists on impacts of specific case studies of industrial symbiosis, use of waste as a feedstock and resource efficiency improvements, for example in the 'IED Contribution to the circular Economy report' and in industrial symbioses case study databases. The former also describes the untapped potential. It is however difficult to extrapolate the information from case studies to the overall industry potential and estimate to what degree obligatory RE/CE plans (in addition to already existing EMS schemes) and related reporting to competent authorities would contribute to this potential. Initiatives of substitution of primary, fossil and non-renewable resources can affect the efficient use of resources both positively and negatively and should be accompanied by solid evidence on the environmental effects.

In certain sectors, a significant share of energy or material input is currently already provided by secondary resources. An example is the cement sector, where the share of energy and material input is generally high, but according to the focus group and literature, varies strongly dependent upon local availability of secondary resources, restrictions in permits on types of wastes or secondary resources allowed, process characteristics and end product requirements. At the EU level, substitution rate by alternative fuels is 48% of thermal energy needed for clinker production.

Social impacts

The potential impacts of introducing RE and CE plans on employment are likely to be **mixed or unclear**. Sectors that produce and process primary raw materials are at risk to decline in size under circular Economy strategies, while the recycling and repair sectors might find opportunities to experience additional growth.

ii. Chemical Management Systems

Description of this component of the measure and requirements for implementation

The obligation would require the development of a chemical management system (CMS) as part of BAT conclusions. This obligation could be introduced as an addition to the existing requirements under BAT 1 for an environmental management system (EMS). Developing a CMS would mean that IED regulated operators would need to use available tools for chemical risk assessment made available by ECHA and report regularly on progress and outcomes, e.g. under IED Art. 14 (1)(d).

There would be basic and advanced components of the CMS, for consideration:

- Basic components would include: an up to date inventory of substances[33], risk assessments and periodic reporting and auditing; and
- Advanced components would include: Routine assessment of alternatives for hazardous substances, commitment to substitute as soon as practical, and the justification of continued use where the review of substitutes identifies viable alternatives.

This measure may also include the introduction of a web-based database populated by operators for improved reporting and transparency. This could be aligned with pre-existing databases / reporting requirements as part of permit requirements.

The database could include a list of chemicals for consideration as part of the development of the CMS that are subject to related legislation such as the Annex I and III substances of the POP Regulation, substances classified as SVHC, including the listings under Annex XIV and XVII of REACH or as priority substances under the Water Framework Directive. Additionally, the CMS should follow the PDCA-cycle (Plan-Do-Check-Act) approach.

Finally, an industry respondent at a focus group for this study highlighted their concern that this CMS-type measure may be considered an attempt to fix the lack of proper implementation under REACH, and efforts could be spent instead on ensuring that there is an effective implementation of existing obligations for operators. One NGO respondent agreed with the position that the elements of the CMS (both the basic components and advanced components) are broadly in line with the existing obligations under REACH. On this basis, there are elements of the CMS that do not represent an increase in scope, but rather a way to strengthen the coherence between REACH

[33] E.g., covering hazardous chemicals, REACH registration data, SVHCs, priority substances, thresholds stipulated in environmental permits as well as reference to monitoring data

and IED, and to provide data regarding processes for REACH, which would enhance implementation.

It is also noted that industrial accidents do not only take place in establishments falling under the Directive 2012/18 on major industrial accident prevention (Seveso Directive) and therefore such risks have to be given adequate attention. For example a dramatic accident occurred during this impact assessment in the Czech Republic in an IED installation, not falling under the Seveso Directive, where 3 people were killed because of a toxic leak. Appropriate management of risks of use of chemicals through a Chemical Management System would better address safety issues in installations and contribute in preventing that accidents with important consequences occur.

Objectives:

The measure will aim to improve the understanding, management and substitution of chemicals of concern by the IED-regulated industry and to enhance transparency for citizens. This measure will, therefore, contribute to the general objective of achieving a non-toxic environment in the EU, and more specifically, prevent or, when impracticable, minimise emission of hazardous chemicals by large industrial and agro-industrial plants.

Implementation needs:

- The CMS could be added to the EMS requirements stipulated under BAT 1 for each industry sector or the CMS requirements could be included in the IED permit conditions (Art. 14) directly.
- The CMS will have flexibility so that it can be adjusted for each industrial sector.
    - In an interview, the EIPPCB commented that flexibility is required as there are industry sector-specific issues. This was especially based on discussions around implementation of CMS during the update of the textiles BREF document.
    - The Hazbref report[34] also provides further examples related to paper pulp, ferrous metals, and food, drink and milk industries where sector-specific issues would affect how a CMS was implemented, particularly around material flows, numbers of chemicals in use, and de novo chemicals.
- Creating synergies/avoiding duplication with regard to already existing reporting systems such as E-PRTR.
    - Multiple reporting requirements under different but closely related legislation, should a centralised database be needed for reporting, due care is needed to harmonise as far as possible to avoid duplication and undue burden.
    - There are also data confidentiality issues, this is already an issue for EMS, with key feedback from the focus group on EMS/CMS providing conflicting

[34] Interreg, 2021, 'Method to include information on hazardous and other substances of concern more systematically into BREFs', Hazbref report under Work Package 3, Activity 3.2.

arguments around quality and availability of data (including public availability of data), how it is reported and who has access to it.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative to negative economic impacts** when compared to the baseline, although this will depend upon the number of operators that would introduce the proposed chapters into their EMS and the extent to which this is additional to the baseline.

Administrative burden on businesses

This measure is likely to lead to **negative impacts** on administrative burden on businesses. The responses regarding adoption of a CMS are mixed. This is in part because a form of CMS has been a concept for some time, with different types of CMS already implemented to a greater or lesser degree by different Member States.

Table 16 summarises the responses by industry and competent authorities that participated in the TSS and a further mini-survey sent to the members of the competent authority working group for IED, to a query whether a CMS was in use and mandatory as part of the environmental permit. 13 MSs (plus Norway) stated that a form of CMS was in use, and 70 (out of 167) industry respondents commented that they already make use of a CMS (for inventory and reporting purposes), while only 20 (out of 167) said they do not use a CMS.

Table A8-16: Overview of the TSS responses for CMS and feedback from MSCAs*

Country	Form of CMS in place	CMS covers a form of inventory	CMS covers data on hazards and risks	CMS is used for tracking regulatory evolution	CMS reporting is part of IED permit requirements
Austria	Yes	Yes	Yes	Yes	Yes
Belgium	Yes	Yes	Yes	Yes	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A
Croatia	N/A	N/A	N/A	N/A	No
Cyprus	Yes	N/A	N/A	N/A	No
Czech Republic	Yes	N/A	Yes	N/A	No
Denmark	No	N/A	N/A	N/A	No
Estonia	Yes	Yes	Yes	No	Yes
Finland	Yes	Yes	Yes	Yes	Yes
France	Yes	Yes	Yes	Yes	No
Germany	Yes	Yes	Yes	Yes	No
Greece	No	N/A	N/A	N/A	N/A
Hungary	No	N/A	N/A	N/A	No
Ireland	No	N/A	N/A	N/A	No

Country	Form of CMS in place	CMS covers a form of inventory	CMS covers data on hazards and risks	CMS is used for tracking regulatory evolution	CMS reporting is part of IED permit requirements
Italy	Yes	Yes	Yes	Yes	No
Latvia	N/A	N/A	N/A	N/A	No
Lithuania	Yes	Yes	Yes	No	No
Luxembourg	No	N/A	N/A	N/A	No
Malta	N/A	N/A	N/A	N/A	N/A
Netherlands	Yes*	Yes*	Yes*	No	No
Poland	No	N/A	N/A	N/A	No
Portugal	No*	N/A	N/A	N/A	No
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	Yes	Yes	Yes	Yes	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A
Spain	No	N/A	N/A	N/A	No
Sweden	Yes*	Yes	Yes	Yes	No

* The MSCAs highlighted that "CMS" is not a defined term under IED, and therefore the full scope of the CMS as set-out within the measure may not be included, but components of it are. Particularly the basic components for inventories of substances and risk assessments, although implementation varies. Responses from the Netherlands, Portugal, and Sweden highlighted that the basic components of the CMS are likely to be implemented on a case by case basis, with certain sectors more likely than others to require such components.

Alongside the TSS, the second mini-survey to the MSCAs for IED sought to seek further clarity on the role and function of a CMS within environmental permitting. Responses from 11 MS were received (Estonia, Finland, Hungary, Ireland, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Spain and Sweden). The main feedback from the MSCA responses was that the term 'CMS' is not yet defined within IED and therefore the scope of the requirements can vary. A number of MS implement other national legislation which requires the development of inventories of hazardous chemicals and risk assessment, not directly under the umbrella of IED or environmental permits, but closely related. While others highlighted that the requirements may be managed on a case-by-case basis, with certain sectors more likely to be required to have a chemicals inventory.

In addition, the Hazbref report (2021) illustrates that discussions around CMS, mass-flow of substances and control of chemical hazards has been a talking point across multiple BREF updates with calls for a more systematic harmonised approach across all operators. The report does, however, recognise that sector specific issues may affect how the CMS is implemented.

A rapid literature review has been completed, alongside expert judgement to support an understanding of the potential costs of a CMS. One caveat is that the nature and scale of the CMS required will be sector specific (as indicated) as well as varying depending on the size and complexity of the facility and number of substances used in a given process. On that basis, no

attempt has been made to estimate EU-wide costs to industry, but rather indicative costs for a single facility.

In terms of the basic components covering an inventory of chemicals in use. A range of software packages are available ranging for the most basic €85 to more comprehensive software (including mass balance) €5 000[35]. There are also examples of bespoke systems for more complex situations which cost €100 000+ to develop[36]. This covers the cost of the software only.

Populating and maintaining the inventory will require chemical audits and assessment of the processes in use. For sectors / facilities which use far fewer chemicals (e.g., less than five) the audit could be expected to take only a few hours. At the other end of the scale, the example provided by the University of Hampshire, the audit and initial set-up of the inventory required 0.5 FTE for an experienced hazardous materials supervisor, plus 1.5 FTEs in other supporting staff. Once established the annual maintenance and update of the system required 0.25 FTE for management staff plus IT support to maintain the audit system.

In practice most operators are likely to fall somewhere between these two extremes. These are described in the Table below.

Table 17: Overview of basic components of a CMS (inventory of hazardous chemicals, uses, risk assessments, reporting and auditing)

Costs associated with setting up and maintaining the basic components of a CMS	Benefits of having a CMS[37]
• Cost of CMS software (varies from €85 to €5 000. Bespoke systems could cost €100 000+) • Audit of hazardous chemical substances to populate CMS (varies from a few hours in simple cases with few substances to 0.5FTE senior staff + 1.5 FTE supporting staff) • Maintaining CMS – update of substances (varies from a few hours per annum to 0.25FTE per annum + IT support of up to 1 FTE) • Risk assessments (already part of standard processes under REACH) • Training of staff for H&S (already part of standard processes under REACH) • Reporting of CMS outputs (should be automated would expect a few hours per annum <0.1 FTE)	• Greater control and visibility of chemicals in use, which would lead to the following benefits: • Better management of storage of chemicals (frees up floor space) • More effective use of chemicals leading to less waste and potentially lower usage of hazardous chemicals. • Better evidence base, to support innovation and identification of safer alternatives. • Greater control of risks to manage chemical safety. • Greater control and visibility over the chemicals in use leading to less risk of compliance issues with related legislation. • Level playing field given CMS is already in use for many MS.

Based on the evidence available expert input, it is assumed that between 40 to 400 hours may be required to populate and maintain the CMS every two years. This is broadly equivalent to up to 0.25 FTE or spending between €1 150 and €11 400 every two years.

[35] https://labcollEUtor.com/lims-flexible-hosting-pricing/?_ga=2.65404782.1594292501.1626773919-89232714.1626773917&_gl=1*1x7nvqg*_ga*ODkyMzI3MTQuMTYyNjc3MzkxNw..*_ga_S4X1ENVXBF*MTYyNjc3MzkxNS4xLjEuMTYyNjc3MzkzNS4w

[36] University of new Hampshire, 2003, 'Chemical Environmental Management System (CEMs), publication from the chemical strategies partnership.

[37] https://cen.acs.org/sponsored-content/taking-stock.html

It is assumed that around 50% of the IED installations or 26 000 could be targeted by this measure. As a result, this would imply that the additional administrative costs would range from €15 million to €150 million each year, on average, over a 20-year period, with a central estimate of €37 million. This is uncertain and depends upon the number of installations affected and their level of preparedness in the baseline.

The advanced components of the CMS require periodic assessment for safer alternatives to the hazardous chemicals identified, a commitment to transition to safer alternatives as soon as practical, and justification of continued use where the review of substitutes identifies viable alternatives. As with the above section these issues are highly substance specific, and would vary in complexity depending on the specific situation. More-over the assessing of alternatives can require a specialist skillsets not necessarily present within the operators' personnel. Use of consultants to carry out such assessments is fairly common. Based on experience of such assessments under REACH Authorisation and Restriction assessment of alternatives could cost between €20-50K per substance in consultancy fees, this is equivalent to between 25-60 days of staff, if completed internally.

Updates to the original audit would likely be less costly than the original study, but could still be time consuming depending on developments. The substitution to safer alternatives, could incur significant costs depending on whether the alternative was a drop-in replacement, or required a change in process wanting new equipment and training. Even with drop-in replacements significant amount of research and development costs could be expected to amend and perfect existing processes. This could also include costs associated with reduced production output depending on how changes are implemented.

In terms of the existing situation and level playing field the baseline appears to be mixed, with at least some implementation of the basic requirements considered for the CMS (directly or indirectly) to date across 13 Member States and possibly more. Standardising requirements for the basic components as a minimum may lead to some weakly negative increases in administrative burden on businesses during harmonisation (see table above), although noting that for those operators that have not used a CMS so far, the development and first population of the requirements may have more considerable impacts.

A CMS with more advanced requirements would look to address substitution more comprehensively. Some TSS respondents suggest that this is already addressed as part of REACH. At a focus group for this Study, one NGO highlighted that the advanced parts of the CMS are broadly in line with the requirements under REACH and, therefore, would not be an expansion of scope, but rather strengthen the implementation and coherence between REACH and the IED. Stakeholders from industry, however, were more concerned about the potential additional burden that could be created by the CMS, particularly for SMEs and certain Economic sectors with less capacity to absorb any additional costs within their operating margins.

At a focus group for this Study, NGO respondents also commented that, for an operator to run an IED regulated facility successfully, they would need to have a strong and clear understanding of

which chemicals are used, for what purposes and what quantities within specific parts of the installation or facility. However, feedback from one competent authority respondent highlighted that they had visited many IED regulated facilities where this was not the case. In particular, participants in this focus group suggested that it was not uncommon for SME operators to have less visibility on the full and complete audit trail chemicals used in their operations. Other respondents commented that the CMS would need to extend beyond simply intentional chemical substances, as impurities and substances formed de novo as by-products present serious challenges for wastewater and waste sectors. A complete material flow including consideration of these other elements was reported as being necessary.

The competent authority respondents also commented that in order to complete the basic components of a CMS it will be necessary to develop and provide tools and guidance to help operators in developing an audit trail of all chemicals used or created as part of industrial processes. Currently, those tools are not in place or freely available at EU-level.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. This is uncertain and varies greatly across operators.

Stakeholders that responded to the TSS for this study suggest that there might be some increases in both operating (i.e. staff time, etc.) and capital costs (i.e. equipment costs, etc.).

- For operating costs, the majority (>70%) of respondents expect an increase in costs as a result of the proposed measure. In more detail, 43% (36 of 82 responses) commented that there would be significant impact >15% increase in costs; 29% of responses (24 out of 82) expect a 5-15% increase in costs; limited impacts (+/- 5%) from 26% of respondents (21 out of 82 responses); and a <15% decline in costs from one respondent.
- For capital costs, the majority (>70%) of respondents also expect an increase in capital expenditure. In particular, 44% (35 out of 79) stated there would be a >15% increase in their annual capex costs; 27% (22 out of 79) of respondents indicated a 5-15% increase in costs; 27% (21 out of 79), only limited impact of +/- 5%; and one respondent indicated that a 5-15% decrease in costs could be expected.

Further responses from the TSS highlighted that integrated management systems (which include CMS) are commonplace within chemical industry sectors, but possibly less so in other IED-regulated industry sectors. The primary concern raised by industry responses was the level of effort required to assess hazardous substances and possible substitution, with some highlighting a risk of overlaps with REACH.

Competitiveness and level playing field

This measure is likely to lead to **limited to no impacts** on competitiveness and **positive impacts** on levelling the playing field. Although the costs of business could increase marginally, there is already a widespread implementation of some form of CMS (particularly for the basic

components) and, therefore, we would not expect that standardisation of the requirements would lead to a significant impact on the competitiveness of EU businesses in the global context.

However, the results of the TSS and discussions with ECHA, EIPPCB and a focus group highlighted an opportunity to level the playing field. A form of CMS (covering the basic components) is already in use across many Member States, with variations in how the CMS is implemented, what it covers, and how it is managed. This in itself represents an uneven playing field. All but one participant of the focus group run for this study conceded that there was a need for greater harmonisation in how the existing situation works, and that a clear CMS with details of what is expected and what it includes would be beneficial. The scope of the CMS and far it should go towards promoting or actively channelling transition to safer alternatives, was a more datable point, with less clear agree. However, the analysis makes clear that the potential benefits of a harmonised approach would have strong benefits for a level playing field.

Position of SMEs

Overall, this measure is likely to lead to **mixed or unclear impacts** on the position of SMEs. There are both positives and negatives with how a CMS could help SME operators and/or result in a disproportionate increase in administrative costs for them.

A focus group undertaken for this Impact Assessment, together with results from the TSS, highlighted that forms of CMS are already in use, but with patchy distribution, both in terms of industry sector and between larger and SME-sized companies. The TSS results, in particular, suggested that companies that have to meet obligations under REACH and SEVESO are more likely to make use of integrated management systems, which would include a CMS (at least for the audit trails of substances and reporting).

One competent authority delegate at the focus group commented that they had visited many IED regulated facilities which entirely lacked a CMS, with SMEs being more likely to fall into this category. This may mean that a greater proportion of SMEs would be faced with both the set-up costs and maintenance of the CMS. Although the argument can also be made that SMEs may be likely to have fewer hazardous substances and so a simpler CMS may be needed. The positive impacts here would relate to the right-hand column of the table on the previous example. Effectively greater knowledge and control of the processes in place, leading to less waste, less use of hazardous chemicals, less likely to have chemical compliance issues because of improved knowledge base, and better potential for innovation from a more informed position.

The issue of sector-specific sensitives was also raised by the focus group on EMS and CMS, Some delegates at the focus group highlighted that different industry sectors make more or less use of chemicals, and therefore may be less likely to encounter hazardous chemicals, meaning a more simplified version of CMS might be warranted.

Data on the proportion of IED regulated SME operators with / without CMS systems has not been identified. It is therefore assumed as a worst case scenario that this category may be significantly more likely not to have a CMS or technical/Economic capacity to meet the full

(basic and advanced) requirements of the CMS measure and care may be needed to implement such an approach in a tailored fashion as part of BAT conclusions.

Innovation and research

This measure is likely to lead to **weakly positive impacts** on innovation and research. The justification of the use and the substitution check could improve the innovation process in the longer-term.

In an interview with the EIPPCB, representatives highlighted their experience with the most recent BREF document update for ceramics (which commenced in February 2021). In particular, the EIPPCB stated that based on previous BREF exercises, it can sometimes be challenging for industry to fully respond as it is not always known which chemicals are in use, and furthermore any by-products. A CMS would, therefore, support in addressing these gaps and allow industry stakeholders to have a more informed discussion around substitution and safer alternatives, including consideration of where negative BAT could be applied. Therefore, requiring a CMS could facilitate knowledge-sharing and indirectly encourage innovation and research.

Public authority impacts

This measure is likely to lead to **negative impacts** on public authority. The CMS would improve the compliance check for competent authorities on the permit installations' obligations and would streamline information on hazardous chemical substances from different legislations such as REACH, the WFD and the POPs Regulation. This would create synergies in the shorter term.

It is unclear, however, whether local competent authorities would require additional technical resources to assess the CMS data that operators would provide. The CMS would indeed provide valuable information on substances that are currently not considered during the BREF process such as SVHC although this would lead to an expansion in the scope of the BREF process and, therefore, could lead to increasing public authority burden, at least in the shorter term.

Based on the evidence available expert input, it is assumed that these efforts would require between 20 to 200 hours from public authorities every two years (50% of the costs incurred by operators). This is broadly equivalent to up to 10% of an FTE or spending between €550 and €5 700 every two years.

It is also assumed that around 50% of the IED installations or 26 000 could be targeted by this measure. As a result, this would imply that the additional administrative costs would range from €7 million to €74 million each year, on average, over a 20-year period, with a central estimate of €19 million. This is uncertain and depends upon the number of installations affected and their level of preparedness in the baseline.

Responses from the TSS by competent authorities suggest that negative impacts should be expected, although these are likely to be relatively small. The majority or 63% (12 out of 19) of respondents expect only limited negative impacts (+/-5% of cost impact). Other responses included a 5-15% increase in costs (3 out of 19 responses) and >15% increase in costs (4 out of

19 responses). As a further means of comparison, the IED impact assessment from 2007[38] provides details of administrative costs for permitting, including reviewing data for granting environmental permitting and audits for compliance. Under Annex 8 of the impact assessment an estimate of 3-10 days of staff time per permit at a cost of €8 700 - €14 500 was estimated. Depending on the complexity of the CMS and whether it included only the inventory of hazardous substances or further information on alternatives, could broadly fit within similar levels of staff effort.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** when compared to the baseline, which will depend upon the number of operators that would introduce a CMS into their EMS and the extent to which this is additional to the baseline.

Climate

This measure is likely to have **weakly positive impacts** on climate. The CMS would provide greater clarity over uses of chemicals, and therefore it is assumed would provide a more informed basis for selection of safer alternatives. However, note that 'safer' would be a broad term covering all environmental aspects. This can mean a chemical with a lower human health hazard profile has other less desirable environmental impacts (e.g., a higher GWP or water and resource demand). These issues are highly substance and site-specific meaning it is challenging to comment on the overall impacts. This said, this measure is intended to form a component part of the EMS and it is, therefore, expected that any actions under CMS will be considered with other activities and objectives, such as reducing the greenhouse gas emissions footprint of the industrial sectors.

Air quality

This measure is likely to result in a **weakly positive impact** on air quality. The CMS could fill the gap of tracking and reporting pollutants that are currently not covered by the E-PRTR such as SVHCs, substances listed in Annex I and III of the POPs Regulation and pollutants from industry sectors that do not report under the E-PRTR. The focus group on EMS and CMS also highlighted that an inventory of hazardous chemicals should go beyond those commercially purchased and include hazardous chemicals formed de novo during the process and any by-products. This would be of high importance for waste management, but could also help identify air emissions of chemicals of concern. The absolute environmental impact (% emission reduction) cannot be quantified as the impacts of the CMS such as increased awareness and potential reduction and/or substitution of hazardous chemicals would vary among the installations. The CMS would have more of an impact in the medium to longer term as new BATC have to be transposed into national legislation within four years.

[38] European Commission, 2007, 'Staff working document for impact assessment of the industrial emissions dirEUtive', COM(2007)844

Water quality and resources

This measure is likely to result in a **positive impact** on water quality and resources. The discussions with the focus group on EMS/CMS highlighted that the CMS would place harmonised obligations on operators to document and quantify chemical substances produced de novo during production processes as well as commercially acquired chemicals used and, therefore, would enable a proportionate and robust response to manage pollution, especially of water bodies through industrial releases and waste. It is expected that the CMS could have a significant positive impact on water quality, although similar to the expected impacts on air quality, the absolute environmental impact (% emission reduction) cannot be quantified as the impacts would vary among installations.

Soil quality or resources

This measure is likely to result in a **weakly positive impact** on soil quality and resources. Similar to air and water emissions, tracking and reporting priority substances, particularly those formed de novo at the facility. The absolute environmental impact (% emission reduction) cannot be quantified as the impacts would vary among the installations.

Waste production, generation, and recycling

This measure may lead to **weakly positive impacts** on waste production, generation, and recycling. In a similar aspect to the water component, generation of chemical substances (as by-products) can have implications for waste, and recycling. Greater understanding of the mass-balance and flow of material would help identify options to minimise the creation of harmful wastes and make existing waste flows easier to recycle. However, as with the other environmental categories quantifying specific benefits is challenging as it would industry sector and potential facility specific.

Efficient use of resources

This measure is likely to lead to **limited to no impact** on the efficient use of resources. There will be possible indirect benefits from greater visibility and understanding of the regulatory acquis.

Social impacts

This measure specifically is likely to result in some **impacts on employment, although the direction is unclear.** The preceding sections have highlighted that a form of CMS is already in use across many EU MS, with the specific details varying both by country and industry sector. However, a harmonised approach with clearly set-out expectations would help strengthen a level playing field and provide additional information that could support further innovation. It would also have the positive impact of raising confidence in the EU to tackle specific pollution issues, and strengthening the overall coherence between IED and its most closely related chemicals and environmental legislation.

The improved level playing field would have positive impacts in terms of business and employment. It would also further help identify where a transition to safer alternatives is needed, to both protect human health and the environment. However, the counter-factual to this position is illustrated by the TSS results and concerns raised by industry in the TSS and at the focus group for the EMS/CMS. Development of an inventory of hazardous chemicals is still not undertaken by many operators, particularly SMEs, and tools to help complete such an inventory are not in place and freely available at EU-level. This could represent significant additional costs, which may have an impact on employment.

The greater point of concern relates to the advanced components of the CMS, in particular work to undertake analysis of alternatives for hazardous substances, and where substitution might be possible. Many industry respondents indicated that this may represent significant effort and cost which could have consequences for employment. This being case, however, the NGO respondents at the focus group meeting also highlighted that such requirements are broadly in line with what is already expected and obligated under REACH, and that the full CMS requirements do not represent an expansion of scope, but rather additional support to the coherence between REACH and IED, including proper implementation of the Regulation and Directive respectively.

Measure 26: Require Member States' national authorities (or delegated competent authorities) to establish a national plan to promote industrial symbiosis.

Description of the measure and requirements for implementation

This measure entails the introduction of a requirement in the IED for Member States' national authorities (or delegated competent authorities) to establish a national plan to promote industrial symbiosis. Because this is a cross-cutting, cross-sectoral topic, the IED itself is a more suitable instrument than the individual BREFs. An IED article (or an Annex) would list a number of obligatory elements (e.g. financial support, regulatory facilitation, facilitation of information exchange, capacity building…), criteria or minimum quality standards for each of these national plans. To date, no specific information is available on which criteria would be fit for this purpose.

Inclusion of information in the BREFs and locally available information on types of IED (or non-IED) activities and their location, would support and feed information to these national industrial symbiosis plans.

On a second level, this could be complemented with an obligation for Member States to report on the progress/results of their national industrial symbiosis plans. For this, a harmonized set of indicators needs to be developed on the EU level.

An obligation to establish national plans to promote industrial symbiosis could be considered within the IED itself, as is proposed in this measure, but it could also be considered to be

included in other policy domains or instruments (e.g. related to CE or other policies within the EU Industrial Strategy). Indeed, there will be many instances were a (potential) industrial symbiosis relation will involve no (or not only) IED installations. Next to that, it is important to note that a main facilitating factor for industrial symbiosis is geographical proximity (which cannot be legally enforced), and that local rather than sectoral conditions and issues are important drivers. This might make the IED not the most suited instrument for promoting industrial symbiosis implementation. As an alternative to national plans, an EU coordinated plan or strategy could also be considered.

Objectives:

The measure will aim to increase the emphasis on industrial symbiosis and the circular management of resources in IED industrial sectors, whilst levelling the playing field. This measure will, therefore, contribute to the general objective of transforming the EU into a circular Economy and, more specifically, contributing towards the transition to a more circular Economic model for the EU in the short-to-medium term.

Implementation needs:

- On EU level, modification of IED legislation (if IED is chosen as the instrument)
- On Member State level:
    - regulation transposing the IED requirements
    - nomination of responsible body, human resources
    - policy documents and instruments
- Exchange of implementation practices/issues (e.g. through IMPEL network)

Assessing impacts

Economic impacts

Overall, this measure is likely to have **limited direct Economic impacts** when compared to the baseline, as these will largely depend on how national plans are established by public authorities and their ambitions.

Administrative burden on businesses

There are **no direct impacts** on businesses expected following the implementation of this measure. Indirect impacts are highly dependent on how national plans are established by public authorities.

Around half of the respondents to the TSS answered that there are existing national measures promoting industrial symbiosis. Evidence suggests that this may be an overestimate. Where these are plans already in place, there will likely be no or only a weakly negative impact on indirect costs.

Only a quarter of industry respondents (22) to the TSS were aware of national initiatives specifically for their sector. Around 40% of the respondents also confirmed that they refer to the sector's feedstock or wastes or by-products (15 and 14 respectively). However, the sample responding to these questions was very limited.

Operating costs and conduct of business

There are **no direct impacts** on businesses expected following the implementation of this measure. The scale and direction of indirect impacts are highly uncertain and dependent on how national plans are established by public authorities. However, it is unlikely that national plans will have a command and control nature, given the large diversity in industrial processes and in possible industrial symbiosis matches.

Competitiveness and level playing field

There are **no direct impacts** on competitiveness expected following the implementation of this measure. There are potential **limited indirect (positive) impacts** on level playing field due to EU level harmonized criteria/quality requirements for a national plan to promote industrial symbiosis.

Position of SMEs

There are **no direct impacts** on businesses expected following the implementation of this measure.

Innovation and research

This measure may have a **limited to no impact** on research and development. The national plans themselves may drive further innovation in (technologies for) matching residues from one activity with feedstock from another activity. Strategies for increasing resource efficiency that consider process technologies, ecodesign and cross-sectoral collaboration (e.g. industrial symbiosis) strongly rely on innovation and research.

Public authority impacts

This measure is likely to result in **weakly negative impacts** on public authorities. This obligation to develop national plans will require additional administrative efforts from public authority administrations, except for those cases (if any) were there is already an established national plan that meets the envisaged criteria/standards. In order for the measure to have a substantial environmental effect, public authorities would have to secure the development and putting in place of policies, mechanisms and measures, as well as their aligning with identified sector-specific roles of industrial installations in cross-sectoral collaboration

Costs of plans and initiatives to promote industrial symbiosis vary widely, given that there is no single standard for such initiatives, and they are therefore very different in the components they include, and the level of depth on each component. Some examples of development costs for IS

initiatives, often collaborations between multiple companies and national or local authorities, are:

- Life M3P project. Project budget of 1.5 M€, of which 60% was co-funded by the EU, "will study and implement an on-line platform to promote exchanging of industrial waste among the companies of manufacturing districts"
- H2020 Scaler project. Project budget of ca. 1 M€, funded by EU; "the project will develop a set of best practices, tools and guidelines, helping businesses and industrial sites work together to ensure sustainable resource use".
- H2020 Sharebox project. Project budget 5.9 M€, of which EU contribution 5.4 M€, "will develop a secure ICT platform (SHAREBOX) for the flexible management of shared process resources that will provide plant operations and production managers with the robust and reliable information that they need in real-time in order to effectively and confidently share resources (plant, energy, water, residues, and recycled materials) with other companies in a symbiotic ecosystem. A suite of new analysis and optimisation tools for flexible energy use and material flow integration will be developed for optimising symbiosis among companies. These tools will be based on input- output (IO) modelling for resource (waste and energy) supply-demand matching and process efficiency analysis (to understand physical and technological conditions), game theoretical (GT) approach for integrating company behaviour in cost-, benefit-, and resource-sharing (to understand Economic conditions), and agent-based modelling (ABM) for designing the (Economic, environmental, and social) optimal symbiotic network (to have the holistic optimum)"

There are also commercially available (international) IS-facilitating platforms and services provided by private for-profit enterprises, for which clients pay regular or service-based fees, as well as ad hoc/local collaborations/clusters, sometimes governed by a coordinating body.

About half of the respondents to the TSS for this study answered that there are existing national measures promoting industrial symbiosis. This is likely to be an overestimate. Nevertheless, where these plans are already in place, there will likely be no or only a weakly negative impact on public authority costs.

Environmental impacts

Overall, this measure is likely to have **limited direct environmental impacts** when compared to the baseline, as these will largely depend on how national plans are established by public authorities and their ambitions.

Climate

This measure will likely result in a **limited positive impacts** on climate. Although there is little evidence, and although the potential for industrial symbiosis is very much dependant on local conditions, such as proximity of potential matches, it should be expected that, in general, national plans increase the uptake/implementation of industrial symbiosis, which will benefit emissions of GHGs compared to the separately conducted, individual industrial activities. It is

important to demonstrate that potentially negative (cross-media) effects of an increased use of renewables, waste, by-products or secondary resources (either in absolute volume or as relative share), will not outweigh the, mostly direct, positive environmental effects. On the potential CO2 savings, see also 'Efficient use of resources' below.

Air quality

This measure is likely to result in a **limited positive** impacts on air quality. It is unclear if the increased uptake of industrial symbiosis will overall lead to lower or higher emissions of air pollutants (if any change at all). However, a national plan could focus on/promote those matches that have a beneficial effect on pollutant air emissions (or a relatively low negative effect compared to the amount of resources saved). It is important to demonstrate that potentially negative (cross-media) effects of an increased use of renewables, waste, by-products or secondary resources (either in absolute volume or as relative share), will not outweigh the, mostly direct, positive environmental effects.

Water quality and resources

This measure is likely to result in a **limited positive impacts** on water quality and resources. It is unclear if the increased uptake of industrial symbiosis will overall lead to lower or higher emissions of water pollutants (if any change at all). However, a national plan could focus on/promote those matches that have a beneficial effect on pollutant water emissions (or a relatively low negative effect compared to the amount of resources saved). It is important to demonstrate that potentially negative (cross-media) effects of an increased use of renewables, waste, by-products or secondary resources (either in absolute volume or as relative share), will not outweigh the, mostly direct, positive environmental effects.

Soil quality or resources

This measure is likely to result in a **limited to no impact** on soil quality and resources. It is unclear if the increased uptake of industrial symbiosis will overall lead to lower or higher emissions of soil pollutants (if any change at all). A national plan could focus on/promote those matches that have a beneficial effect on pollutant soil emissions (or a relatively low negative effect compared to the amount of resources saved), but it is unlikely that any industrial by-product matchmaking will impact these emissions to soil.

Waste production, generation, and recycling

This measure may lead to **weakly positive impacts** on waste production, generation, and recycling. While there is little evidence (see also 'Efficient use of resources' below) and although the potential for industrial symbiosis is very much dependant on local conditions – such as proximity of potential matches – it should be expected that in general national plans increase the uptake/implementation of industrial symbiosis. This will avoid waste generation compared to the separately conducted, individual industrial activities.

Efficient use of resources

This measure may lead to **weakly positive impacts** on the efficient use of resources. There is little evidence of impact of industrial symbiosis on efficient use of resources at the Economy level. The COWI report 'Economic analysis of resource efficiency policies' (2011) estimates, based on an extrapolation of the NISP results to Europe, that an investment of €250 million (as operating costs of the programme) would generate environmental benefits of 52 million tonnes of landfill diversion and 46 million tonnes of CO_2 reduction. The report 'Cooperation fostering industrial symbiosis: market potential, good practice and policy actions' by University College London, Technopolis Group and Trinomics (2018) estimates cost avoidance linked to waste prevention and landfill diversion of €73 billion, and value generated by secondary materials in a range of €7 billion to €13 billion.

Although the potential for industrial symbiosis is very much dependant on local conditions, such as proximity of potential matches, it is expected that, in general, national plans may lead to an increase in the uptake/implementation of industrial symbiosis, which will decrease consumption of resources compared to the separately conducted, individual industrial activities.

The report further refers to a particularity of the Basque country's approach, in which they use the knowledge of IPPC activities to promote regional synergies. According to the publication on this approach '36 Circular Economy demonstration projects in the Basque country. Results from business initiatives[39] . The report 'IED contribution to the circular Economy' (Ricardo and VITO, 2019), contains a number of case studies with their resource savings and other environmental and financial benefits, and several other reports and databases are available.

However, with the information available at this stage, it is not possible to estimate the potential that could be realised by requiring national authorities to establish national plans. The reports and studies identified suggest that evidence available is limited and fragmented, and that IS activity may be unreported.

Stakeholders participating in the TSS were asked about the untapped potential of IED actions for the following categories: Water use efficiency & water reuse; Choice of primary/ secondary feedstock and fuels; Waste reduction and recycling; Energy use; and Improved environmental performance over the supply chain. One of these IED actions was 'Promotion of industrial symbiosis by Member States/regions/intra-sector and inter-sector local systems'. Overall, industry stakeholders and national authorities expected the lowest and similar levels of untapped potential across categories (mostly around -0.4 on a scale from -1 to 1), whilst they had higher expectations for the potential across waste reduction and recycling. Local and regional authorities (mostly +0.4, but +0.2 for water) and Environmental NGO (mostly +1.0, but +0.25 for energy) expected higher levels of potential across all categories.

[39] (Ihobe, 2016) "In a successful outcome, the projEUts estimate potential savings of 276,000 tonnes of materials per year, a turnover of 38.7 million euros annually and the creation of 156 new jobs"

Social impacts

This measure has **unclear impacts** on employment.

Summary of problem area 3 measures

For the measures presented in problem area 3, Table 18 summarises the Economic, environmental and social impacts of the measures using the qualitative ratings. Overall, these policy measures would generate limited to negative Economic impacts, positive environmental impacts and limited social impacts at least in the shorter to medium term. This suggests that, as a response to these policies, IED operators may incur some Economic costs to improve their energy, water and materials efficiency through implementation of measures that would facilitate such efficiency improvements. The analysis primarily qualitative, and the benefits are especially uncertain as they depend on the outcomes of technological advances and investment decisions by operators.

Table A8-18: Summary of Economic, environmental and social impacts for measures in problem area 3

Policy measures	Economic impacts	Environmental impacts	Social impacts (employment focus)
#23	✗	✓	O
#24	✗	✓✓	O
#25	✗	✓✓	O
#26	✗	✓	U/O

Table A8-19 similarly uses qualitative ratings to summarise costs and benefits for measures in problem area 3. Overall, expected benefits associated with measures 23, 24 and 25 to increase energy, water and materials efficiency through implementation of measures that would facilitate such improvements are likely to outweigh costs. There is uncertainty, however, associated with the cost and benefit balance of introducing national symbiosis requirements (#26).

Table A8-19: Summary of costs and benefits for measures in problem area 3, with central estimates of administrative costs for businesses and public authorities shown

Policy measure	Administrative costs – businesses (€m/yr)	Administrative costs – public authorities (€m/yr)	Overall costs	Overall benefits
#23	7	6	✖	✓
#24	16	12	✖	✓✓
#25	46	23	✖✖	✓✓✓
#26	No/limited	Not estimated	✖	✓

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PART 4/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
{SWD(2022) 112 final}

Annex 8: Impact of Shortlisted Measures – Industrial Emissions Directive

Problem area 4: The IED's contribution to reducing greenhouse gas emissions has been limited

There are four measures shortlisted to address the problems, drivers and consequences associated with this problem area. For example, the IED's design and implementation to date have not prioritised greenhouse gas emissions and, as a result, the IED has not been as effective as it could be in contributing to reducing GHG (Ricardo et al, 2020).

We have structured these measures based on the specific problems they are trying to tackle and provide a description, outline the requirements for implementation and a rapid assessment of their impacts. Following this, we provide an overview of the Economic, environmental, and social impacts supported by evidence.

Measure 27: Delete Article 9(2) that exempts (agro-) industrial installations from setting requirements relating to energy efficiency in respect of combustion units or other units emitting carbon dioxide on the site.

Description of the measure and requirements for implementation

This measure would ask operators of IED installations to develop a plan that would comply with energy efficiency requirements, where energy efficiency concerns the carbon emitting technical units rather than energy efficiency per ton of product.

The definition of energy efficiency is key for this measure from the outset, especially given the different ways in which energy efficiency is defined and considered in other EU legal instruments. If it were defined per ton of product, there could be barriers to implementation associated with confidential business information. Similarly, setting a range of energy efficiencies may get pushed back from industry.

Having considered this, energy efficiency in this proposed measure has been defined in terms of carbon emitting units.

Objectives:

The measure seeks to enhance the energy efficiency of IED installations. This measure will, therefore, contribute to the general objective of achieving carbon neutrality in the EU, and more specifically, support the decarbonisation of the (agro-)industrial sectors covered by the IED.

Implementation needs:

- EU to define energy efficiency for the purposes of this proposed measure and scope for carbon emitting technical units

- Authorities and operators to establish a monitoring and reporting / enforcement approach that is proportionate and effective, building e.g. on the approach used for EMS BAT conclusions
- Operators to follow through with the plan's implementation and engage in periodic discussions (during inspections or otherwise) with the competent authorities to review the conditions of the permits

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** when compared to the baseline, depending on the number and ambition of additional energy efficiency plans developed as a result of this measure.

Operating costs and the conduct of businesses: **PO4-a-energy efficiency** will also lead to an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether are measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts.

Administrative burden on businesses

This measure is likely to lead to **negative impacts** on administrative burden on businesses, primarily from the development of additional energy efficiency plans. The measure will require adjustments to the BREF and permitting processes, which are likely to increase the frequency and duration of administrative activities for businesses and public authorities.

A review of the evidence suggests that a marginal cost could be expected, since energy efficiency is already encouraged in certain BAT conclusions and around half of the installations may already have energy efficiency plans in place. This marginal administrative cost would, therefore, be incurred by approximately 26 000 IED installations, each of which may require time and resources to develop and implement these plans.

To estimate core planning costs for these installations, the Ecodesign Directive could be a starting point. The Ecodesign Directive provides rules for improving the environmental performance of products, setting increasing minimum mandatory requirements for the energy efficiency of these products. An energy efficiency plan under the IED could ensure that the Ecodesign requirements are better implemented and, therefore, allow more efficient forms of combustion when compared to the baseline. To estimate the impacts of energy efficiency requirements, two different industries can be taken as representative examples, that is the

industry for electronic displays[1] and the one for welding equipment[2]. In the first case, because of commercial interest, no administrative burden for the industry is expected. In the second example, the administrative costs associated with reporting and communication of energy and material efficiency data in the supply chain is very low with respect to expected revenues from the measure.

In the baseline, the costs to operators from engaging in these activities are estimated based on multiple sources outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)
- Costs associated with BREF reviews (once every 10 years per sector)
- Annual monitoring and reporting costs (once every year)
- Costs associated with supporting inspections (once every two years)

Upon the adoption of this measure and over a 20-year period, the additional effort required is uncertain although, based on expert judgement, it is assumed that it would lead to an addition of 10% over the baseline. As a result, over this period, additional administrative costs could range between €1 million and €44 million each year for operators, on average, with a central estimate of around €29 million each year.

Additional administrative costs would be incurred if this measure is implemented in isolation, especially as there would be a need for operators to expand their efforts with review permits, the BREF review process, receive and maintain more reported data, and support inspections and other enforcement-related activities.

Operating costs and conduct of business

This measure is likely to have **weakly negative impacts** on the costs of doing business. For those installations without an energy efficiency plan especially, this measure would be expected to require capital investments earlier than planned, bringing therefore costs forward. Further, operating cost impacts would depend on the measures implemented. Lower energy costs would be expected although further evidence could be sourced from the IA of Ecodesign Directive, considering the two industry examples mentioned above.

In particular, energy efficiency measures are estimated to create €66 billion in extra revenue for European companies per year[3].

For those industries for which no correlation is expected between the retail prices and the energy efficiency (such as for electronic displays), business revenues and jobs will not differ from the BAU scenario[4]. In addition, market competitiveness requires dynamic industries to invest in production, redesign, and test more efficient products, whose costs will be absorbed by the industry.

Differently, investments for energy and material savings are possible for welding equipment. However, initial investments by the industry and retail sector are compensated by the higher

[1] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354
[2] SWD/2019/0340 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0340
[3] https://EU.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-EUodesign/about_en
[4] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354

revenues generated[5]. As for the previous example, compliance and redesign costs are not expected to increase because they are a common practice in the industry.

Competitiveness and level playing field

This measure would likely lead to **limited to no impacts** on competitiveness and **weakly positive impacts** on levelling the playing field. The costs of the measure are unlikely to be significant to affect the competitiveness of EU businesses in a global context. The measure would require all installations across the EU to introduce energy efficiency plans and, therefore, would lead to a more level playing field when compared to the baseline.

Position of SMEs

This measure is likely to lead to **limited to no impacts** on the position of SMEs. The measure is not expected to affect small and large businesses differently.

In particular, considering the Ecodesign directive example, for some industries (e.g. electronic displays), SMEs do not work in the production chain and no impact is expected on SMEs retailers[6].

Innovation and research

This measure may have a **limited to no impact** on research and development, as it is not focussed on pushing the innovation frontier but rather implementing available techniques/ equipment. This said, this measure will likely encourage more investment in developing and testing innovative techniques and technologies, to help operators comply in a cost-efficient manner with potentially more stringent energy efficiency and GHG requirements,.

Setting ambitious mandatory minimum Ecodesign-style requirements would boost innovation in terms of energy efficiency, as currently there is no relevant Research and Development in the field of display-technology in the EU[7].

For welding equipment-like industries, the Ecodesign regulation with energy efficiency measures is not expected to lead to any significant structural increase in R&D budgets. Energy-efficient products are already commercially available on the market. However, SMEs may undertake investments to adapt the supply chain routes to the required power source technology change[8].

Public authority impacts

This measure will likely lead to **negative impacts** on public authorities.

A review of the evidence suggests that a marginal cost could be expected, since energy efficiency is already encouraged in certain BAT conclusions and around half of the installations may already have energy efficiency plans in place. This marginal administrative cost would, therefore, be incurred by approximately 26 000 IED installations, each of which may require time and resources to develop and implement these plans.

[5] SWD/2019/0340 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0340
[6] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354
[7] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354
[8] SWD/2019/0340 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0340

In the baseline, the costs to operators from engaging in these activities are estimated based on multiple sources outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)
- Costs associated with BREF reviews (once every 10 years per sector)
- Annual costs from engaging with information received from operators and maintaining systems (once every year)
- Costs associated with leading and managing inspections (once every two years)

Upon the adoption of this measure and over a 20-year period, the additional effort required is uncertain although, based on expert judgement, it is assumed that it would lead to an addition of 10% over the baseline. As a result, over this period, additional administrative costs could range between €2 million and €29 million each year for operators, on average, with a central estimate of around €21 million each year.

Additional administrative costs would be incurred if this measure is implemented in isolation, especially as there would be a need for public authorities to expand their efforts with review permits, the BREF review process, receive and maintain more reported data, and manage expanded inspections and other enforcement-related activities.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** when compared to the baseline, depending on the number and ambition of additional energy efficiency plans developed as a result of this measure.

Climate

This measure will likely lead to **weakly positive to positive impacts** on climate. This measure is expected to improve the energy efficiency of IED installations across the EU when compared to the baseline, and, as a result contribute to achieving EU Green Deal objectives[9]. The scale of this impact will likely vary by sector, with those operating bespoke energy systems such as iron and steel installations likely to see less savings than those sectors using a more standard energy boiler/ generator system, although the evidence is limited. This option should also have positive knock-on effects on air quality and other environmental categories via reduced fuel use and combustion.

Illustratively, the environmental impacts derived from energy efficiency measures can be estimated using the Ecodesign and the Energy labelling directives as a comparative example. Such pieces of legislation are estimated to bring energy savings of approximately 230 Mtoe by 2030[10].

More specifically, energy efficiency measures for electronic display-like industries under the Ecodesign directive are estimated to produce a cumulative decrease in GHG emissions with respect to baseline, from 22 to 98 Mt CO2 eq/a in the period 2021-2030. Similarly, EU

[9] https://carbonmarketwatch.org/publications/a-new-industry-framework-for-achieving-the-eu-green-deal-zero-pollution-goal/

[10] https://EU.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-EUodesign/about_en

electricity consumption would decrease between 64 and 277 TWh/yr with respect to baseline in the same period[11].

Energy efficiency measures for welding equipment-like industries under the Ecodesign directive are estimated to produce a cumulative decrease in GHG emissions with respect to baseline, from 1.73 to 3.03 Mt CO2 eq/a in the period 2019-2030. Similarly, EU electricity consumption would decrease between 6.18 and 10.3 TWh/yr with respect to baseline in the same period[12].

Air quality

This measure is likely to result in a **weakly positive** impact on air quality. Energy efficiency measures are expected to have a direct impact on reducing the emission of pollutants to air when compared to the baseline.

Other environmental impacts

This measure will likely have **limited to no impacts** on water quality and resources; soil quality and resources; waste production, generation and recycling; and the efficient use of resources.

Social impacts

This measure specifically is likely to result in a **limited to no impact** on employment, although some employment opportunities may arise from the development and implementation of the energy efficiency plans. No impact on EU employment is expected for products for which no correlation is expected between energy efficiency and retail price[13].

However, it should be noted that environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory disease, and leading to reductions in health and social care costs across the EU. Any reductions in GHG emissions would contribute to climate change mitigation.

Measure 28: Introduce a review clause of the interface between the IED and the ETS

Description of the measure and requirements for implementation

Article 9(1) of the IED prevents the setting of emission limit values in permits for GHG where those emissions are addressed under the EU ETS. This measure introduces an opportunity to review the coherence of the two directives and identify how to maximise synergies between them in achieving the EU's climate objectives.

Objectives:

[11] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354
[12] SWD/2019/0340 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0340
[13] SWD/2019/0354 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52019SC0354

The measure will aim to consider ways in which to maximise the synergies between the IED and climate policy, in particular the ETS. This measure could, therefore, contribute to the general objective of achieving carbon neutrality in the EU, and more specifically, support the decarbonisation of the (agro-)industrial sectors covered by the IED.

Implementation needs:

- Competent Authorities to engage with stakeholders and consider whether the IED could better contribute to EU climate objectives more directly and in a way that maximise synergies with the EU ETS.

Assessing impacts

Economic impacts

This measure is likely to have **limited to no direct economic impacts**. The measure would have very limited administrative burden impacts, primarily on public authorities, although operators may be consulted, since a review would be carried out in the EU policy context.

Environmental impacts

This measure is likely to have **limited to no direct environmental impacts**. However, reviewing what steps may be most effective with regards to synergies between IED and ETS could help ensure that any potential conflicts with the ETS mechanism are avoided and, as result, maximise the potential positive benefits.

Social impacts

This measure is likely to result in **limited to no direct impacts** on employment across the EU.

Measure 29: Introduce a limit of 2035 ('sunset date') beyond which the exemption for (agro-) industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS will not apply.

Description of the measure and requirements for implementation

Article 9(1) of the IED prevents the setting of emission limit values in permits for GHG where those emissions are addressed under the EU ETS. This measure would seek to introduce ELVs for GHG into permit conditions for IED installations from 2035, as an alternative to the immediate deletion of Article 9(1) considered in the following section. 2035 was chosen as a point between the 2030's target of 55% emissions reduction and 2050's carbon neutrality goal. This would provide the industry with time to review and adjust their course of action so they can contribute to the EU's journey towards climate neutrality. Further, deferring the deletion of Article 9(1) would also provide time to consider further the interaction between the IED and the EU ETS to ensure coherence and effective implementation.

Objectives:

The measure will aim to address GHG emissions more directly as part of the IED permitting process. This measure will, therefore, contribute to the general objective of achieving carbon neutrality in the EU, and more specifically, support the decarbonisation of the (agro-)industrial sectors covered by the IED.

Implementation needs:

- Competent Authorities to consider actions to ensure coherence between the IED and EU ETS.
- All stakeholders involved in the BREF process would consider BAT-AELs for GHG emissions from 2035, although industry's implementation of any substantive actions may take an additional 5-10 years.
- Operators and Competent Authorities would consider these BAT conclusions in any new or updated permits.

Assessing impacts

Economic impacts

This measure is likely to have **limited to weakly economic impacts** in the period. The measure would have similar albeit delayed impacts associated with measure 30, which is an alternative.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses. Additional administrative costs would be incurred, especially as there would be a need to include GHG emissions as part of permit reviews, the BREF review process, monitor and report more data, and engage with inspections and other enforcement-related activities.

In the baseline, the costs to operators from engaging in these activities are estimated based on multiple sources, as outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)
- Costs associated with BREF reviews (once every 10 years per sector)
- Annual monitoring and reporting costs (once every year)
- Costs associated with supporting inspections (once every two years)

These additional costs would only affect IED installations from 2035 or thereafter. It is assumed that there would be a period longer than 5 years over which operators can adjust to the new requirements; and that around 13 000 installations may be affected by this measure within the period. Each of these operators will require time and resources to implement this measure. The additional effort required is uncertain although, based on expert judgement, it is assumed to be an additional 10% over the baseline for each of the activities outlined.

As a result, additional administrative costs for operators could reach between €0.7 million and €23 million each year over a 20-year period, on average, with a central estimate of around €15 million each year. These costs are averaged over the period for comparison in a context where implementation timings are generally uncertain and undefined, even though in this case they would be backloaded from 2035.

Having said this, Article 8 of the EU ETS states that Member States shall take the necessary measures to ensure that, where installations carry out activities that are included in Annex I to IED, the conditions and procedure for the issue of a GHG emissions permit are coordinated with those for the issue of a permit provided for in that Directive. This can reduce the administrative burden on IED installation operators for obtaining and managing permits where both Directives apply, although the magnitude of this impact is likely to be small albeit uncertain given the evidence available.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. Compliance costs could differ significantly by sector and would be incurred from 2035 and more likely within 5-10 years. However, stricter GHG requirements would likely result in changes to capital and operating expenditure. This may be explored further through the use of case studies.

This measure may also free up allowances and, as a result, business may invest in research and development to identify and introduce technologies and/or techniques that comply with a plausible EU's carbon neutrality pathway. The iron and steel roadmap developed by Eurofer can be used to identify an example of a potential pathway.

It is not feasible to estimate these costs without further evidence on how installations may expect to transform over the coming decades and associated costs when compared to the baseline.

Competitiveness and level playing field

This measure will likely lead to **limited to no impact** on competitiveness, and a **weakly positive impact** on levelling the playing field. Costs for businesses would increase albeit not significantly and, therefore, the position of EU businesses in the global context would not necessarily worsen as a result of this measure. It is also unlikely to benefit businesses, unless decarbonising relatively early could lead to a first-mover advantage and/or acquiring competitive advantage against businesses operating outside of the EU.

The measure will, however, likely lead to an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether are measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts. It is notable that the measure would likely result in a more consistent approach across the EU (in terms of defining GHG ELVs in permit conditions).

Position of SMEs

The measure is **not expected to affect** businesses disproportionately depending on their size.

Innovation and research

This measure may have a **weakly positive impact** on research and development. A recent study on the wider environmental impacts of industry decarbonisation[14] by Wood reviewed new technologies that can address GHG emissions and considered their level readiness of readiness. One of the conclusions was that needing to comply with GHG ELVs was one of the drivers for why these technologies were being researched and developed. It is, therefore, expected that the (agro-)industry may seek to invest in research and development to identify, test and introduce technologies and/or techniques that would allow them to comply with new ELVs in a manner that is as cost-efficient as possible.

Public authority impacts

This measure is likely to have a **weakly negative impact** on public authorities. Additional administrative costs would be incurred, especially as there would be a need to include GHG emissions as part of permit reviews, the BREF review process, manage and maintain more complex information systems, and manage with inspections and other enforcement-related activities.

In the baseline, the costs to public authorities from engaging in these activities are estimated based on multiple sources outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)
- Costs associated with BREF reviews (once every 10 years per sector)
- Annual costs from engaging with information received from operators and maintaining systems (once every year)
- Costs associated with leading and managing inspections (once every two years)

These additional costs would only affect IED installations from 2035 or thereafter. It is assumed that there would be a period longer than 5 years over which operators can adjust to the new requirements; and that around 13 000 installations may be affected by this measure within the period. Public authorities will require time and resources to d implement this measure. The additional effort required is uncertain although, based on expert judgement, it is assumed to be an additional 10% over the baseline for each of the activities outlined.

As a result, additional administrative costs for public authorities could range between €1 million and €17 million each year over a 20-year period, on average, with a central estimate of around €11 million each year. These costs are averaged over the period for comparison in a context where implementation timings are generally uncertain and undefined, even though in this case they would be backloaded from 2035.

[14] Wood, Deloitte, IEEP (2021). Wider environmental impacts of industry decarbonisation.

Environmental impacts

This measure is likely to have **limited to weakly positive environmental impacts**, as these will primarily depend upon how this measure would affect the policy outcomes of the EU ETS.

Climate

IED#29 may result in GHG emission reductions at the specific installations, depending on the stringency of GHG emission limits derived under IED. Overall, the impacts on climate are unclear. The measure may also have other positive environmental impacts, such as on air quality and resource use, as decarbonisation techniques may have also positive impacts on overall depollution, and hence environmental protection. The IED #29 sunset clause regarding Article 9(1) may, however, delay potential positive impacts, compared to the immediate deletion of Article 9(1).

Coherence between potential changes to the IED and the EU ETS should be considered further to ensure that these potential negative impacts are mitigated (e.g. aligning these impacts with a reduction in carbon allowances). Any of these potential impacts would be deferred to 2035-2045.

Air quality

This measure is likely to result in **limited to weakly positive impacts** on air quality. This measure would encourage a more holistic approach towards all core polluting emissions, including GHG, which is likely to lead to actions that are more closely aligned with the EU's general objectives. However, considering the market interference with the EU ETS, the overall effects of deleting Article 9(1) are not clear. Any of these potential impacts would be deferred to 2035-2045. There are significant uncertainties that limit our ability to quantify these impacts reasonably.

Other environmental impacts

This measure will likely have a **limited to no impact** on water quality and resources; soil quality and resources; waste production, generation and recycling; and the efficient use of resources.

Social impacts

This measure specifically is likely to result in **limited to weakly positive impact** on employment. Additional employment might be required to comply with new obligations and produce and use additional information in the BREF process.

Measure 30: Delete Article 9(1) that exempts (agro-) industrial plants from setting GHG ELVs requirements in permit conditions if they are regulated by the EU ETS.

Description of the measure and requirements for implementation

Article 9(1) of the IED prevents the setting of emission limit values in permits for GHG where those emissions are addressed under the EU ETS. The legislation that transposes the IED in the majority of MS (21 out of 27) does not include emission or concentration limits for CO_2[15]. This measure would change this by deleting this provision, thereby allowing IED permits to contain GHG ELVs. Consequently, BREFs would set BAT-AELs for GHG emissions.

This provision was included in the IED to avoid unintended consequences or interference with the market mechanism employed under the EU ETS[16]. This potential interaction should be considered prior to implementation of this measure to limit any negative impact on the EU ETS mechanism.

It is proposed that this measure is implemented with an initial focus on sectors emitting relatively more GHG emissions. This may include gas refineries, combustion plants, production of cement, and iron and steel production.

This measure would be expected to lead to implementing some actions by operators from 2030, especially given the expected timings for updated/ revisions of pertinent BREFs by 2026, and the follow-on implementation of permits requirements by IED installation operators.

Objectives:

The measure will aim to address GHG emissions more directly as part of the IED permitting process. This measure will, therefore, contribute to the general objective of achieving carbon neutrality in the EU, and more specifically, support the decarbonisation of the (agro-)industrial sectors covered by the IED.

Implementation needs:

- Competent Authorities to consider actions to ensure coherence between the IED and EU ETS.
- All stakeholders involved in the BREF process would consider BAT-AELs for GHG emissions immediately, although industry's implementation of any substantive actions may take an additional 5-10 years.
- Operators and Competent Authorities would consider these BAT conclusions in any new or updated permits.

[15] https://www.eea.europa.eu//publications/application-of-the-european-union

[16] https://eeb.org/library/eeb-comments-to-the-european-commission-study-preliminary-determination-of-key-environmental-issues-kei-for-industrial-sEUtors-in-bref-reviews-under-the-ied/ argues that no double regulation would exist as a result of the different mechanisms by which emissions are addressed under the IED and EU ETS.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **weakly negative Economic impacts** when compared to the baseline.

Administrative burden on businesses

This measure is likely to lead to **negative impacts** on administrative burden on businesses. Additional administrative costs would be incurred, especially as there would be a need to include GHG emissions as part of permit reviews, the BREF review process, monitor and report more data, and engage with inspections and other enforcement-related activities.

In the baseline, the costs to operators from engaging in these activities are estimated based on multiple sources outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)
- Costs associated with BREF reviews (once every 10 years per sector)
- Annual monitoring and reporting costs (once every year)
- Costs associated with supporting inspections (once every two years)

This measure would affect all of the existing 52 000 IED installations (and new ones) over the 20-year period. Each of these operators will require time and resources to implement this measure. The additional effort required is uncertain although, based on expert judgement, it is assumed to be an additional 10% over the baseline for each of the activities outlined. As a result, additional administrative costs for operators could reach between €2 million and €86 million each year over a 20-year period, on average, with a central estimate of around €56 million each year.

Having said this, Article 8 of the EU ETS states that Member States shall take the necessary measures to ensure that, where installations carry out activities that are included in Annex I to IED, the conditions and procedure for the issue of a GHG emissions permit are coordinated with those for the issue of a permit provided for in that Directive. This can reduce the administrative burden on IED installation operators for obtaining and managing permits where both Directives apply, although the magnitude of this impact is likely to be small albeit uncertain given the evidence available.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on the costs of doing business. Substantive compliance costs could differ significantly by sector. However, stricter GHG requirements would likely result in an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether are measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life

cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts.

Competitiveness and level playing field

This measure will likely lead to **limited to no impact** on competitiveness, and a **weakly positive impact** on levelling the playing field. Costs for businesses would increase albeit not significantly and, therefore, the position of EU businesses in the global context would not necessarily worsen as a result of this measure. It is also unlikely to benefit businesses unless decarbonising relatively early could lead to a first-mover advantage and/or acquiring competitive advantage against businesses operating outside of the EU.

The measure would likely result in a more consistent approach across the EU (in terms of defining GHG ELVs in permit conditions). However, issues could arise from market interference with the EU ETS. The carbon price would be impacted by imposing more ambitious objectives to reduce (agro-)industrial emissions, an environmental performance approach that contrasts with the EU ETS mechanism which allows the market to determine the appropriate price for carbon. More specifically, carbon allowances granted under the EU ETS to an IED-regulated sector could become available for trading i.e. increasing supply of allowances, thus deflating the CO_2 price.

Position of SMEs

The measure is **not expected to affect** smaller businesses disproportionately.

Innovation and research

This measure may have a **weakly positive impact** on research and development. A study on the wider environmental impacts of industry decarbonisation[17] by Wood reviewed new technologies that can address GHG emissions and considered their level of readiness.

One of the conclusions was that needing to comply with GHG ELVs was one of the drivers for why these technologies were being researched and developed. It is, therefore, expected that the (agro-)industry may seek to invest in research and development to identify and introduce technologies and/or techniques that would allow them to comply with new ELVs as efficiently as possible.

Public authority impacts

This measure is likely to have a **negative impact** on public authorities. Additional administrative costs would be incurred, especially as there would be a need to include GHG emissions as part of permit reviews, the BREF review process, manage and maintain more complex information systems, and manage with inspections and other enforcement-related activities.

In the baseline, the costs to operators from engaging in these activities are estimated based on multiple sources outlined earlier in this Annex:

- One-off costs associated with permit reviews (once every 10 years)

[17] Wood, Deloitte, IEEP (2021). Wider environmental impacts of industry decarbonisation.

- Costs associated with BREF reviews (once every 10 years per sector)
- Annual monitoring and reporting costs (once every year)
- Costs associated with supporting inspections (once every two years)

This measure would affect all of the existing 52 000 IED installations (and new ones) over the 20-year period. Public authorities will require time and resources to implement this measure. The additional effort required is uncertain although, based on expert judgement, it is assumed to be an additional 10% over the baseline for each of the activities outlined. As a result, additional administrative costs for public authorities could reach between €3 million and €55 million each year over a 20-year period, on average, with a central estimate of around €40 million each year.

Environmental impacts

This measure is likely to have **limited to weakly positive environmental impacts**, as these will primarily depend upon how this measure would affect the policy outcomes the EU ETS.

Climate

This measure will likely have **unclear impacts** on climate. Immediate deletion would likely result in GHG emission reductions at the specific installations, depending on the stringency of GHG emission limits derived under IED. This may also have other positive environmental impacts, such as on air quality and resource use, as decarbonisation techniques may have also positive impacts on overall depollution, and hence environmental protection.

There are significant uncertainties that limit our ability to quantify these impacts reasonably. For example, Carbon Capture and Storage (CCS) technologies can capture CO_2 emissions produced and/or associated with industrial processes[18]. CCS in industrial applications is projected to facilitate a reduction of CO_2 emissions by up to 4.0 Gt a year by 2050[19], approximately 9% of the global reductions needed to halve energy-related CO_2 emissions in 2050. Such an outcome would require the installation of CCS equipment in 20%-40% of industrial and fuel transformation plants by 2050[20]. These actions could be encouraged by introducing GHG ELVs.

According to Carbon Market Watch, this measure would enable a combined approach to GHG emissions[21]. "The prohibition in Art. 9(1) of the IED on including limits on GHG emissions in IED operating permits is unhelpful, and it unnecessarily restricts the options available to Member States with respect to undertaking measures that promote GHG emission reductions of industrial installations".[22] Forcing stricter performance-based standards for

[18] http://www.ccsassociation.org/what-is-ccs/

[19] http://www.iea.org/publications/freepublications/publication/TEUhnologyRoadmapCarbonCaptureandStorage.pdf

[20] The Role of Industrial Emissions Within the EU: Trends and Policy | Climate Policy Info Hub

[21] https://carbonmarketwatch.org/publications/a-new-industry-framework-for-achieving-the-eu-green-deal-zero-pollution-goal/

[22] https://carbonmarketwatch.org/publications/carbon-market-watchs-response-to-the-inception-impact-assessment-on-industrial-emissions-dirEUtive-revision/

GHG pollution and energy efficiency not only leads to incremental improvements for wider air pollution but also benefits resource consumption aspects as well as climate protection.

Air quality

This measure is likely to result in **limited to weakly positive impacts** on air quality. This measure would encourage a more holistic approach towards all core polluting emissions, including GHG, which is likely to lead to actions that are more closely aligned with the EU's general objectives. However, considering the market interference with the EU ETS, the overall effects of deleting Article 9(1) are not clear. There are significant uncertainties that limit our ability to quantify these impacts reasonably.

Other environmental impacts

This measure will likely have a **limited to no impact** on water quality and resources; soil quality and resources; waste production, generation and recycling; and the efficient use of resources.

Social impacts

The measure is likely to have a weak or insignificant impact on employment in the EU. Additional employment might be required to comply with new obligations (particularly with regard to new techniques to reduce GHG emissions); however, additional CAPEX/ OPEX expenditure by operators might result in some (possibly temporary) loss of jobs.

A clearer benefits is that the aforementioned associated positive environmental impacts, especially the reduction on emissions to air, are likely to have positive impacts on public health in the EU, by reducing the risk of disease, especially respiratory disease, and leading to reductions in health and social care costs across the EU. Any reductions in GHG emissions would also contribute to climate change mitigation.

Summary of problem area 4 measures

For the measures presented in problem area 4, **Table 20** summarises the Economic, environmental and social impacts of the measures using the qualitative ratings. Overall, these policy measures would generate weakly negative Economic impacts, weakly positive environmental impacts and limited social impacts at least in the shorter to medium term. This suggests that, as a response to these policies, IED operators may incur some Economic costs to improve their energy efficiency and/or carbon footprint, with associated by-product environmental benefits on air quality and others. The analysis primarily qualitative, and the benefits are especially uncertain as they depend on technological progress and investment decisions by operators.

Table A8-20: Summary of Economic, environmental and social impacts for measures in problem area 4

Policy measures	Economic impacts	Environmental impacts	Social impacts (employment focus)

Policy measures	Economic impacts	Environmental impacts	Social impacts (employment focus)
#27	✗	✓	O
#28	O/✗	O/✓	O
#29	✗	✓	✓
#30	✗	✓	✓

Table A8-21 similarly uses qualitative ratings to summarise costs and benefits for measures in problem area 4. Overall, expected benefits associated with measures 27 and 28 are likely to outweigh the costs. These measures would address some of the IED's limitations in contributing to the EU's climate objectives. There is uncertainty, however, associated with the cost and benefit balance of deleting Article 9(1) prior to an in-depth review that can ensure coherence with the EU ETS, especially for measure #30, which presents an unbalanced position due to the uncertainty around the potential benefits to GHG emissions in the EU-27.

Table A8-21: Summary of costs and benefits for measures in problem area 4, with central estimates of administrative costs for businesses and public authorities shown

Policy measure	Administrative costs – businesses (€m/yr)	Administrative costs – public authorities (€m/yr)	Overall costs	Overall benefits
#27	29	21	✗✗	✓✓
#28	No/limited	No/limited	O	O
#29	15	15	✗	✓
#30	56	40	✗✗	✓

Problem area 5: The IED does not regulate some highly polluting (agro-) industrial sectors

Introduction to Measures 31 to 33:

The first three measures considered in this section are inter-related. They are:

- **(31) Include cattle farming within the scope of the IED**. This measure needs to define a threshold for farm size above which the cattle farms would be considered within the IED. The capacity threshold could be set based on number of places or on the basis of livestock units (LSUs), a reference unit that facilitates the aggregation of livestock from various species and age. A threshold within the range of 50-150 Livestock Units (LSU) could mean that an additional 84 000-330 000 cattle farms could be regulated under the IED.
- **(32) Amend the capacity thresholds of the rearing of pigs and poultry (IRPP) considered under activity 6.6 of Annex I**. This measure seeks to consider lowering the current capacity thresholds to include the environmental impacts of slightly smaller farms. The thresholds could be set using number of places or based on LSUs. A threshold within the range of 50-150 LSU could mean that additional 77 000-187 000 poultry and pig farms could be regulated under the IED.
- **(33) Introduce a tailored regulatory framework for installations carrying out rearing of animals**. Around 40% of the existing IED installations are related to rearing of animals. The IED's scope expansion would include cattle farming and more poultry and pig farms, leading to around four to eleven times more installations that would be regulated by IED. This would translate into significant additional administrative and operational burden for businesses and public authorities and, therefore, a lighter administrative process is proposed for all installations rearing animals with this tailored regulatory framework.

The tailored regulatory approach as introduced above, would need to be introduced hand-in-hand with the measures to introduce cattle farms and to reduce the existing IRPP threshold, in order to avoid an overly burdensome regulatory cost to business and authorities. It is also important to note upfront that for both the cattle farms and the smaller IRPP farms, some Member States already regulate these activities (but from varying capacity thresholds) and so existing permitting approaches in these MS will be allowed to stay "as is" for MS who wish to apply it to IED installations covered by IRPP requirements or to cattle farms that are already regulated. The collective arrangements among these three measures will also likely need a revised BREF, in which the interactions and possibilities of the three measures described here will be examined in totality.

Measure 31: Include cattle farming within the scope of the IED

Description of the measure and requirements for implementation

Include cattle farming within the scope of the IED. A potential approach would be to include a capacity threshold expressed in animal places that is comparable to thresholds for similar environmental impacts for the IRPP sector. This similarity can be achieved by calculating the new threshold on the basis of the equivalent livestock units (LSUs), a reference unit which

facilitates the aggregation of livestock from various species and age. This means, for example, that thresholds expressed in animal places between cattle farming and the IRPP sector are similar in terms of livestock units, but are expressed as animal places in the Directive. Livestock units are derived from the definition used by Eurostat, which is considered applicable across all EU Member States. Using Livestock Units directly as a threshold is complex and not advised, as it may be too different from existing implementation of the IRPP BREF and national systems, causing additional administrative burden. However, it can be used as a guide in assessing the measure to ensure that the environmental protection between cattle, pig and poultry sectors is similar in ambition.

Applying the IED to cattle farming activities would require a new set of agricultural installations to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED. This would also require a revised BREF document, which will describe the interactions and possibilities of measures 31, 32 and 33 together. Therefore, this measure should be read and considered in conjunction with the measure for introducing a tailored approach for regulating agricultural installations, and attempts are made to ensure alignment with changes in measure 32 on changes to the existing IRPP sector.

There will need to be a decision by the EU on how to introduce this activity into the scope of the IED. This will need to be considered in conjunction with the proposed measure for a tailored approach, as the choices for including this new activity will be affected by whether a tailored approach is used. The options could include:

- Inclusion of an additional activity under IED Annex I (e.g. 6.6(d))
- Inclusion as an activity under a new Annex of the IED, not under Annex I

The measure will need to be further defined with regards to the proposed wording and capacity threshold to be used for cattle rearing. A proposed capacity threshold within range of 50-150 LSU for cattle as well as for pigs and poultry. The cost-benefit analysis is favourable for all thresholds in the range of 50-150 LSU considered (further information on benefit/cost ratios are included in the section on Air Quality impacts below and presented in the analysis conducted by Ricardo in May 2021[23]). The analysis considered a range of possible thresholds, from 50 LSU, to 750 and above. The equivalent number of cattle to the LSU thresholds considered are included in the table below.

Total number of cattle farms within EU is 2 797 050. This covers farms including subsistence with the LSU below 10 (1 927 650) and farms above 10 LSU (869 400), based on Eurostat data.

[23] Ricardo Energy & Environment (2021) Updating of available information for undertaking the assessment of impacts for a possible modification of the IED with regard to aspects of intensive agriculture, available at: https://circabc.europa.eu/sd/a/c863480b-5fd5-41e9-93ee-9c68669d6511/Intensive%20Agriculture%20and%20IED%20Final%20Report%202021.pdf

Table A8-22: Cattle thresholds considered, expressed in LSU and with the equivalent average number of animals in heads or places, depending on the structure of the farm, and expected farm numbers. (source: Ricardo, 2021 and Eurostat)

Threshold (LSU)	Threshold (number of heads of cattle)	Approximate number of farms in the EU above this threshold
50	69	330 000
100	138	163 000
125	173	123 000
150	207	84 000
300	415	19 600
450	622	8 000
600	829	4 200

Objectives:

- Reducing the environmental impact of agro-industry across the EU-27, via the amendment/expansion of coverage of the IED.
- Levelling the playing field for installations across the EU.

Implementing needs:

- EU to make legislative change to the IED text
- EU to develop BAT conclusions for cattle
- Member States to transpose changes into national law
- Member States to regulate the cattle farms according to the new requirements, to the extent this requires changes from their existing regulatory approaches for cattle farms. This will require upfront and ongoing implementation actions.

Assessing impacts

Economic impacts

Overall, this measure is likely to have **strongly negative economic impacts** when compared to the baseline, though this will vary heavily by Member State. Some states may have very little to no required compliance costs and low administrative costs as a result of existing policy. These impacts are likely concentrated in a small number of Member States who have a majority of EU cattle farms, in particular those who would not be able to benefit as much from the tailored approach as EU Member States with more advanced existing regulation on cattle farming.

Administrative burden on businesses

This measure will have **negative impacts** on the administrative burden on businesses. This will be due to the farm operators being regulated when they were not previously regulated. For cattle, the administrative costs associated with the granting and enforcement of permits were estimated to be €102-401 m per year on the assumption of full IED chapter II requirements from 50 and 150 LSU, respectively (Ricardo, 2021; and further assessment). The adoption of a tailored approach for implementing cattle farming in the IED (Measure 18) could see these costs drop to €63 - €70m per year for 150 LSU, and to €249 – €281m per year for 50 LSU, which represents a reduction of 30 - 38%. The upper level of the ranges (€70 and

€281m/year) is based on a generic 20% reduction from reduced administrative requirements, plus information on known information from Member States from the stakeholder consultation on existing policy that would (partially) already take care of IED compliance. The lower level of the ranges (€63 and €249m/year) is based on making assumptions about existing policies already regulating the sector in Member States (assumptions made due to lack of information gained from consultation), assuming the Member States are likely to require some level of BAT already.

The calculation method for this reduction is explained under Measure 33. How these numbers could be expected to change based on higher thresholds are included in the table below. For higher thresholds, the tailored approach has slightly larger benefits (e.g. 33% at 300 LSU vs 30% at 150 LSU, for the upper level of the range for the Tailored Approach) because at higher levels a relatively higher proportion of animals would already be under some form of regulation, which the Tailored Approach would take into account.

The total expected administrative costs are shown in the table below[24]. Of the total expected cost of permitting, 50% of this cost is expected to be borne by the operator and 50% by the permitting authority. This is different from the original estimate in the 2007 IED IA, whereby the split was 1/3 for the operator and 2/3 for the authority. However, evidence from the focus group held on this topic with Member State authorities in 2021 confirmed that authorities are likely to pass on some of the cost to the farmer as part of the cost of applying for a permit. For example, one Member State stakeholder indicated to have a strict policy of charging the farmer for 50% of the personnel cost borne by the permitting authority, in exchange for use of an automated online application system that streamlines the application process for the operator. We do not expect this to be the case in all Member States, but from expert knowledge we do expect that costs for farmers are likely to be higher than 1/3 of the total permitting costs.

[24] These costs are lower than reported in Ricardo (2021). They are based on more recent data provided by Member States.

Table A8-23: Estimated total additional administrative costs for full chapter II requirements and under a tailored approach.

LSU	Administrative costs for business (€m/year) (full chapter II requirements)	Administrative costs for business (€m/year) (Tailored Approach)
50	401	249 - 281
100	198	123 - 139
125	150	93 - 105
150	102	63 - 70
300	25	14 - 16
450	11	4 - 7
600	6	3 - 4

It should be noted that the estimate for the costs under the tailored approach could be reduced further, as no comprehensive information on existing policies was provided by all Member States under consultation on the extension of the IED towards livestock. An important omission for example is detail on the impact of existing regulation of cattle farms in Spain, because it is estimated that about €14.5m of the €198 million of the full permitting administrative costs (for a threshold of 100 LSU) would accrue to farms in Spain, and it is not clear what the scope of the reduction could be in the tailored approach.

There will also be costs to industry for the development of BAT based requirements. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for businesses, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for businesses would be expected to range from €0.1m/year to €0.7m/year, with a central estimate of €0.2m/year. It could be expected that the costs of BAT based requirements would be on the lower end of this range due to the possibility to build on the existing IRPP BREF and having a simpler process.

Operating costs and conduct of business

This measure will have negative impacts on the operating costs and conduct of business. This will be due to farm operators needing to implement techniques to mitigate the environmental impacts as will be identified in a BAT conclusions document for the sector. Note that in some Member States, techniques are already applied as a result of national policy or their implementation of other EU Directives. For example, the Nitrates Directive may place limits on the amount of slurry that can be spread on land, which indirectly reduces NH_3 emissions to air as well. Further, the Habitats Directive and Birds Directive may place requirements on certain Member States or regions, based on observed concentrations of pollutants in environments near farms. The National Emissions reduction Commitments Directive may lead certain Member State to implement additional measures targeting the reduction of certain pollutants, including at farms. These farms may then be required to implement BAT in order to reduce observed concentrations and depositions of NH_3 to vulnerable natural areas.

When existing policy is driven by other EU legislation, “target driven” regulation (where the target is measured as environmental improvement, not direct emission reduction) can lead to implementation of BAT, which is implemented already in, for example, Member States such as Germany, the Netherlands, Denmark and Belgium (this is a non-exhaustive list). The addition of this sector to the Industrial Emissions Directive could lead to similar improvements and better ability of other regulations to reach higher levels of environmental protection, by mandating directly (command and control) what actions need to be taken at installation level to address the pollution at source. Through this policy implementation, the IED could be a shorter route towards the actions that need to be taken for environmental improvement. This is possibly in contrast to the route via the Nitrates and/or Habitat directives, which may be more complex since the implementation of BAT in those directives has to be linked to measurement and modelling of complex environmental variables; an example is that of estimating additional deposition of NH_3 in nearby natural habitats as a result of new projects, which is currently taking place in some Member States. This alternative example application of “BAT” (s.lato) may lead to increased administrative burdens in the permitting process compared to that of the IED.

Cattle farming is not presently included within Annex I of the IED, and is not currently considered by the IRPP BREF. In order to estimate the possible emission reductions introducing cattle within Annex I of the IED, assumptions have had to be deployed. In practice, the inclusion of an activity under the IED Annex I would lead to the need for a BREF, and consequent generating of BAT Conclusions relevant for the sector. It is difficult to anticipate the techniques that would be considered and the level of ambition the BREF would have (and hence also its potential, in terms of emission reductions, is also uncertain).

Ricardo (2021) identified two key environmental issues for the sector that could be quantified: the reduction of emissions to air of NH_3 and CH_4. That work estimated the techniques that could be necessary to be deployed across each Member State to reach an assumed level of ambition deemed to be BAT (without prejudice to possible determination of BAT through the BREF process). Based on Ricardo (2021) and further analysis. the total EU27 compliance costs estimated for introducing the cattle sector into the IED, from a threshold within the range of 69-207 heads (equivalent to 50-150 LSU) were estimated to be up to €112 - €441 million per year for applying abatement techniques tackling NH_3 and CH_4 emissions. How these numbers could be expected to change based on different specific thresholds are included in the table below. (For benefits vs. costs, please see the table in the air quality section).

Table A8-24: Estimated compliance costs for business for implementing techniques addressing NH_3 and CH_4 emissions at cattle farms

Threshold (LSU)	Compliance costs for business (€m/year)
50	441
100	217
125	165
150	112
300	50
450	30
600	21

The above costs are based upon the techniques already deployed at the farms, and what possible additional techniques could or would be necessary if additional farms and sectors were brought within the scope of the IED. The key source used has been GAINS 4[25], with the accompanying pollution control technologies included in the model's baseline scenario. The selection of which techniques to apply for Member States is based on the initial selection made by GAINS on what is used, supplemented by the information provided in the consultation. This estimate, therefore, does not attempt to replicate or suggest BAT, but serves as a guide of the potential level of cost to benefit.

These costs, when combined with administrative costs to form a total cost, remain favourable in terms of a benefit-cost ratio, when compared to the monetised benefits of NH3 and CH4 emissions reductions. The benefit-cost ratios are presented in the subsection on air quality.

[25] See: https://iiasa.ac.at/web/home/research/researchPrograms/air/GAINS.html

Box 1: Notes on the impact of existing emission reductions policy on the modelling performed

Note that the process for estimating the total business compliance costs has some uncertainties, reflected in the range of values presented in Table 25. The estimation process uses the GAINS model where all existing compliance is already assumed to be in the model baseline. The remaining uncertainty is due to unknown information about uptake rates of techniques at farms of smaller and larger sizes in some Member States. The GAINS model only provides the total number of animals and the share of those which are under different emission reduction regimes, not the distribution of farm sizes in which these animals are held. It is however more likely that larger farms employ more advanced emission reduction techniques, in particular as large point sources of NH_3 emissions create localised air pollution problems, for which authorities have more incentive to take action. If this is the case, then higher share of uncontrolled emissions from those Member States would be concentrated in smaller farms.

To explain why this is, the measure does not propose to regulate farms below 50 LSU ("small farms"). If in reality a country has a higher relative share of emissions per animal from small farms (because larger farms are already regulated to a degree), then overall potential emission reductions from the IED (and associated compliance costs) would be lower, compared to the case where there are similar emission reduction techniques applied to all farms, irrespective of size. An example of this is Germany, where it is known from stakeholder consultation that the country already requires farms above 450 LSU to use the "state of the art" in emission reductions technology (and it is therefore assumed the IED would not have an impact above 450 LSU). Therefore, the existing emissions reductions that the GAINS model baseline defines for Germany will be more concentrated in the farm size class above 450 LSU, where animals will have lower emissions than the average for Germany. Conversely, animals in farms of size class below 450 LSU will have a higher average emissions. As the proposed IED threshold is within the range of 50-150 LSU and the majority of animals is concentrated below 50 LSU, the net effect of this is that the potential for emission reductions when applying policy above 50 LSU is smaller than when the GAINS model data is not modified with this specific information on compliance by farm size.

This becomes an uncertainty because there is no complete information available at this time for all countries with significant cattle sectors, on how the cattle sector is currently regulated and at what farm size classes this applies to. For most countries, information was gathered on their existing policy thresholds and the modelling was modified accordingly. Notably though, there is an uncertainty on the policies in Spain and Italy, which have significant cattle sectors. In the scenario where Italy and Spain also behave like Germany, this could reduce the emission reduction benefits and associated compliance costs by up to 10%**.** It is not expected to impact the cost – benefit ratio as this uncertainty applies proportionally to both benefits and costs. This uncertainty is significant only to the smaller classes of regulated farms, from 100 to 450 LSU, given that most existing regulation applies to larger farms above 300 LSU, and ~ 80% of the animals that would be brought under regulation are in the class of 100 to 450 LSU.

Competitiveness and level playing field

This measure will have a **positive impact** on levelling the playing field. Introducing cattle farming within Annex I of the IED imposes a singular set of requirements towards these

newly introduced farms and operators. It therefore offers the potential to level the playing field by providing minimum criteria for all Member States, notably towards the use of emission limit values in permits standardised to BAT-AELs. This has largely been supported within the IED evaluation, where, for industry stakeholder surveyed, 69% agreed or strongly agreed with the statement 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations'. This would be likely to also be the case for the farms newly regulated under this measure. Farms that employ specific unconventional techniques, such as a focus on Ecological farming, may still need a specific approach. The focus group held with selected Member State authorities within the context of the revision to the IED in June 2021 identified support from Member States to regulate cattle farming due to, among other things, the benefits to be gained from levelling the playing field.

This measure will have **mixed impacts** on competitiveness. For those cattle farms that are already regulated and for which no or little additional cost impacts would be seen, the relative competitiveness of these farms would be expected to increase. For those cattle farms that are not already regulated and which will see additional cost impacts, the relative competitiveness of these farms would be expected to decrease. The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon cattle farms. The exact level, however, as noted in the above, is to be determined by the BREF process. If these costs cannot be passed on in the price of produce, these costs will be incurred by businesses, impacting upon profitability. As noted, however, the cost to benefit ratio remains favourable when environmental benefits are considered and monetised.

Position of SMEs

The measure will likely bring **additional impacts on SMEs**. No specific statistics on whether the cattle farms will be defined as SMEs or not were identified. No means to identify the costs per employee or businesses have been identified. The impact of this measure towards SMEs, therefore, remains unclear.

Innovation and research

This measure may have a **limited impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT.

Public authority impacts

This measure will have **negative impacts** on public authority costs. The largest impact will be on permitting and inspecting authorities, due to a significant number of farms that would require an environmental permit where they either may not have one, or would not have one that is of the same level of requirements as under the IED, with requirements on BAT use and adherence to emission limit values.

Public authority impacts are calculated from evidence obtained from authorities on the total cost of permitting a farm over a 20 year permit, including:

- Permit application and granting
- Permit reconsiderations in response to BREF updates
- Inspections and enforcement activities

The costs of this are estimated to be between 1 000 to 2 000 EUR on average per year, recognising that most of the costs of an farming project occur at the beginning, at permit application and granting. It depends on the size of the project what the cost will be, as public authorities have indicated that larger projects generally have more costs to obtain a project permit. The average administrative costs is closer to the low bound of 1 000, as the vast majority of farms introduced through measure 31 and 32 are in the smaller LSU categories of 50 to 150 LSU and 150 to 300 LSU.

The 2007 IED IA estimated that of the total costs, 2/3 would be for public authorities and 1/3 would be for the operator, on average across all IED sectors. Stakeholder engagement has shown that this is not a correct assumption for the livestock sector, with evidence that the operator may incur more costs than the authority. There are a few reasons for this:

- Firstly, as the IED has been implemented already on pig and poultry farms, there is scope and opportunity for efficiency gains at the public authority level, who regularly process permits on a continued basis. This type of efficiency gains have been observed in some Member States that were part of the focus group and interviews, and have shown that this can reduce costs by 50% or more. Conversely, operators do not have as much opportunity to gain efficiency, as they usually only engage in the permitting process at granting or permit reconsideration.
- As mentioned earlier, the scope extension for the IED means the average installation size in the renewed scope is much smaller, with the majority of installations having less than 300 LSU. This means that the average project size is much smaller compared to other IED sectors, and this is reflected in lower complexity and lower expected costs for permitting and enforcement.

To reflect new evidence, the assumption was made that the total costs of permitting are shared equally between operator and public authority. From some Member States, there is evidence that the operator incurs a majority of the costs, due to large efficiency gains on the authority side and an increased need for external advisory services by farmers to handle the complexity of emission reduction measures. However, there is not enough evidence to assume this is the average situation across the EU, so the assumption of a 50 – 50 split is seen as a reasonable middle ground.

Table A8-25: Administrative costs for measure 31 with or without measure 33

Threshold (LSU)	Administrative costs for public authorities (€m/year) (Full IED Chapter II requirements)	Administrative costs for public authorities (€m/year) (Tailored Approach)
50	401	249 - 281
100	198	123 - 139

125	150	93 - 105
150	102	63 - 70
300	25	14 - 16
450	11	4 - 7
600	6	3 - 4

There will be the costs to the Commission for the development of a BREF (Livestock BREF). The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for public authorities, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for public authorities would be expected to range from €0.3m/year to €1.4m/year, with a central estimate of €0.5m/year. It could be expected that the costs of an BAT based requirements would be on the lower end of this range due to the possibility to build on the existing IRPP BREF and having a simpler process.

There will be one-off costs to the Member States for transposition of new requirements, as well as ongoing regulatory costs. Further evidence gathered during the focus group with selected Member State authorities identified how several Member States are already regulating cattle farms to some degree, with variation between them on (1) the threshold from which they are regulating the farms, and (2) the approach taken to regulating them (i.e. whether permitting, or simpler registration / notification systems). No information has been identified however on the possible costs to Member States for transposing and implementing the requirements. The envisaged common IT format could lead to additional indirect benefits through facilitating reporting under the CAP, Nitrates Directive, and National Emission Ceilings Directive (NECD).

Environmental impacts

Climate

This measure will have **strongly positive impacts** on reducing greenhouse gas emissions. Estimates in Ricardo (2021) and based on further analysis suggest that with a threshold at the equivalent of between 50-150 LSU, approximately 185-360 kt of CH_4 could be mitigated per year, with c. 55% of these reductions estimated to accrue in France, Germany and Spain. These estimates are based on input from the model GAINS 4, and the accompanying pollution control technologies included in the model's baseline scenario.

Put more broadly in context, agriculture emissions of 463 Mt CO_2eq[26] represent 13 %[27] of the total EU-27 GHG emissions. This range of 185-360 kt of CH_4 represents in CO_2 equivalent terms 5.2-10.1 Mt CO_2eq, i.e. between around 1.1-2.2% of the EU27 agricultural sector GHG emissions. The achievement of these reductions depends on whether technologies to reduce emissions from enteric fermentation can successfully be implemented. If so, then the potential for CH_4 emission reductions is very large, as methane from enteric fermentation is ~

[26] EEA greenhouse gases data viewer https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

[27] European Court of Auditors Special Report Common Agricultural Policy and climate

30% of EU agricultural GHG emissions[28]. This study has assumed a technique (nutrition based) can be applied that reduces emissions from enteric fermentation by up to 10%, which is a current accepted value and which is in line with academic research on various feed modifications that can be done. However, it is acknowledged that it is a conservative estimate as there are publications demonstrating a potentially higher methane emission reduction potential (36-50%)[29].

Further reductions beyond those estimated could be possible and would depend on the level of ambition of a BATC for cattle, as well as if N_2O emissions are accounted for.

These reductions would contribute to the EU Methane Strategy and would help to address the concerns flagged in the recent European Court of Auditors Special report 'Common Agricultural Policy and climate' which indicates that despite the Common Agricultural Policy funds injected to the agriculture sector, GHG emissions from the sector have not decreased since 2010, partly due to the process of concentration and intensification of the EU farmed animals in specific areas.

Air quality

This measure will have **strongly positive impacts** on reducing air pollutant emissions. Estimates in Ricardo (2021) and further analysis suggest that with a threshold at the equivalent of between 50-150 LSU, approximately 60-115 kt of NH_3 emissions could be mitigated per year, with c. 55% of this estimated to accrue in France and Spain. These estimates are based on input from the model GAINS 4, and the accompanying pollution control technologies included in the model's baseline scenario.

EU27 total NH_3 emissions were 3.6 Mt in 2018, of which 2.4 Mt/year were from livestock.[30] This reduction of 60-115 kt therefore represents around 2.5-4.8% of livestock sector emissions, or around 1.6-3.2% of total EU NH_3 emissions.

Using the latest work on damage cost functions by the EEA[31], the monetised benefits of these emission reductions are estimated to be around €6 633 million per year for a threshold of 50 LSU, and €3 399 million per year for a threshold of 150 LSU. Across the different considered farm size thresholds, the ranges of benefit-cost ratios, of all costs combined (administrative

[28] Eurostat (2010), Agri-environmental indicator – greenhouse gas emissions https://EU.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_greenhouse_gas_emissions&oldid=110348

[29] Publications concerning CH4 emission reduction potential:

- How to reduce on-farm enteric methane production (Josef van Wyngaard, Robin Meeske, Lourens Erasmus) - How to reduce on-farm enteric methane production (journals.co.za)
- Can enteric methane emissions from ruminants be lowered without lowering their production? (C. Grainger, K.A. Beauchemin) - Can enteric methane emissions from ruminants be lowered without lowering their production? | Request PDF (researchgate.net)
- Bark-dwelling methanotrophic bacteria decrease methane emissions from trees (multiple authors) - Bark-dwelling methanotrophic bacteria decrease methane emissions from trees | Nature Communications

[30] EEA air pollutant emissions data viewer https://www.eea.europa.eu/data-and-maps/dashboards/air-pollutant-emissions-data-viewer-3

[31] Unpublished draft EEA (December 2020) "Costs of air pollution from European industrial facilities 2008–2017"

and compliance costs), remains positive and favourable. The benefit-cost ratio decreases with a lowering of the IED farm size threshold down to 50 LSU (equivalent to around 69 heads of cattle), as administrative costs become a larger relative burden at these lower thresholds.

The variation in these values by LSU threshold is shown in the following table.

Table A8-26: Monetised benefits of climate and air quality impacts, and benefit-cost ratio (based on total costs summing administrative and compliance costs)

LSU	Monetised benefits (€m/year) (NH_3)	Monetised benefits (€m/year) (CH_4)	Ratio of total benefits divided by costs
50	3 980	2 653	**7**
100	3 096	1 980	**11**
125	2 628	1 610	**12**
150	2 100	1 299	**14**
300	1 064	607	**25**
450	710	378	**30**
600	540	269	**32**

Reductions in other air pollutants would also be expected, both directly (e.g. PM) and indirectly (e.g. PM, ozone) leading to further benefits which have not been quantified.

Water quality and resources

This measure should provide **weakly positive impacts** on water quality and resources. The integrated approach of the IED and the range of environmental issues that could be covered by a cattle sector BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from cattle. The analysis conducted by Ricardo in May 2021 did not cover releases to water. Other data sources, such as the E-PRTR, similarly to the IED, do not consider cattle farming within its scope and therefore do not hold data on the activity. The extent of the activities impact, or the potential for the reduction of this environmental impact is uncertain.

Soil quality

This measure should provide **weakly positive impacts** on soil quality. The integrated approach of the IED and the range of environmental issues that could be covered by a cattle sector BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from cattle. The analysis conducted by Ricardo in May 2021 did not cover releases to land. Other data sources, such as the E-PRTR, similarly to the IED, do not consider cattle farming within its scope and therefore do not hold data on the activity. The extent of the activities impact, or the potential for the reduction of this environmental impact is uncertain.

Waste production, generation, and recycling

This measure should provide **positive impacts** on waste production. The integrated approach of the IED and the range of environmental issues that could be covered by a cattle sector

BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from cattle. Measures that limit manure spreading are common among Member States, and it is likely that a BREF for the cattle sector would include requirements on ammonia application to land, but it is unclear what the influence of the IED can be on this factor, as these concern emissions that transcend the farm gate boundary (i.e. IED installation boundary), even if they do originate from the farm.

No means of assessing the volume or type of waste has been identified. However, regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EU).

Efficient use of resources

Unclear impacts. No means of assessing the efficient use of energy or water have been identified, however regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

This measure has **unclear social impacts**. This measure will incur costs towards business and operators. If these costs cannot be passed on within the price of produce, these costs will impact upon profitability and could therefore impact upon employment. No formal assessment has been carried out, but the impacts are thought to be negative.

Measure 32: Amend the capacity thresholds of the rearing of pigs and poultry considered under activity 6.6 of Annex I.

Description of the measure and requirements for implementation

Revise the capacity thresholds for the rearing of pigs and poultry considered under activity 6.6 of Annex I of the IED. Currently, activity 6.6 is split into three activities, with definitions reflecting different capacity thresholds for different livestock types, in turn reflecting different levels of environmental impact.

The measure will need to be further defined with regards to the proposed wording and capacity threshold to be included in Annex I, and whether a tailored approach is taken forward (see measure 33). A proposed revised capacity threshold is within the range of 50-150 livestock units (LSU), or the equivalent in places/heads for each livestock type[32].

The cost-benefit analysis is favourable for all thresholds in the range of 50-150 LSU as per the analysis conducted by Ricardo in May 2021[33] and further analysis. Note that the analysis

[32] LSU is a reference unit which facilitates the aggregation of livestock from various species and age. Using this unit would invoke the need for a framework for calculation of LSUs from poultry and pigs of different varieties. This may, in turn, require a new set of agricultural installations to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED.

[33] Ricardo (2021) Updating of available information for undertaking the assessment of impacts for a possible modification of the IED with regard to aspects of intensive agriculture, available at:

by Ricardo (2021) has since been updated, in particular with respect to the administrative costs, which the analysis of May 2021 may have overestimated based on outdated information from the 2007 IED IA on permitting administrative burdens. Further analysis was also conducted and a range of possible thresholds, from 50 LSU, to 750 and above, is presented.

The equivalent number of **additional** pigs and poultry included under the LSU thresholds considered are included in the table below. The IED farm size threshold of 50 LSU is equivalent to approximately either 65 sows or 170 production pigs, whilst the size of a threshold of 150 LSU equates to approximately 195 sows or 500 production pigs. To reiterate, the number of farms and animals below covers only those that are not yet covered by the existing IRPP thresholds.

If all pig farms are mixed pig farms following a farrow-to-finish model, then the real IED threshold is the sum of the grey and red bars in Figure A8-21, at a maximum. The average of this for the EU-27 is 893 LSU (which has been approximated to 900 LSU). If all farms are specialised, then the average LSU is 588 (which has been approximated to 600 to align with the groupings available). The differences between Member States are governed by the ratio of the number of sows to the number of production pigs. Generally, the more sows there are, the more a country is able to use mixed "farrow to finish" farms, which results in a larger number of animals on farms not subject to IED regulation.

Evidence from the focus group of the IED Impact Assessment has noted that it is unlikely for large to medium sized farms to adopt a farrow-to-finish model. This is because Specialisation is generally seen as more profitable. Therefore, it is most likely that most Member States are closest to the specialised farm threshold and not to the mixed farm threshold.

Total number of pig farms within EU is 2 230 850. This covers farms including subsistence with the LSU below 10 (1 955 640) and farms above 10 LSU (275 210), based on Eurostat data. Under current IED threshold there are 11 100 pig farms covered (EU registry).

Total number of poultry farms within EU is 4 291 490. This covers farms including subsistence with the LSU below 10 (3 972 880) and farms above 10 LSU (318 610), based on Eurostat data. Under current IED threshold there are 12 000 poultry farms covered (EU registry).

Table A8-27: IRPP thresholds considered, expressed in LSU and with the equivalent average number of animals in heads or places, depending on the structure of the farm, and expected farm numbers. (source: Ricardo, 2021 and further analysis)

Threshold (LSU)	Threshold (number of pigs)	Approximate number of pig farms in the EU above this threshold and below current IRPP thresholds	Threshold (number of poultry)	Approximate number of poultry farms in the EU above this threshold and below current IRPP thresholds
50	170 p.p., 65 sow	91 000	2 400	95 800

https://circabc.europa.eu/sd/a/c863480b-5fd5-41e9-93ee-9c68669d6511/Intensive%20Agriculture%20and%20IED%20Final%20Report%202021.pdf

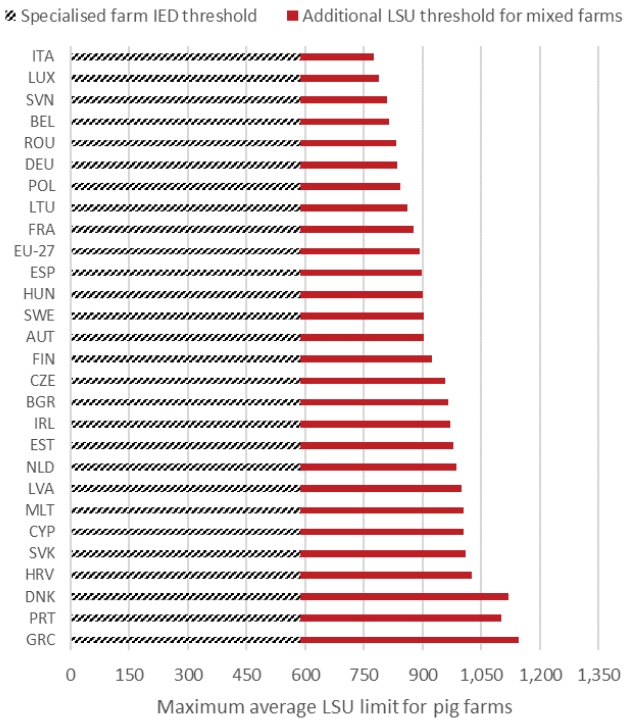
100	330 p.p., 130 sow	58 500	4 800	59 700
125	420 p.p., 160 sow	48 000	6 000	49 700
150	500 p.p., 195 sow	37 400	7 200	39 700
300	1 000 p.p. 390 sow	18 700	14 400	20 800
450	1 500 p.p. 585 sow	9 700	21 600	11 400
600	2 000 p.p.** 780 sow	3 700	28 800	5 300
750	-	-	36 000	2 200

** Pig farms between 600 and 900 LSU may or may not be installations already covered by the IED. This coverage depends on the level of Specialisation of the farm, as follows:*

- *Specialised farms that only keep production pigs, or only keep sows raising piglets are simpler to identify as being within or outside IED scope. Such Specialised farms are included in the IED above about 600 LSU (as 600 LSU corresponds to 2 000 production pigs, or ~780 sows).*
- *'Farrow to finish' farms that raise sows and production pigs together are subject to the IED only if either the number of sows or the number of production pigs exceeds the IED thresholds (750 sows or 2 000 production pigs). These 'mixed farms' will have LSU higher than about 600. The following text justifies our suggestion that this upper threshold may be around 900 LSU.*

In relation to the regulation of mixed livestock farms hosting both pigs and poultry in the same installation, there is a potential need to also consider whether an additional activity of 'mixed livestock farm' should also be included in Annex I activity 6.6. This could be defined either using the summation of various thresholds that are all based on LSU units, or could be defined using a percentage of other thresholds basis as compared to a total of 100%.

Figure A8-21: Maximum additional LSU that pig farms can have by adopting a mixed "farrow-to-finish" model, as opposed to only specialisation, per Member State.



Objectives of the measure:

- Reducing the environmental impact of industry across the EU-27, via the amendment/ expansion of coverage of the IED in Annex I.
- Levelling the playing field for installations across the EU.

Implementation needs:

- EU to make legislative change to the IED text
- EU to extend IRPP BAT conclusions
- Member States to transpose changes into national law
- Member States to regulate the smaller IRPP farms according to the new requirements, to the extent this requires changes from their existing regulatory approaches for smaller pig and poultry farms. This will require upfront and ongoing implementation actions.
- (EU to consider the possibility for applying a tailored approach (measure 33) for IRPP installations)

Assessing impacts

Economic impacts

Administrative burden on businesses

This measure will have **negative impacts** on the administrative burden on businesses. This will be due to the farm operators being regulated when they were not previously regulated.

For pigs and poultry, the associated administrative costs associated with the granting and enforcement of permits were estimated to be €94.6 m and €99.6 m respectively per year from 50 LSU; and €38.9 m and €41.3 m per year from 150 LSU on the assumption of full IED permitting (Ricardo, 2021 and further analysis). The adoption of a tailored approach for IRPP in the IED (measure 33) could see these permitting costs drop by c. 40%, i.e. to €55.1 m and €57.9 m per year respectively from 50 LSU; and to €22.6 m and €24.0 m per year respectively from 150 LSU. How these numbers could be expected to decline based on higher thresholds are included in **Table 28** below. This table shows the total costs for including farms above this threshold at each level. The values in the columns should not be added together, as they are already a cumulative total of all farms that would be included at the threshold.

The methodology for deriving the costs for the tailored approach is described in Measure 33. The cost reduction is slightly higher at higher farm thresholds, because more Member States already regulate some of the larger classes of farms compared to smaller farms. That means that for example for poultry farms above 600 LSU, the reduction in the tailored approach is 37%. For farms above 750 LSU, as the sample of farms is so small, individual differences among Member States again reduces the benefit, as it appears that a considerable number of these farms close to the existing IED threshold, are located in countries where less significant emission reduction policies were identified.

Table A8-28: Administrative costs for businesses, pigs and poultry, at different LSU thresholds

Threshold (LSU)	Administrative costs for pig business	Administrative costs for poultry

	(€m/year)		business (€m/year)	
	Full IED Ch.2 requirement (€m/year)	Tailored approach (€m/year)	Full IED Ch.2 requirement (€m/year)	Tailored approach (€m/year)
50	94.6	55.1	99.6	57.9
100	60.9	35.4	62.1	36.1
125	49.9	29.0	51.6	30.1
150	38.9	22.6	41.3	24.0
300	19.4	11.3	21.6	12.6
450	10.1	5.9	11.9	6.9
600	3.8	2.2	7.8	4.5
750	-	-	3.3	2.2

There will be costs to industry of the further development of the BREF (Livestock BREF). The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for businesses and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for businesses would be expected to range from €0.1m/year to €0.7m/year, with a central estimate of €0.2m/year. It could be expected that the costs of an BAT based requirements would be on the lower end of this range because it would be building on the existing IRPP BREF by way of expanding its scope to smaller farms and a simpler process could be used.

Operating costs and conduct of business

This measure will have **negative impacts** on the operating costs and conduct of business. This will be due to farm operators needing to implement techniques to mitigate the environmental impacts as will be identified in an extended BAT conclusions document for the sector.

Pig and poultry farms smaller than the existing IED threshold and down to sizes as small as 50 LSU are not currently considered by the IRPP BREF. In order to estimate the possible emission reductions from introducing these smaller farms into the IED, assumptions have had to be deployed in the absence of identified BAT for the part of the sector. It is difficult to anticipate the techniques that would be considered and the level of ambition the BREF would have (and hence also its potential, in terms of emission reductions, is also uncertain).

Ricardo (2021) identified two key environmental issues for the sector: the reduction of emissions to air of NH_3 (for pigs and poultry) and CH_4 (for pigs). That work estimated the techniques that could be necessary to be deployed across each Member State to reach an assumed level of ambition deemed to be BAT (without prejudice to possible determination of BAT through the BREF process). The total EU27 compliance costs for reducing the IED IRPP thresholds to 50 LSU were estimated to be €222 m/year and €150 m/year for pig and poultry farms respectively for applying abatement techniques tackling NH_3 and CH_4 emissions. In the case of a threshold at 150 LSU, these compliance costs were estimated to be €91 m/year and €62 m/year. How these numbers could be expected to decline based on higher thresholds are included in the table below.

Table A8-29: Estimated compliance costs for business for implementing techniques addressing NH3 and CH4 emissions at pig and poultry farms.

Threshold (LSU)	Compliance costs for pig farm business (€m/year) for applying techniques tackling NH_3 and CH_4	Compliance costs for poultry farm business (€m/year) for applying techniques tackling NH_3
50	222	150
100	143	93
125	117	78
150	91	62
300	64	41
450	41	25
600	16	11
750	-	5

Note that CH_4 techniques were not considered for poultry, as the EU-wide source data from the GAINS model v4 (2020) did not yet contain the baseline information required to perform this assessment. In the GAINS model, CH_4 abatement techniques are limited to anaerobic digestion which is assumed to have a net zero abatement cost (whereby the investment is paid back to a zero NPV over time due to benefits from energy recovery). This means that the cost data in **Table 29** are entirely from NH_3 reduction measures. For pigs and poultry, there is no CH_4 element from enteric fermentation, which is an emissions source with associated reduction techniques that can lead to compliance costs for cattle in measure 31.

These costs, when combined with administrative costs to form a total cost, remain favourable (positive) in terms of a benefit-cost ratio, when compared to the monetised benefits of NH_3 and CH_4 emissions reductions. The benefit-cost ratios are included in the air quality assessment section.

The above costs are based upon the techniques already deployed at the farms, and what possible additional techniques could or would be necessary if additional farms and sectors were brought within the scope of the IED. The key source used has been GAINS 4, with the accompanying pollution control technologies included in the model's baseline scenario. The selection of which techniques to apply for Member States is based on the initial selection made by GAINS on what is used, supplemented by information provided in the consultation. This estimate, therefore, does not attempt to replicate or suggest BAT, but serves as a guide of the potential level of cost to benefit.

Competitiveness and level playing field

This measure will have a **positive impact** on levelling the playing field. Introducing smaller pig and poultry farms into the IED imposes a singular set of requirements towards these newly introduced farms and operators. It therefore offers the potential to level the playing

field by providing minimum criteria for all Member States, notably towards the use of emission limit values in permits standardised to BAT-AELs (measure 31 already reminded the finding of the IED evaluation that inclusion of an activity in the IED leads to a levelling of the playing field). This would be likely to also be the case for the farms newly regulated under this measure. Specific care will need to be given to farms that employ specific unconventional techniques, such as a focus on Ecological farming. The focus group held with selected Member State authorities on Livestock rearing (17th June 2021) within the context of the revision to the IED in June 2021 identified support from Member States to regulate smaller pig and poultry farming due to, among other things, the benefits to be gained from levelling the playing field.

This measure will have **mixed impacts** on competitiveness. For those smaller pig and poultry farms that are already regulated and for which no or little additional cost impacts would be seen, the relative competitiveness of these farms would be expected to increase. For those farms that are not already regulated and which will see additional cost impacts, the relative competitiveness of these farms would be expected to decrease. The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon farms. The exact level, however, as noted in the above, is to be determined by the BREF process. If these costs cannot be passed on in the price of produce, these costs will be incurred by businesses, impacting upon profitability. As noted, however, the cost to benefit ratio remains favourable when environmental benefits are considered and monetised.

Position of SMEs

The measure will likely bring additional impacts on SMEs. No specific statistics on whether the farms will be defined as SMEs or not were identified. No means to identify the costs per employee or businesses have been identified. The impact of this measure towards SMEs, therefore, remains unclear.

Innovation and research

This measure may have a limited impact on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the Sevilla Process, with emerging techniques considered within the eventual BREF.

Public authority impacts

This measure will have **negative impacts** on public authority costs.

Similarly to measure 31 for cattle, the administrative cost for authorities is expected to be the same as for operators, whereby total administrative costs for granting and enforcement of permits is split 50-50 between farmer and permitting authority. The reasoning for this split is

explained in the public authority impacts for Measure 31, as the same processes and logic applies. The data is shown in the following table.

Table A8-30: Administrative costs for public authorities in the expanded scope for pig and poultry farms, in the baseline situation of full IED Chapter 2 requirements, and under the tailored approach.

Threshold (LSU)	Administrative costs for public authorities from permitting pig farms		Administrative costs for public authorities from permitting poultry farms	
	Full IED Ch.2 requirement (€m/year)	Tailored approach (€m/year)	Full IED Ch.2 requirement (€m/year)	Tailored approach (€m/year)
50	94.6	55.1	99.6	57.9
100	60.9	35.4	62.1	36.1
125	49.9	29.0	51.6	30.1
150	38.9	22.6	41.3	24.0
300	19.4	11.3	21.6	12.6
450	10.1	5.9	11.9	6.9
600	3.8	2.2	7.8	4.5
750	-	-	3.3	2.2

There will be the costs to the Commission/ EU overall in developing BAT based requirements. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for public authorities, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for public authorities would be expected to range from €0.3m/year to €1.4m/year, with a central estimate of €0.5m/year. It could be expected that the costs of developing BAT based requirements would be on the lower end of this range because of the limited scope to extending the scope of the existing IRPP BREF to smaller farms, and the possibility of having a simple process.

There will be one-off costs to the Member States for transposition of new requirements, as well as ongoing regulatory costs. Further evidence gathered during the focus group with selected Member State authorities identified how several Member States are already regulating smaller pig and poultry farms to some degree, with variation between them on (1) the threshold from which they are regulating the farms, and (2) the approach taken to regulating them (i.e. whether permitting, or simpler registration / notification systems, i.e., the Tailored Approach [see Measure 33) – next section]. No information has been identified however on the possible costs to Member States for transposing and implementing the requirements.

Environmental impacts

Climate

This measure will have **strongly positive impacts** on reducing greenhouse gas emissions. Estimates in Ricardo (2021) and further analysis suggest that with a threshold at the equivalent of 50-150 LSU, approximately 77-101 kt of CH_4 could be mitigated per year, with

c. 40% of this estimated to accrue in Spain. These estimates are based on input from the model GAINS 4, and the accompanying pollution control technologies included in the model's baseline scenario. To place this value in context, CH_4 emissions reported from activities relating to pigs reported to the E-PRTR (activities 7a(ii) and 7a(iii)), average around 570 kt between 2017 and 2019. These emissions are approximately 0.04% to 0.06% of GHG emissions relative to the baseline scope of the IED.

However, more broadly in context, agriculture emissions of 463 Mt CO_2eq [34] represent 13 %[35] of the total EU-27 GHG emissions. This 77-101 kt of CH_4 represents in CO_2 equivalent terms 2.1-2.8 Mt CO_2eq, i.e. around 0.4-0.6% of the EU27 agricultural sector emissions.

Further reductions beyond those estimated could be possible, and would depend on the level of ambition of a BATC for smaller pig farms, as well as if N_2O emissions are accounted for.

These reductions would contribute to the EU Methane Strategy, and would help to address the concerns flagged in the recent European Court of Auditors Special report 'Common Agricultural Policy and climate' which indicates that despite the Common Agricultural Policy funds injected to the agriculture sector, GHG emissions from the sector have not decreased since 2010.

Air quality

This measure would have **strongly positive impacts** on reducing air pollutant emissions. Estimates in Ricardo (2021) and further analysis suggest that with a threshold at the equivalent of 50 LSU, approximately 25 kt and 45 kt of NH_3 emissions could be mitigated per year for pigs and poultry respectively; and approximately 19 kt (pigs) and 37 kt (poultry) at a threshold of 150 LSU. These estimates are based on input from the model GAINS 4, and the accompanying pollution control technologies included in the model's baseline scenario.

To place these values within context, both poultry and pigs are large sources of NH_3 emissions. The NH_3 emissions from pigs represent approximately 45% of NH_3 emissions relative to the scope of the IED, and the corresponding value for poultry is 28%. Combined they represent approximately 72% of all NH_3 emissions reported by IED activities in E-PRTR. EU27 total NH_3 emissions were 3.6 Mt in 2018, of which 2.4 Mt/year are from livestock.[36] This combined pigs and poultry reduction of 70 kt/year (50 LSU) therefore represents around 2.9% of livestock sector emissions, or around 1.9% of total EU NH_3 emissions. At the threshold of 150 LSU, the combined reduction of 56 kt/year represents around 2.3% of livestock sector emissions, or around 1.6% of total EU NH_3 emissions.

As was already mentioned in the discussion on measure 31, for some Member States the very large number of animals concentrated in a small geographical area, has led to Member States enacting policies to address these emissions sources, in order to meet objectives under other EU rules, such as the Nitrates Directive, Habitats Directive and Birds Directive.

[34] EEA greenhouse gases data viewer https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer
[35] European Court of Auditors Special Report Common Agricultural Policy and climate
[36] EEA air pollutant emissions data viewer https://www.eea.europa.eu/data-and-maps/dashboards/air-pollutant-emissions-data-viewer-3

Using the latest work on damage cost functions by the EEA[37], the monetised benefits of these emission reductions (NH3 and CH4) for the range of 50-150LSU are estimated to be around €1 075-1 409m/year for pigs and €974-1 195m per year for poultry. Across the different considered farm size thresholds, the ranges of benefit-cost ratios, of all costs combined (administrative and compliance costs), remains positive and favourable, ranging from 4.3 to 9.3 for pigs, and from 4.5 to 11.8 for poultry. The benefit-cost ratio decreases with a lowering of the IED farm size threshold down to 50 LSU, as administrative costs become a larger relative burden at these lower thresholds.

The variation in these values by threshold is shown in the table below. There are considerable CH_4 emission reductions estimated here for the pig sector, which come from a strong application of anaerobic digestion at manure processing facilities. It is recognised that this technique may have significant investment costs and long payback periods. In the long term, this technique is expected to be cost positive by the GAINS model. It was considered to be too optimistic an assumption, and we have reduced the net Economic cost to 0 for pig and poultry manure, also because anaerobic digestion often requires a co-substrate to function and can therefore not always be applied to every situation of high manure supply. If the IED is not the appropriate instrument to incentivise investment in anaerobic digestion, then many of these CH_4 benefits may not be realised. However, the benefit cost ratios will remain positive even at 0 CH_4 benefits, relying entirely on NH_3 reduction measures.

For the poultry sector, due to lack of baseline data on the application and practice of anaerobic digestion on poultry manure, this assumption was not made and no data is shown on the potential impact of this CH_4 measure for the poultry sector at this time.

Table A8-31: Monetised benefits and associated benefit-cost ratios

	Threshold (LSU)	Monetised benefits (€m/year) (NH_3)	Monetised benefits (€m/year) (CH_4)	Benefit-cost ratio
Pigs	50	690	719	**4.3**
	100	628	654	**6.0**
	125	578	601	**6.7**
	150	524	551	**7.9**
	300	344	376	**8.2**
	450	220	241	**8.6**
	600	98	106	**9.3**
Poultry	50	1 195	-	**4.5**
	100	1 125	-	**6.8**
	125	1 050	-	**7.6**
	150	974	-	**8.9**
	300	657	-	**9.7**
	450	419	-	**10.4**
	600	222	-	**11.5**
	750	96	-	**11.8**

[37] Unpublished draft EEA (December 2020) "Costs of air pollution from European industrial facilities 2008–2017"

Reductions in other air pollutants would also be expected, both directly (e.g. PM) and indirectly (e.g. PM, ozone) leading to further benefits which have not been quantified. These will also be included when updating the BREF and BAT conclusions, but no accurate baseline of this information from recent years was obtained as the main modelling system for the baseline (IIASA GAINS 4) did not yet contain full information about other pollutants outside of ammonia and methane.

The estimated costs are much smaller than the total monetised benefits of NH_3 and CH_4 emissions reductions estimated. Across the different considered farm size thresholds, the ranges of benefit-cost ratios, of all costs combined (administrative and compliance costs), therefore, remains positive and favourable, ranging for pigs from 4.3 to 9.3 for pig farms. This is showing that the relative benefits to costs are lowest for pig farms. This is in line with the expectations, as pig farms already have the lowest farm size threshold included within the IED scope, at an estimated 750 LSU, but near 600 LSU for Specialised farms. This means that already a large proportion of very large farms are captured, and those are the farms with the highest potential benefit-cost ratio, and there is more limited potential for economies of scale.

The benefit-cost ratio decreases linearly with a lowering of the IED farm size threshold to 50 LSU (which is equivalent to either 65 sows or 170 production pigs) due to increased total administrative costs.

For poultry, the estimated costs are also much smaller than the monetised benefits of NH_3 emissions reductions. Across the different considered farm size thresholds, the benefit-cost ratio of all costs combined (administrative and compliance costs) ranges from 4.5 to 11.8 for poultry farms. The benefit-cost ratios for the poultry sector therefore are lower than those for cattle, but higher than those for pigs. This is in line with the expectations as the current IED farm size threshold for poultry is relatively higher than for pigs, when expressed in LSU (approximately equivalent to 900 vs 750), but lower than for cattle, which has no current regulation under the IED at all. Similar to the analysis for pigs, the benefit-cost ratio decreases linearly with a lowering of the IED farm size threshold to 50 LSU (2 400 poultry places) due to the increased weight of administrative costs. Lastly, a very important factor that significantly increases benefit-cost ratios for cattle is the potential for CH_4 emission reductions from enteric fermentation.

Water quality and resources

This measure should provide **weakly positive impacts** on water quality and resources. The integrated approach of the IED and the range of environmental issues that could be covered by an integrated Livestock sector BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from pigs and poultry. The analysis conducted by Ricardo in May 2021 did not cover releases to water.

However, according to E-PRTR data, nitrogen releases reported between 2017 and 2019, from IRPP totalled between 0.5 – 0.9%, relative to the baseline scope of the IED. Phosphorus releases reported for 2018 and 2019 from IRPP totalled between 3.3 – 5.1%, relative to the

baseline scope of the IED.[38] Similarly, with the above statistics, these are often based on a single site reporting, indicating that the majority of farms are below the Annex II reporting thresholds within the E-PRTR Regulation for these pollutants. This makes assessing the potential impact of the measure, towards water quality, problematic using this data source. The extent of the activities' impacts, or the potential for the reduction of this environmental impact is uncertain.

Soil quality or resources

This measure should provide **weakly positive impacts** on soil quality. The integrated approach of the IED and the range of environmental issues that could be covered by an Livestock sector BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from pigs and poultry. The analysis conducted by Ricardo in May 2021 did not cover releases to land. However, according to E-PRTR data, phosphorus releases reported between 2017 and 2018 from IRPP totalled between 63 – 100%, relative to the baseline scope of the IED. No 2019 releases of phosphorus were reported. These figures are often based on a single site reporting, indicating that the majority of farms are below the Annex II thresholds within the E-PRTR Regulation for these pollutants. This makes assessing the potential impact of the measure, towards soil quality, problematic.

Waste production, generation, and recycling

This measure should provide **weakly positive impacts** on waste production. The integrated approach of the IED and the range of environmental issues that could be covered by an Livestock BREF and BAT Conclusions would be expected to lead to tighter controls on a range of environmental issues from pigs and poultry. No means of assessing the volume or type of waste has identified, however regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EU).

Efficient use of resources

Unclear impacts. No means of assessing the efficient use of energy or water have been identified, however, regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

This measure has unclear social impacts. This measure will incur costs towards business and operators. If these costs cannot be passed on within the price of produce, these costs will impact upon profitability and could therefore impact upon employment. No formal assessment has been carried out, but the impacts are thought to be negative.

[38] 2017 releases of phosphorus from IRPP reported in E-PRTR appear to be spurious, owing to the reporting of one site.

Measure 33: Introduce a tailored regulatory framework for installations carrying out rearing of animals.

Description of the measure and requirements for implementation

The possible widening of the IED scope for IRPP (measure 32), and inclusion of the cattle sector (measure 31), may cause significant increase of workload for the competent authorities and farmers considering the number of installations possibly concerned. With this in mind, and due to the fact that the concerned processes and emissions patterns are relatively simple in comparison with other IED activities, agro-industrial activities may not require the full extent of the IED regime as laid out in 2010/75/EU. Therefore, for such activities it is appropriate to consider a specific tailored approach (TA).

The assumption is that the tailored approach is needed for the IED to better address the specificities of livestock rearing. This would apply both to IRPP installations already covered by the IED and additional IRPP and cattle installations. No other IED activities are being considered for this measure.

The tailored approach would seek to minimise impact on the already established MS permitting systems. This would be done by defining the tailored approach as minimum requirements that MS could implement within their national permitting / registration systems. MS may then opt for keeping current IRPP installations under the full IED regime (i.e. without change) or could choose to change the way existing IRPP installations are regulated by switching to the tailored approach. It is noted that many MS have found ways to modify (simplify) permitting within the IED for IRPP (e.g. linked to certification systems that exist for other agricultural obligations, and/or using general binding rules) which is already achieving flexibility, so it will be important to understand the extent of existing practices here.

The tailored approach and its expected effect on public authorities and businesses is comprised of two pillars:

1. Measure design
2. Alignment with existing permitting systems and application of BAT

Pillar 1: Tailored Approach measure design: reducing overall IED requirements

The first pillar on measure design aims to reduce the general administrative burden on all farms within the revised scope of the IED by reducing the requirements for operators. The possible reduction in requirements would include:

- Review the applicability and monitoring requirements for ELVs on air and water. Feedback was received from Member State authorities that direct monitoring requirements of air and water ELVs may not be suitable for this type of installation, as in the majority of cases, monitoring is done by estimation of emission factor based on the techniques that are applied. Further, emissions to air and water are often very indirect, via animals that are grazing, or via the choices made by the farmer on application of manure, which is already regulated via the Nitrates Regulation and related water regulations. The inclusion of minimum ELVs, required resource management techniques and other provisions (e.g., monitoring requirements and

compliance rules) will be determined in a subsequent dedicated Commission implementing decision, that will adopt a proportionate approach regarding the pollution risks, and the requirements of farms to demonstrate that BAT has been applied, and that required results have been achieved.

- Simplification of the Environmental Management System, where feasible, whilst still retaining a high degree of environmental protection. Similar to the above, an Environmental Management System is a measure designed for large industrial installations and may not need to be as comprehensive for especially smaller livestock farms. Often in permitting, the relevant environmental emissions are already controlled for via the permitting conditions and the conditions on the farm, day by day, do not change to the point where intensive environmental management may be necessary throughout the year. The following elements of the IRPP EMS could therefore be removed:

    - Independent internal or external auditing to determine if the EMS conforms to planned arrangements. (this is because farming EMS implementation and monitoring thereof is often not to a complexity that an external auditor would be required)
    - Consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant (environmental impact from decommissioning are negligible compared to use-phase impacts)
    - Application of sectoral benchmarking on a regular basis (Farming systems do not change or evolve as rapidly as other, more technology-intensive industries, and farming systems are often heterogeneous across a Member State. Therefore, this action is more appropriate as a sector-wide effort than on the individual farms).

- The IRPP BREF also contains techniques whereby the operator can make a choice for one or more to select. However, this may not be as relevant to all types of techniques. In particular, nutrition research is rapidly evolving and locking in certain techniques to be used on this front introduces inflexibility. A simplification would be to determine that farms may use one of the techniques described (in for example BAT 3), or may use a different technique provided it has been demonstrated (and evidenced by the permitting authority to the EU) that this technique achieves the same level of impact reduction, in terms of reaching the BAT-associated excrement levels. This can be done because many Member State authorities maintain their own BAT documents that are often more detailed than what is in the IRPP BREF, and those documents could be validated by an EU entity as “compliant” with the IED, at which point it can be used in combination with local regulation as evidence of compliance to a BAT requirement and the associated ELV. This means no additional burden would be introduced above existing regulations based on these other techniques. This may have some administrative burden at the start of the implementation of the BAT based

requirements, but this would only happen once, and not every time per farm permit process.

- Removal of the need for baseline reports under Article 22, as the environmental impacts of a farm are not often felt on the site of the farm itself but relate more to soil in the surrounding environment, not the soil on the site of the farm.
- Reduction in the frequency of inspections to e.g. every 5 years as a default, or being triggered by complaints or compliance. Farms are already subject to monitoring and reporting to other regulations, and operating conditions do not change very rapidly.
- Registration rather than permitting for smaller farms (threshold of what denotes "smaller" to be determined)
- Inclusion of minimum ELVs, resource management techniques and monitoring/ compliance requirements in a Commission decision.

Pillar 2: Tailored approach permitting: Alignment with permitting systems

In addition to the core tailored approach provisions to be integrated in the IED, the Commission may issue guidelines for MS, recommending minimum requirements that MS registration/permitting systems should include, and providing an application template (for operators) and a permit template (for authorities). An ideal implementation of this would allow Member States to evidence compliance with the IED via existing policy implementations. This could substantially reduce the impacts on the measure for Member States who have already implemented (some level of) environmental permitting with (some level of) BAT.

To support pillar 2 of the tailored approach, 'tailored BATC' may be needed to support this approach through which a specific Implementing Act (IA) /Delegated Act (DA) could be used to lay down minimum environmental requirements for installations under a permitting regime. As national implementation of such conclusions would most likely not comprise a through site-by-site revision of permits, the act would have to be either directly applicable (EU regulation) or subject to translation by Member States in general binding rules or permits, where applicable. The Livestock BREF/ 'tailored BATC':

1. would cover current IRPP and additional installations from the cattle sector and poultry and pigs below current IED thresholds
2. would be started as a priority as soon as consensus emerges on the overall IED revision, associated scope change(s) and the tailored approach
3. should include technical requirements (ELVs, requirements for environmental management, monitoring provisions, and BAT requirements) whose implementation does not necessarily need to be verified directly via full permitting. Instead, it should allow Member States to gather and present evidence of existing regulations that would (partially) fulfil the requirements.

Point 3 of the above is where the tailored approach to permitting differs from the classic approach of the IED. Instead of ensuring compliance via direct control requirements on environmental permits, the EU would set up an evidence gathering system that allows Member States to submit evidence that IED requirements are already (partially) met via implementation of national legislation. This national legislation may in turn be in response to

other EU legislation, but the initial driver for regulation on livestock farms is not consequential.

It is generally not considered feasible to use compliance evidence of other EU Directives or Regulations as evidence for being below IED ELVs. This, because other relevant EU Directives are controlling the destination of pollutants (e.g. concentrations in air, water and soil, or pollutant deposition fluxes), not the emissions source. Therefore, Member States may have already controlled emissions from farms in order to reduce concentrations of pollutants in the air, water or soil. However this is not evidence that the farms causing this pollution are using BAT and/or are operating below ELVs, as the final concentrations of pollutants also heavily depend on the number of farms and animals in any local area as well as other pollution sources.

Therefore, it is only relevant for the Commission to understand whether or not farms are already regulated by restricting emissions per farm (expressed as emissions per animal place) and if the implementation of national legislation has ensured application of (partial) BAT to do so, not what the original driver was for that existing regulation.

To enable this, for the tailored approach, there needs to be a method for Member States to submit evidence that existing permitting regimes/general binding rules *ensure compliance* with the IED, by providing evidence that their existing permitting regimes/general binding rules can only be complied with by farms that are below the suggested IED BAT based ELVs, and/or can only be complied with by farms that use BAT. To gather this evidence, a suggestion is for each Member State to implement a national online register for farm operators and authorities, which can be used to gather the relevant evidence that would be required by the Commission to ensure compliance with the IED:

- The online register would use the Livestock BREF and relevant EU secondary legislation (via an IA/DA mechanism) for environmental aspects;
- The Commission would support Member States, by issuing guidelines, to facilitate creation and usage of online registers;
- Member States could decide whether authorities would need to check all of the applications put into the online register, or if random checks could be performed;
- Member States could decide if the online register would be applicable for installations that require a permit and/or those requiring notification only.

Objectives:

The aim of such a tailored approach would be to facilitate effective implementation of the IED in Member States in terms of achieving a high level of protection of the environment as a whole, while minimising administrative burden. Given the variation across Member States for regulating smaller farms - below current IED thresholds - which are being considered for potential inclusion in the IED, this provision of an EU-wide tailored approach would also help in levelling the playing field for farms across the EU.

Implementation needs:

- EU to specify which requirements to include in a tailored approach, which will need to be determined with the input of competent authorities, from the perspective of

implementation. It would also require inputs from the sector itself, from a technical point of view.

- EU to make amendment to the IED to bring agriculture activities outside the scope of Chapter II and Annex I and to provide a separate Article and associated Annex with the requirements for Member States to regulate these activities using the tailored approach.
- EU to develop BAT based requirements
- Member States to implement the tailored approach to the extent needed to provide its minimum requirements, depending on the extent of the legislation and approaches already implemented in the Member State.
- Development of a common reporting system facilitated by a common IT format, that would enable data between Member States on implementation to be utilised for reporting on the IED, via channels such as the EEA EU Registry and other agricultural-related databases (such as Eurostat agricultural indicators).

Economic impacts

Six specific categories of Economic impacts were selected for an in-depth assessment of the policy options for the revision of the IED. These include administrative burden on businesses, operating costs and conduct of businesses, competitiveness of businesses and levelling the playing field, the position of SMEs, innovation and research and public authority impacts.

Administrative burden on businesses

This measure is likely to lead to **strongly positive impacts** on administrative burden on businesses. The possible administrative costs of permitting agriculture installations under the IED have been based on those in the study from Amec (2012), and adjusted to 2020 EUR prices, as well as additional information received through consultation as part of the IED revision. These costs are shown in Table 12; they represent a full permitting regime, and apply to all additional farms brought under IED control with a lowered threshold, or a new threshold in the case of cattle. Note that these are average costs, and reflect the current average size of IED installations. The "Central" estimate uses data from Amec (2012), divided by two to show only the share that is a cost to businesses. The 2007 IED IA originally estimated that 2/3 of the total administrative burden would be for public authorities and 1/3 for farmers. We have revised this to ½ for authorities and ½ for farmers. This is based on stakeholder inputs and knowledge of permitting implementation, which has shown that:

- Farmers make additional costs that are not accounted for in the IED IA, to acquire the required information needed for a permit for which external advisors may need to be hired.
- Public authorities often charge farmers a share of their permitting costs, and this charge can be dependent on the time spent by desk officers on the permit.

The "Central" estimate here reflects the original central estimate from Amec (2012). The "Higher" estimate reflects a more inefficient permitting regime, whereby more time is spent on the permitting process (duration: > 1 year) and the farmer has to engage with multiple public institutions. The "Lower" estimate reflects a very efficient permitting regime, that is enabled by central IT systems which some Member States have already developed in a

response to implementing the IED for their many pig and poultry farms above the thresholds, which results in shorter durations (< 1 year) elapsing for permit applications and more clarity for the farmers on the exact information requirements for them.

Table A8-32: Administrative costs (sources: Amec 2012, Stakeholder evidence from focus groups, and Ricardo estimation for costs for Tailored Approach)

Range	Administrative costs per installation (2012) – full permitting – previous IED IA scope	Administrative cost for newly covered installations (2020 prices) – full permitting – evidence from focus group and stakeholder interviews	Administrative cost for newly covered installations - Tailored Approach (2020 prices)
Lower	2 450 EUR/ year	1 000 EUR/year	700 EUR/year
Central	4 250 EUR/ year	1 500 EUR/year	1 150 EUR/year
Higher	15 000 EUR/ year	2 000 EUR/year	1 450 EUR/year

It should be noted that the administrative cost is an average expected increase across all installations that would be newly subject to IED requirements where they were not before. The lowest cost are envisioned for farms *already under a permitting regime driven by existing (national) regulation*, as the tailored approach would represent the most savings there.

A tailored approach would lead to a reduced administrative cost for businesses (farms) as compared to implementing full IED chapter II requirements. The amount this would be reduced will depend on which requirements are placed on installations in the tailored approach. It is expected that the tailored approach via Pillar 1 (reducing requirements) could reduce cost up to 20%. Second, it is further expected that for Member States who already implement environmental permitting with some level of BAT, the tailored approach could reduce administrative burdens by an up to an *additional* 40%. These reductions are applied to Member States dependent on information that has been received through the various consultations (including focus group). Various levels of existing permitting approaches exist:

- Registration and/or notification systems. These are not permits but may enable the competent authority to have the information required to intervene should they choose to do so. No additional burden reduction is estimated from having this in place, as it does in no way replace an IED permitting requirement.
- Evidence of a permitting system in place, but no knowledge about its requirements on environmental protection, and no evidence of a requirement to apply BAT. **This would reduce the burdens by an additional 5% for these Member States**, as some synergy can be expected, for example via the IED allowing the existing permitting authorities at municipal level to remain and reduce disruption to existing IT systems / processes within a Member State.
- Evidence of a permitting system in place with some requirements on environmental protection via either BAT or requirements on farming practices. This would reduce burdens by up to 20%, as this means the permitting system in place is already similar with the main pathways through which compliance with the IED should be

implemented, and these existing systems / processes could be used. This would reduce the potential additional administrative cost by 20%.

- Finally, if there is evidence of a permitting system with full requirements on farmers to use BAT for a wide range of environmental issues, then it is expected that these farms will already be compliant or near-compliant. Efforts taken by the Commission to align and seek evidence from Member States who have implemented this should allow for a further 20% reduction in administrative burdens.

Table 33 below sets out how these different scenarios could play out for Member States with different baselines in terms of environmental permitting. The maximum assumed reduction from the tailored approach is 60% compared to the baseline. This is a conservative approach, as there is not enough knowledge available yet on how the Commission would ensure that national permitting systems are not disrupted, and how the Commission would gather evidence from Member States to validate their compliance.

Table A8-33: Approach to estimating the reduction in administrative burdens from implementing a tailored approach.

Base reduction in tailored approach from Pillar 1: Reduction in requirements	Additional reduction based on existing environmental permitting system	Second additional reduction based on existing environmental permitting system with full implementation of BAT	Cumulative level of reduction in administrative burdens achieved for different baseline situations.
20% for all operators and permitting authorities	**0%** (no evidence of a permitting system. Registration systems are not considered valid)	N/A	20%
	5% (evidence of a permitting system but no evidence of BAT)	N/A	25%
	20% (evidence of a permitting system with some level of BAT, but with confirmation from the MS that BAT requirements are more limited than likely required under the BAT based requirements)	**20%** (evidence of a permitting system with full implementation of BAT)	40% - 60%

The administrative burden for farms already regulated under the IED under activity 6.6 could also potentially be reduced. If Member State competent authorities chose to implement a tailored approach for those already regulated, then costs for existing IRPP operators would be

lowered for these farms in the EU27 by € 19m/year (with a reduction of 20% from pillar 1 of the Tailored Approach, which is €2 300/year per installation, with ~20 500 installations). If the MS authorities chose to remain with the existing regulatory approach for the current IRPP farms then no saving would occur. So, the cost saving (benefit) would be within the range of €0 to €19m/year.

For the impact of this measure on the administrative costs of the additional farms being considered for inclusion (measures 31 and 32), the counterfactual scenario would not have these farms regulated. The administrative costs of including these additional farms is only to be considered using the tailored approach. The potential administrative costs of this are considered within measures 31 and 32.

Operating costs and conduct of business

The tailored approach is intended to reduce administrative burdens without compromising the application of BAT to reduce emissions. It does so by taking advantage of existing policy already in place (Pillar 2), as well as by not requiring some Chapter II requirements that may not add to emission reductions for the vast majority of livestock farms (Pillar I). Therefore, this is not expected to change compliance costs already incurred by businesses, except in cases where the tailored approach helps avoid overlapping regulations with similar goals, but conflicting requirements.

Competitiveness and level playing field

Introducing a tailored approach would impose a singular set of minimum requirements towards agricultural installations and operators. It offers, however, an opportunity to alter these requirements to reflect the specificity of animal husbandry, in a manner which may not be needed for other activities found within Annex I of the IED. It therefore continues to level the playing field by providing minimum criteria for all Member States. This has largely been supported within the IED evaluation, where, for industry stakeholder surveyed, 69% agreed or strongly agreed with the statement 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations'. Participants from Member States in the focus group consulted on this matter continued to support the need for ensuring a level playing field, since livestock farming was considered to be a global industry.

Position of SMEs

Farm operators that are SMEs would stand to benefit from the reductions in administrative burden discussed above. There are no means to identify how this measure may impact on SMEs, but it is evident that any reduction in administrative burden would serve to aid the costs faced by these businesses. The impact of this measure towards SMEs, therefore, is positive but unclear.

Innovation and research

This measure will not impact innovation and research.

Public authority impacts

There will be one-off adoption costs for the authorities to implement a new tailored approach. These administrative costs for public authorities will vary by Member State, depending on the extent to which the existing practices in the Member State already have adopted a tailored permitting approach for livestock farms. The measure as described will allow Member States to utilise their existing approaches already implemented, as long as they meet the minimum requirements. The IED evaluation suggested that IED implementation costs for one Member State were ~€250 000/year. This would be on a scenario of having no policy in place and full implementation of IED requirements. There would be some complexity involved at the Member State side, to set up a process which enables the Member State to provide evidence of compliance with the IED via implementation of existing regulations. At this point in time, it is not feasible to speculate as to the exact costs of this process.

There will also be ongoing costs of implementation of the tailored approach, including the means to assess public authority impacts have been identified, and the predicted number of new installations that may be introduced within the scope of the IED, requiring regulation via the lowering of the capacity threshold within Annex I of the IED, cannot be readily determined from available data sources.

Environmental impacts

No environmental impacts are expected by this measure, which is aimed to reduce administrative burden.

Social impacts

The introduction of a tailored approach to an optimised "permitting" system will likely reduce administrative burden, reducing costs faced by operators. This reduction in costs may positively impact upon profitability and upon employment. No formal assessment has been carried out, but the impacts are thought to be positive.

Measure 34: Extend the current sectoral coverage to also include battery production within the scope of the IED

Description of the measure and requirements for implementation

The measure is to include battery production (lithium-ion and related technologies) within the scope of the IED. Battery production (specifically of lithium-ion batteries) is expected to grow in the EU and, although the possible evolution is uncertain, evidence suggests that the EU27 may host between 45-95 'gigafactories' by 2040 (CIC Energi, 2021)[39]. According to the High-Level Meeting of the European Battery Alliance up to 111 major battery projects are being developed across EU Member States, with the total level of investment along the entire value chain amounting to €127 billion[40]. Battery production will play a critical role in

[39] CIC energiGUNE, Gigafactories: Europe´s major commitment to economic recovery through the development of battery factories, available at: https://cicenergigune.com/en/blog/gigafactories-europe-commitment-economic-recovery-battery-factories

[40] https://ec.europa.eu/commission/presscorner/detail/en/IP_22_1256

the transition of the EU economy to climate neutrality as it is the key enabling technology for zero-emission mobility and energy storage. This is a gap-filling extension of scope, as much of the batteries value chain is already covered by IED (non-ferrous metals and processing, chemicals, production of chemicals, waste treatment).

Lithium-ion batteries (LIBs) have been extensively employed in portable electronics, electric vehicles, and grid storage due to a number of valuable qualities such as their high energy density, high power density and long cycle life[41]. Other types of batteries have been and are continued to be researched and developed, including solid-state batteries (SSBs), sodium-ion batteries, lithium-sulphur batteries, lithium-air batteries, and multivalent batteries, and they might be involved in the route to achieving lower prices. However, LIBs are expected to continue dominating the market for at least the next decade.

Objectives of the measure

- Reducing the environmental impact of industry across the EU-27, via the expansion of coverage of the IED in Annex I.
- Levelling the playing field for installations across the EU.

Implementation needs

- EU to make legislative change to the IED text.
- EU to develop BAT conclusions.
- Member States to transpose changes into national law.
- Member States to regulate the installations according to the new requirements. This will require upfront and ongoing implementation actions.

Further evidence and activity data

The battery industry is usually divided in three main areas: electric mobility, stationary energy storage systems and consumer electronics. In terms of total energy storage capacity, this substantial growth is primarily attributable to the electrification of transport which will account for most of the battery demand in 2030[42]. While the market share of batteries for electric mobility have rapidly increased and continue to show a steady rising trend, other industries such as portable electronic or electrical equipment batteries are already very developed, and they present a slower growing tendency.

In 2020, around 3 million new electric automobiles were registered. This year, for the first time, Europe led global electric-car sales with around 1.3 million new registrations, and it is predicted to do so again in 2021[43]. China followed with 1.2 million new vehicles and then the United States with 295 000 new registrations[44]. The IEA estimates electric vehicles might account for 15 to 30% of all vehicle sales by 2030.

A number of reasons have contributed to the increase in electric car registrations. On a total cost of ownership basis, EVs are becoming more competitive in several countries, and numerous governments have increased or extended fiscal incentives to help electric car

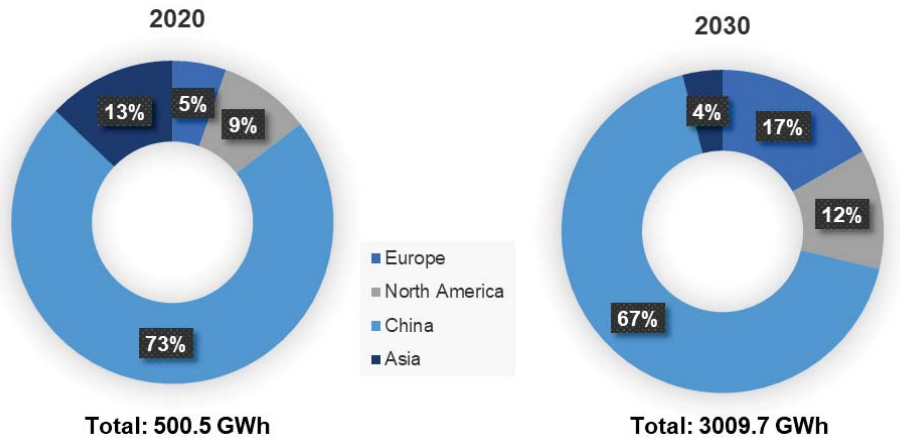
[41] Current and future lithium-ion battery manufacturing - ScienceDirect
[42] Projected global battery demand by application | Statista
[43] The Next Electric-Car Battery Champion Could Be European
[44] Trends and developments in electric vehicle markets – Global EV Outlook 2021 – Analysis - IEA

customers weather the market downturn (France, Germany, United Kingdom, etc.). Despite the economic recession, Europe saw a spike in EV registrations in 2020. According to the IEA, this might be related to two governmental initiatives. First, the European Union's CO_2 emissions limits, which limit new car's average carbon dioxide (CO_2) emissions per kilometre driven, were set to expire in 2020. Second, as part of stimulus packages to counter the pandemic's effects, numerous European governments extended EV subsidy programmes.

However, the European battery demand continues to outstrip supply. Hence, the path to build a battery supply chain rapidly and efficiently is underway across the continent, fuelled by European and national government funding and solid investment plans.

In this context, the global demand for batteries is expected to increase from 185 GWh in 2020 to over 2000 GWh by 2030[45]. BloombergNEF estimates that Europe could see its share of global battery production increase from a 7% in 2020 up to 31% by 2030[46], while Benchmark Mineral Intelligence expects that production capacity (GWh) to rise from 5.4% in 2020 to 16.7% in 2030 as show in the figure below. The European Union's climate-neutral target includes an objective of at least 30 million zero-emission cars on the road by 2030[47], and the ambition of European companies meeting more than 90% of the demand for batteries.

Figure A8-22: Lithium-ion battery cell capacity in 2020 and planned for 2030.



Source: Benchmark Mineral Intelligence

Lithium-ion battery production is currently growing at an exponential rate, mainly due to the 41% increase in global electric car registrations and a constant average battery capacity of 55 kWh for BEVs (battery electric vehicles) and 14 kWh for PHEVs (plug-in hybrid electric vehicles)[48]. Over the following decade, global supply is predicted to expand fivefold, from 297 GWh per year in 2018 to 1.6 TWh per year in 2028[49].

In 2017, the European Commission formed the European Battery Alliance (EBA)[50] to develop a complete, sustainable and globally competitive battery value chain in the EU. The

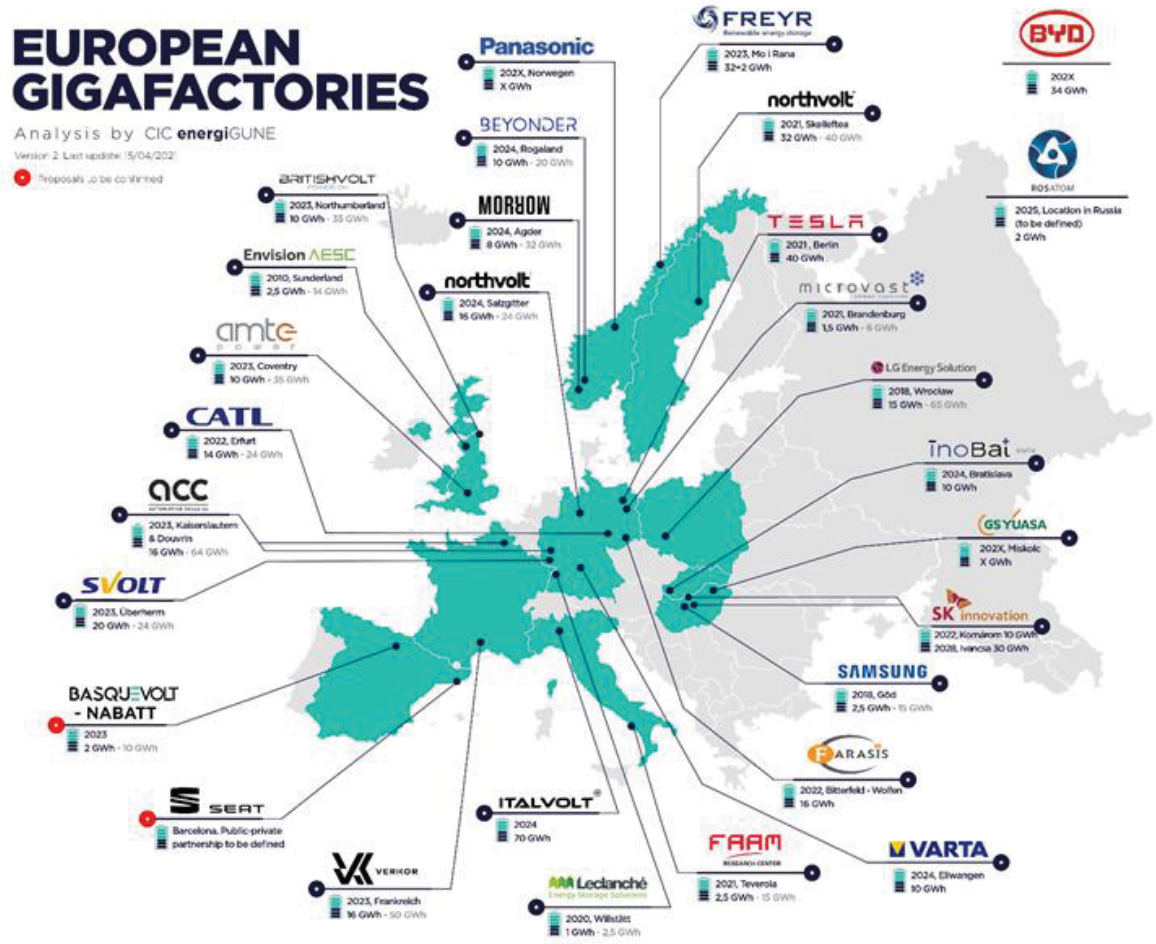
[45] Projected global battery demand by application
[46] The Next Electric-Car Battery Champion Could Be European
[47] EU to target 30 million electric cars by 2030 - draft | Reuters
[48] Trends and developments in electric vehicle markets – Global EV Outlook 2021 – Analysis - IEA
[49] Faraday_Insights-2_FINAL.pdf
[50] ABOUT EBA250 - European Battery Alliance

objective was to ensure that the EU would become a global centre for battery production, recycling and innovation and to ensure greater resilience in the single market for this strategic sector.

The current European annual production capacity is around 35 GWh but announced capacity might reach 400 GWh by 2025[51]. Poland and Hungary are now home to the main continent's battery plants. Many new battery factories were announced or under development in Europe in 2020, with financing support from Member States, the European Investment Bank, private investment among others.

The following map from CIC energiGUNE[52] provides an overview of the current and projected large-scale battery factories in Europe, the main companies involved and their estimated (minimum and maximum, when available) capacity.

Figure A8-23: Map of the current and projected large-scale battery factories in Europe (2021)



Source: CIC energiGUNE

[51] Trends and developments in electric vehicle markets – Global EV Outlook 2021 – Analysis - IEA

[52] Gigafactories: Europe´s major commitment to economic recovery through the development of battery factories | CIC energiGUNE

From these European battery factories, the table below lists only those already installed in the EU-27 and their estimated minimum and maximum capacities. The lowest maximum capacity of the existing large-scale battery factories is 2.5 GWh. The maximum capacities of the projected factories in the EU-27 starts from 2.5 GWh up to 70 GWh.

Table A8-34: Existing large-scale battery factories in EU-27

Company	Year	City	Country	Capacity (GWh)	
				Min	Max
LG Energy solution	2018	Wroclaw	Poland	15	65
Samsung	2018	Göd	Hungary	10	15
Faam Research Center	2018	Teverola	Italy	10	15
Microvast	2021	Brandenburg	Germany	1,5	6
Leclanché Energy Storage Solutions	2020	Willstätt	Germany	1	2,5
Nothvolt	2021	Skelleftea	Sweden	32	40

Considering the battery factories listed above, the total capacity in the EU ranges between 69.5 and 143.5 GWh. However, data from the IEA annual report on *Trends and developments on electric vehicle markets*[53] and studies from Benchmark Mineral Intelligence[54] have estimated the European capacity to be around 35 and 27 GWh, respectively.

This is an area where there are still information gaps, as not all the large-scale battery factories listed above are fully built and operating at the planned capacity range. According to information provided by RECHARGE, precise statistics/figures on each plant's current and final maximum capacity may not be available publicly due to market strategies and R&D investment in this industrial sector.

Existing legislation currently regulates a number of activities related to battery production. EU policies and directives for battery technology and other connected and dependant fields[55], include:

- New batteries regulation: Proposal for a Regulation on batteries and waste batteries
- Batteries directive: DIRECTIVE 2006/66/EC
- Ecodesign directive: DIRECTIVE 2009/125/EC
- REACH regulation: REGULATION (EC) No 1907/2006
- Strategic Action Plan on Batteries: COM(2018) 293 final – Annex 2
- List of critical raw materials: COM(2017) 490 final

For the inclusion of battery production within the scope of Annex I of the IED, battery production installations will be required to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED. This will need to recognise battery compound production (i.e., chemicals, non-ferrous metals) is already covered within the IED's present scope; alongside battery disposal and recovery (to the extent already covered by activity 5.1).

Currently, the IED does include a number of activities that are thought to partially overlap with battery production, identified via analysis of the E-PRTR dataset, which includes a

[53] Trends and developments in electric vehicle markets – Global EV Outlook 2021 – Analysis - IEA
[54] EU to target 30 million electric cars by 2030 - draft | Reuters
[55] EU LEGISLATION & DIRECTIVES - European Battery Alliance

categorisation of facilities by NACE code '27.2 - 'Manufacture of batteries and accumulators'. The Annex I activities associated most commonly with these sites were IED activity 4.2 on production of inorganic chemicals. Similarly, IED Annex I activity 5.3a on disposal of non-hazardous waste with production a capacity exceeding 50 tonnes per day (or 5a in Annex I of the E-PRTR Regulation) or activity 5.3b on recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day for those installations including battery recycling among their activities, and activity 5.1 on disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day (or 5a in Annex I of the E-PRTR Regulation) is listed for some plants. It therefore appears that the IED does cover multiple aspects of the value chain of battery production, just not explicitly with regards to the phrasing of Annex I.

The key environmental impacts from battery production appear to be already covered by the IED, referring most of them to the electrode manufacturing step and relating to the use of chemical substances. Other elements from the production process might not be currently covered by the IED, such as those associated to the cell assembly or the battery assembly processes. However, their environmental impact might not be considered as relevant as other parts of the process. For example, Northvolt's environmental assessment of the process considers that the environmental impacts of the battery pack assembly process are insignificant. The final impact of all elements of the battery production chain, however, is strongly dependent on the production scale of the installation.

Assessment of impacts

Economic impacts

The sector is growing as stated above and the number of production installations is expected to be c. 20-25 sites by 2030 and c. 45-95 by 2040. Implementing the measure would be unlikely to lead to large increases in operating and capital expenditure costs. Economic spill over effects from positive environmental impacts, such as positive effects on reducing sickness, healthcare costs and improving productivity, are captured within the environmental impacts section.

Administrative burden on businesses

The measure would likely lead to **weakly negative impacts** on the administrative burden on businesses.

Resources will be required for the permitting process, primarily depending on the number of installations potentially covered by the IED and the type of permitting framework that would be introduced. There will be costs to industry of the development of a BREF.

A range of 20-95 is employed, with a central estimate of 25 sites, to develop an average view of the likely annual average costs of including 'gigafactories' in the IED. Based on the estimated number of installations for this sector and the assumptions of unit costs for the main requirements for operators, administrative burden on businesses has been estimated between €0.1m/year to €3m/year, with a central estimate of €0.6m/year, on average over the period of 20 years from adoption. This wide range is due to the uncertainty in unit

administrative costs and the number of installations. These costs are not expected to represent a significant burden on the sector.

Input from industry via the Targeted Stakeholder Survey, indicated that, for 14 industry respondents for 'battery production', who supplied a definitive response, 5 would anticipate their costs to be increase by between 5-15%, whilst 7 respondents expect costs greater than 15%. The vast majority of industry respondents chose not to respond, which may be because they had no particular thematic expertise.

For 'battery disposal and recovery', out of the 13 industry respondents who supplied a definitive response, 5 would anticipate their costs to be increase by between 5-15%, whilst 4 respondents expect costs greater than 15%. Similarly, to the above, the vast majority of industry chose not to respond.

Operating costs and conduct of business

This measure will have **negative impacts on compliance costs**, that is to assume that there will be costs to achieve BAT, but the exact level is to be determined by the BREF process. There is uncertainty as to what would be considered BAT for each process, and the degree of environmental pollution risk, and associated protection measures, already in place via the activity's partial inclusion within other activities under Annex I. Such uncertainty means compliance costs cannot be readily determined.

Competitiveness and level playing field

The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon businesses within the battery industry. The exact level, however, as noted in the above, is to be determined by the BREF process. Administrative costs have been estimated and are thought to be small relative to the size of the sector, which some projections forecast a value of €250 billion by 2025.[56] If these costs cannot be passed on in the price of products, these costs will be incurred by businesses, impacting upon profitability.

Inclusion of battery production, disposal, and recovery within the Annex I of the IED imposes a singular set of requirements towards installations and operators. It therefore offers the potential to level the playing field across the EU by providing minimum criteria for all member states, notably towards the use of emission limit values. This has largely been supported within the IED evaluation, where for industry stakeholders surveyed, 69% agreed or strongly agreed with the statement 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations'. This is likely to continue to be the case under new sectors adopted, including for battery production, disposal, and recovery, as in the case of this measure.

The measure therefore can be seen as creating a level playing field as this crucial industry further develops.

[56] Oliver Wyman (2019) Battery manufacturing in Europe

Position of SMEs

The limited information available suggests this measure will bring additional impacts to SMEs. However, this is unlikely given that it is expected that 'gigafactories' will be operated by larger enterprises.

Innovation and research

This measure will have **no or limited impact** on innovation and research.

Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the BREF Process, with emerging techniques considered within the eventual BREF. The activities partial inclusion to date, owing to similar activities within Annex I, may have had an indirect effect.

In the baseline, there is significant support from EU instruments and funds to support the development of the EU battery manufacturing industry. Specifically, through the Important Projects of Common European Interest (IPCEI) instrument which supports two major pan-European battery projects. In terms of European research, all battery-related issues have been grouped under the new Horizon Europe framework programme, and a battery partnership with the industry and other relevant stakeholders has been established (BATT4EU). The European Investment Bank also significantly contributes to the funding of battery-related projects in the European Union. Furthermore, several R&D centres have also been incorporated in the development programmes for battery manufacturers, such as LG Chem and Northvolt.

Public authority impacts

This measure may have a **weakly negative impact** on public authorities. This measure would impact upon the costs to competent authorities. Competent authorities would primarily need to engage with the permitting process, permit reconsiderations and updates, maintain information systems and gather evidence provided through monitoring and reporting, lead inspections, and participate in the BREF process.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for public authorities, additional administrative costs have been estimated between €0.3m/year to €3m/year, with a central estimate of €0.8m/year, on average over the period of 20 years from adoption. This wide range is due to uncertainty in unit administrative costs and the number of installations. These costs, in isolation, are not expected to represent a significant burden on public authorities.

Input from both national and regional member state authorities, via the Targeted Stakeholder Survey for the revision of the IED, indicated that, for the 6 local/regional respondents for 'battery production', who supplied a definitive response, 2 would anticipate their costs to be

increase by between 5-15%, whilst 1 respondent expect costs greater than 15%. 3 would anticipate a variation of + or – 5% or little to no impact. The same results the 9 national respondents for 'battery production', who supplied a definitive response, 1 would anticipate their costs to be increase by between 5-15%, whilst 3 respondents expect costs greater than 15%. 5 would anticipate a variation of + or – 5% or little to no impact. The vast majority of respondents chose not to respond.

For the 7 local/regional respondents for 'battery disposal and recovery', who supplied a definitive response, 2 would anticipate their costs to be increase by between 5-15%, whilst 2 respondents expect costs greater than 15%. 3 would anticipate a variation of + or – 5% or little to no impact. The same results the 13 national respondents for 'battery production', who supplied a definitive response, 1 would anticipate their costs to be increase by between 5-15%, whilst 4 respondents expect costs greater than 15%. 8, however, would anticipate a variation of + or – 5% or little to no impact. Similar to the above, the vast majority of respondents chose not to respond, perhaps not having particular thematic expertise.

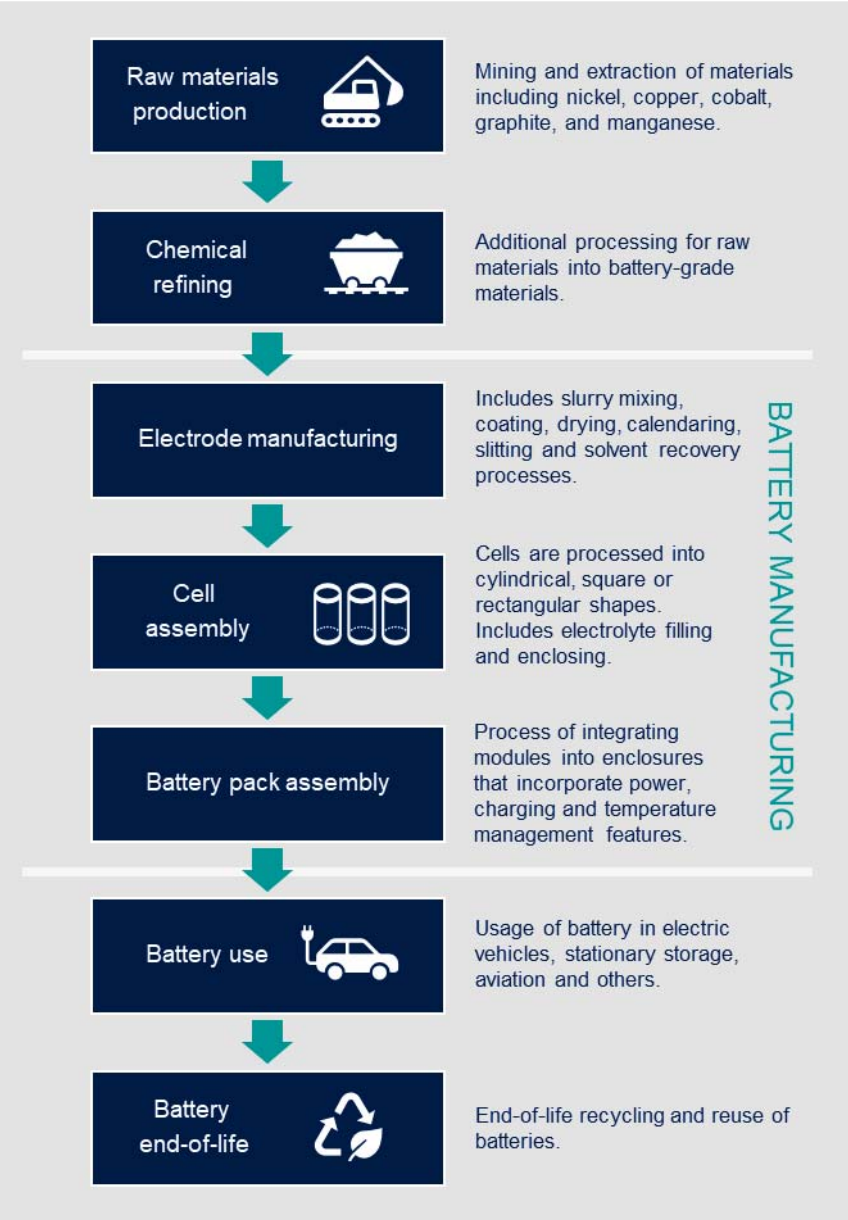
Environmental impacts

The environmental profile of a battery manufacturing facility is directly related to the process or processes covered, as not all battery factories include all three steps of the manufacturing process (electrode manufacturing, cell assembly and battery pack assembly).

The battery manufacturing supply chain begins with the extraction of basic materials. The battery ingredients are then processed to make them battery-grade ready. After the manufacture and integration of battery cells in modules, battery packs are integrated with a battery management system, a cooling system, and a battery case.

An outline of the battery supply chain is shown in the figure below.

Figure A8-24: Battery supply chain.



Source: Ricardo PLC

There are numerous lithium-ion battery chemistries and cell designs. However, many of these use comparable manufacturing procedures, as different ways of cutting and stacking cell layers result in distinct cell designs. There are a variety of lithium-ion battery (LIB) technologies available, each with a different chemical composition for different uses and varying degrees of power and energy density.

The table below lists the primary environmental impacts and their principal sources during the battery manufacturing process.

Table A8-35: Environmental impacts for lithium-ion battery manufacturing process.

Environmental impacts	Type of emissions	Major sources	Measures - normal operation	Expected values after measures
ENVIRONMENTAL IMPACT ON THE OPERATIONAL PHASE				
Energy consumption	Large amounts of energy used in the manufacture of batteries.	Equipment operation and auxiliary energy consumption	- Energy efficiency designs. - Energy management system - Identification of sources of waste heat	Depends on the scale of the factory. However, according to data for current battery manufacturing, the energy use lies between 350 and 650 MJ/kWh[57].
Waste	Residual waste	Production process	Residual waste is usually sorted to the waste station while monitoring quantities, spills and gas formation.	Depends on the scale of the factory.
	Organic solvent (NMP)	Production process	Recovered by condensation to be returned to the process.	Depends on the scale of the factory.
	Non-hazardous waste for external disposal: - metal (from magnets) - waste aluminium foil - waste graphite powder - waster copper foil - waste nickel-plated steel - sodium sulphate (Na2SO4)	Discarded intermediate products	Minimum waste is expected when operating under normal operation conditions[58]. However, due to maintenance and other than normal operations, waste is expected to be produced at a rate of 1-5% of annual production.	1-5% of annual production. E.g., Norhvolt expected values[82] expressed in approx. weight (kg/day): - metal: 100 kg/day - aluminium foil: 100 kg/day - graphite powder: 750 kg/day - copper foil: 200 kg/day - nickel-plated steel: 700 kg/day - See section dedicated to Na2SO4 (emissions to water).

[57] The Life Cycle Energy Consumption and Greenhouse Gas Emissions from Lithium-Ion Batteries

[58] Information from Northvolt's Environmental and Social Impact Assessment (ESIA).

Environmental impacts	Type of emissions	Major sources	Measures - normal operation	Expected values after measures
	Hazardous waste for external disposal: - Cathode production.: LiNiCoO, LiOH, NMP, cathode (discarded) - Anode production: CBC, SBR, anode (discarded). - Electrolyte mixture: ingredient chemicals, electrolyte (discarded). - Capsule manufacturing: PCE, etc - Propagation: damaged cells. - Other: sludges from water treatment, residual oils, chemical residues	- Cathode production - Anode production - Electrolyte mixture - Capsule manufacturing - Propagation (damaged cells) - Other	Minimum waste is expected when operating under normal operation conditions[59]. However, due to maintenance and other than normal operations, waste is expected to be produced at a rate of 1-5% of annual production.	E.g., Norhvolt expected values[82] expressed in approx. weight (kg/day): - Cathode production: ~1650 kg/day - Anode production: ~100 kg/day - Electrolyte mixture: ~200 kg/day - Capsule manufacturing: ~35 kg/day - Propagation: ~500 kg/day
Emissions to air	GHG	It is not always easy to determine which emissions occur from what stage in the production. Most common is that the emissions from the battery components are presented (anode, cathode etc) but that it is not divided between material mining and refining and further processing.	Information under development.	The results differ quite drastically. In general, it appears that most articles are non-transparent and there are usually information gaps in the goal and scope reporting[60].
	Dust in form of metal particles (nickel, cobalt, manganese, lithium).	- Drying of active material at cathode manufacturing. - Other production steps.	Purification techniques. E.g., ceramic filter or textile barrier filter followed by HEPA	Max. emissions[82]: 103 kg/year Air flow: 13200 Nm3/h

[59] Information from Northvolt's Environmental and Social Impact Assessment (ESIA).
[60] The Life Cycle Energy Consumption and Greenhouse Gas Emissions from Lithium-Ion Batteries

Environmental impacts	Type of emissions	Major sources	Measures - normal operation	Expected values after measures
			filters.	
	PCE (VOC)	Cathode production	Purification techniques. E.g., carbon filter.	Max. emissions[82]: 160 kg/year Air flow: 1000 Nm3/h
	Ammonia	Recycling of ammonia that ends up in the process effluent after ammonia has been used for precipitating a metal slurry.	Purification techniques. E.g., scrubber for venting from stripper.	Max. emissions[82]: <1 kg/year Air flow: 50 Nm3/h
	Non-metal containing particles: graphite, CBR and SBR	Production process	Purification techniques. E.g., condensation trap followed by textile blocking filter.	Max. emission[82]s: 900 kg/year Air flow: 23100 Nm3/h
	NMP (VOC)	Production process	Purification techniques. E.g., condensation followed by carbon filter.	Max. emissions[82]: 1120 kg/year Air flow: 71700 Nm3/h
	Hydrogen	During combustion, only water is formed.	Purification techniques. E.g., torch.	Max. emissions[82]: 230 tons Air flow: 30 kg/h
Emissions to water	Sodium sulphate (Na2SO4)	Process wastewater	Conventional drainage technology (evaporation, membranes, decants, etc.)	Depends on the production range of the battery factory.
	Ammonia	Process wastewater	Recycled in stripper (exclusively dedicated to ammonia).	

Environmental impacts	Type of emissions	Major sources	Measures - normal operation	Expected values after measures
Aquatic environment	- Arsenic and the metals chromium, zinc and copper - Mercury and PBDE the flow of process wastewater is estimated to be approximately 120 m3/h (0.03 m3/s)	- Ni-Co-Mn oxide preparation in cathode production - Refinement step in cathode production - Cell assembly - Washing water	Purification steps as part of the process.	E.g., Norhvolt expected values[82] expressed in maximum concentration in the measuring points: - Nickel: 20 g/l - Cobalt: 20 g/l - NH4 - N: 40 mg/l - Na2SO4: 2 g/l - Lithium: 0.2 mg/l - Organic pollutants: 20 g/l - NaOH: 9 (pH)
	Water temperature	Outgoing water having too high temperature.	Heat exchanges and cooling water tower.	Information not available.
Noise and vibration	Noise	Normal production process. Specially those steps related to: - Mechanical process steps - Loading and unloading of materials - Increased transport density in near roads (e.g., number of trucks)	- Facility's design. - Major noise sources placed in closed areas. - Installation of local screens. - Selection of equipment.	40 dBA - 80 dBA
	Vibration	Information under development.	Information under development.	< 0.4mm/s

Lithium-ion battery production is an energy-intensive process and entails a number of complex manufacturing procedures.

In several LCAs of battery electric vehicle (BEV) technologies, battery manufacturing is found to be the source of the greatest amount of energy consumption and associated environmental effects during the manufacturing stage. Depending on the approach taken and the electricity generation source, it is estimated a range from 10% to 75% of manufacturing energy and 10 to 70% of manufacturing greenhouse gas (GHG) emissions (e.g., coal-fired, natural gas-fired, or renewable)[61].

The source of the energy used to manufacture batteries has a significant impact on their environmental footprint, as the largest part of the energy use in the production of lithium-ion batteries comes from electricity use. Due to this, the electricity mix used is a critical factor for the GHG emissions from production, as it is stated to account for 62% of the total emissions, implying that manufacturing accounts for 107 kg CO_{2eq}/kWh.

Manufacturing cells in facilities powered solely by renewable energy sources is currently the most efficient way to reduce GHG emissions from battery production.

Climate

The measure is expected to have **limited or no impacts on greenhouse gas emissions**. Including the sector within the IED would lead to the development of BAT Conclusions for the sector, which may identify options for improving energy efficiency at the sites, but such options may be taken up by industry under business as usual.

The 2017 E-PRTR data indicates no emissions of CH4, CO2 or N_2O from plants categorised by NACE code '27.2 - 'Manufacture of batteries and accumulators'. It is thought, therefore, that the battery production, at least at its current levels, has limited GHG emissions in the EU.

Other research reports do indicate battery manufacturing to lead to GHG emissions, but clearly these are not being reported to E-PRTR perhaps because they are not occurring in Europe. The ICCT (2018) conducted a meta-analysis of various battery manufacturing studies and identified only one study estimating battery production GHG intensity based on European manufacturing, which had GHG emissions 56 kg CO2e / kWh. That said these estimates may be taking a lifecycle approach rather than an installation level approach. The ICCT study, and others, have noted several trends suggesting these may drop over time, as they are mainly influence by the source of the energy used for the battery manufacturing.

Air quality

This measure could have **positive impacts on air quality**. However, the extent of this is uncertain and would depend on the ambition level of future BAT Conclusions. The 2017 E-PRTR data indicates that only lead emissions were reported from plants categorised by NACE code '27.2 - 'Manufacture of batteries and accumulators'. This may not simply be due to the fact these are the only emissions associated with the activity, but rather, these emissions exceed the pollutant thresholds in Annex II of the E-PRTR Regulation. The addition, these lead emissions is equivalent to 0.002% of EU27 reported lead emissions,

[61] Environmental Effects of Battery Electric and Internal Combustion Engine Vehicles (fas.org)

relative to the baseline scope of the IED. It is considered that the E-PRTR data source limitations are affecting the conclusions that can be drawn.

According to available information provided from the Environmental and social impact assessments (ESIA) for a number of battery manufacturing projects in the EU, the main environmental impacts related to emission to air are those including dust from metal particles (nickel, cobalt, manganese and lithium), ammonia, non-metal dust (graphite, CBR and SBR), organic solvent NMP and hydrogen emissions.

Water quality and resources

This measure could have **positive impacts on water quality**. However, the extent of this is uncertain and would depend on the ambition level of future BAT Conclusions. By comparison, the US EPA has developed Battery Manufacturing Effluent Guidelines and Standards (40 CFR Part 461). The regulated pollutants include cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, oil & grease, silver and zinc.

According to available information provided from the Environmental and social impact assessments (ESIA) for a number of battery manufacturing projects in the EU and LCA studies on the battery electric vehicle (BEV) technologies, the main environmental impacts related to emission to water are those including sodium sulphates, ammonia, nickel, cobalt, lithium, and organic compounds.

Soil quality

No releases to soil have so far been identified.

Waste production, generation, and recycling

This measure could have **positive impacts on waste**. However, the extent of this is uncertain and would depend on the ambition level of future BAT Conclusions. According to available information provided from the Environmental and social impact assessments (ESIA) for a number of battery manufacturing projects in the EU, waste production is mainly related to residual waste from the production process, organic solvent (NMP) from the cathode production, and non-hazardous and hazardous waste for external disposal related with several steps of the battery manufacturing process, such as cathode and anode production, electrolyte mixture and propagation.

However, regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC).

Efficient use of resources

The impacts on the efficient use of resources are unclear. The regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

The inclusion of battery production sector within Annex I of the IED will incur costs towards business and operators. If these costs cannot be passed on within the price of products, these costs will impact upon profitability and, therefore, potentially upon employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

Measure 35: Extend the current sectoral coverage to also include shipbuilding (other than coating) and ship dismantling within the scope of the IED

The measure is to include shipbuilding (other than coating) and ship dismantling within the scope of Annex I of the IED.

NB: Although the impacts of this measure have been assessed, it was decided to discard the measure at a later stage in the assessment of the PO5 measures. The rationale for discarding the measure is as follows:

- **Shipyards** are already partly covered under IED Activity 6.7, for the coating activity (being one of the main environmental pressures from the activity). The IED includes any activity in which a single or multiple application of a continuous film of a coating is applied to, which includes the surfaces of ships. Shipbuilding and repair installations that carry out coating activities with an organic solvent consumption capacity of more than 150 kg per hour or more than 200 tonnes per year are included in the scope of the IED. By comparison, E-PRTR includes in its scope facilities for the building of, and painting or removal of paint from ships, with a capacity for ships 100 m long (EC, 2006).
- In the context of **ship dismantling and recycling**, there is already a set of minimum requirements for ship recycling facilities across the EU due to the EU Ship Recycling Regulation (regulation (EU) No 1257/2013, based on the Hong Kong Convention (2009) on transboundary movements of hazardous wastes and their disposals to the ship recycling industry). This is argued to already provide a (minimum) level playing The main environmental pressures from this activity are addressed by existing EU and national policies.

Measure 36: Extend the current sectoral coverage to also include forging presses, cold rolling with capacity exceeding 10 t/h, and wire drawing with capacity exceeding 2 t/h within the scope of the IED (e.g. via Annex I, activity 2.3).

Description of the measure and requirements for implementation

Include forging presses, cold rolling with capacity exceeding 10 t/h, and wire drawing with capacity exceeding 2 t/h within the scope of the IED (e.g. via Annex I, activity 2.3).

The **production of forged materials** can be carried out using open/closed die or cold forging techniques. In open die forging, the preheated metal (materials are typically forgeable at

temperature above 60% of their melting temperature) is compressed between multiple dies that do not completely enclose the material. The open die forging is less suitable for the production of complex finished shapes than closed die, and machining is typically required afterwards in order to achieve the desired dimensions. The open die forging process can be performed by using presses and hammers. Close die forging is more suitable for producing complex geometries. In close die forging, it is often not possible to achieve the final shape with one set of dies, and hence multiple forging with various dies would be required to achieve the final quality. The available published information does not distinguish between the stand-alone and integrated operations with those of primary/secondary steelmaking or the application of presses and hammers in closed or open die forging.

Cold rolling is a process by which hot rolled strip steel products are compressed between rollers with no prior heating in order to adjust and improve the surface, thickness, mechanical, and metallurgical properties of the product. The stand-alone operation of such mills is referred to installations where the hot rolling of strip products is occurred outside of the facility, and hence the steel feedstock used for the cold rolling processes are imported into the installation. The cold rolling process is performed on hot rolled steel products. The hot rolling operations with a capacity exceeding 20 tonnes of crude steel per hour is already covered in the IED, whilst the operation of stand-alone cold rolling mills is not currently included in the scope.

The **wire drawing** process is carried out on wire rod coils produced in wire rod mills. The wire rod mill processes billets that are produced from primary/secondary steelmaking routes. The size of wire rods is reduced in wire drawing mills by pulling them through a single or series of drawing dies. There are many applications for such products including, cables, electrical wiring, structural components, etc. The wire drawing process in part of the scope of the FMP BREF. However, its stand-alone operation is not currently part of the scope of the IED.

Therefore, this measure would ensure that certain loopholes in the scope of the IED are closed.

Objective(s):

The following objectives apply:

- Levelling the playing field for installations across the EU.
- Reducing the environmental impact of industry across the EU-27, via the amendment/expansion of coverage of the IED in Annex I.

Implementation needs:

The following actions will need to be taken to implement the measure:

- EU to amend the IED to bring the activities inside the scope of the IED, primarily by including the activities in Annex I.
- EU to make legislative change to the IED text.
- Member States to transpose changes into national law.

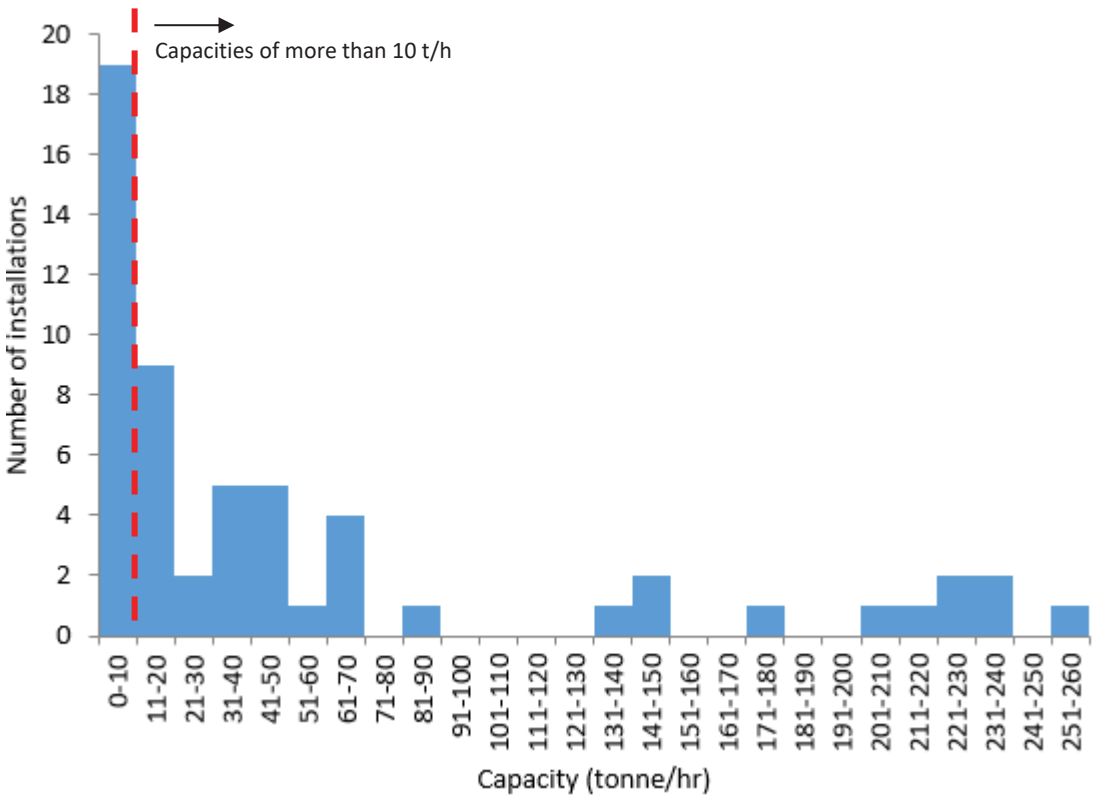
- Member States to regulate the activities according to the new requirements, to the extent this requires changes from their existing regulatory approaches. This will require upfront and ongoing implementation actions.

Further evidence and activity data

The number of plants with operational **forging presses** is estimated to be around 400 in EU 27 (assumptions based on EUROFORGE data and split between operations of presses and hammers). The majority of the production of forged materials in Europe is performed by using closed die operations. Apart from closed die forging that has been in decline during the period, the rest of the categories of production show little change.

There are estimated to be 140 **cold rolling plants** in EU 27 with total capacity of 63 060 ktonne per annum. The stand-alone cold rolling plants are estimated to be 93 with total annual capacity of 21 652 ktonnes. The capacity distribution of the installations for stand-alone cold rolling plants is provided in the figure below. It can be seen that if a production capacity of more than 10 tonnes/hour is introduced for inclusion in the IED, this would affect ~35 installations. This amount equates to about 65% of the total number of stand-alone cold rolling installations in EU 27.

Figure A8-25: The capacity distribution of stand-alone cold rolling installations across EU 27.



As part of the FMP BREF review, there have been 7 wire drawing plants that have reported data, out of which 3 were standalone plants with permitted capacity exceeding 2 tonnes/hour. A survey carried out by the Wire Drawers Association indicated that there are 12, 35, 5 and 11 stand-alone installations in Germany, Poland, Netherlands and Sweden, respectively. There was no data available at the time of reporting on the number of such installations in

other Member States. The total number of such installations, based on the production figures, can however be estimated to be around 260 in EU 27.

Assessing impacts

Economic impacts

Six specific categories of economic impacts were selected for an in-depth assessment of the policy options for the revision of the IED. These include administrative burden on businesses, operating costs and conduct of businesses, competitiveness of businesses and levelling the playing field, the position of SMEs, innovation and research and public authority impacts.

The data obtained as part of the complementary study supporting the impact assessment of the IED revision[62] have indicated the total number of forging installations in EU 27 to be around 400. The estimation of the exact number of such plants that exceed a certain pressing capacity, for instance 10 000 kN with calorific value of more than 5 MW, has not been possible.

The data collated for the development of the revised 'ferrous metals processing industry' BREF, indicates that a capacity threshold of 10 t/h would be appropriate for standalone cold rolling plants, capturing 8 out of the 9 known plants. The supporting study has found approximately 35 standalone installations in EU27 that are estimated to operate at capacities of higher than 10 t/h. For the Wire Drawing (WD) sector, the data collection did not include many plants. Only 7 WD plants reported data, out of which 3 were standalone plants with permitted capacity > 2t/h. The supporting study has estimated the total number of WD plants to be approximately 260 in EU27. No data was found to provide an estimate on the exact number of standalone WD installations, however, this number is expected to be far lower than the standalone cold rolling installations in Europe.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses.

Businesses would primarily need to engage with the permitting process, permit reconsiderations and updates, monitoring and reporting, host inspections, and participate in the BREF process.

The number of installations that would be covered by this extension in scope is uncertain. Currently estimates suggest that there might be 250-400 sites, and likely closer to the upper end estimate.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for operators, administrative burden on businesses has been estimated between €0.6m/year to €11m/year, with a central estimate of €6m/year, on average over the period of 20 years from adoption. This wide range is due to the uncertainty in unit

[62] Trinomics, Ricardo, Wood, 2021. Gathering of complementary evidence for assessing the impacts of extending the scope of the IED to additional sectors. Draft final report

administrative costs and the number of installations. These costs are not expected to represent a significant burden on the sector.

It should however be noted that there is uncertainty about the current regime of regulations across the EU with regards to the emissions from the aforementioned sectors. Among the respondents to the survey carried out in this study Sweden and Austria have indicated that they currently have a permitting system in place for such installations. It would however be unclear for instance that if IED is extended to include forging presses of or above certain capacity, that what level of BAT-AELs would be required from the industry to adhere to.

Input from industry via the Targeted Stakeholder Survey, indicated that, for 26 industry respondents for 'downstream ferrous metal processing activities', who supplied a definitive response, 6 would anticipate their administrative costs to be increase by between 5-15%, whilst 19 respondents expect costs greater than 15%. 1 respondent anticipated administrative costs to decrease by 5-15%. The vast majority of industry respondents chose not to respond, perhaps not having particular thematic expertise.

"Administrative costs for installations considered for inclusion in the scope of the IED (e.g. smitheries below the current IED threshold, downstream ferrous metal processing activities – ***Q2-5***) would increase significantly due to additional requirements (e.g. environmental inspections, additional reporting, and creation of the baseline report). Most of these installations are small and the costs incurred by the additional burden would be disproportionate compared to the expected environment benefit."

Operating costs and conduct of business

Compliance costs are thought to be negative, that is to assume that there will be costs to achieve BAT, but the exact level is to be determined by the BREF process. There is uncertainty as to what would be considered BAT for each process. Such uncertainty means compliance costs cannot be readily determined. The SF BREF do not discuss BAT for forging presses and hammers in detail, and therefore establishment of the baseline would not be possible at this stage. This is while the FMP BREF provides environmental benchmark for cold rolling and wire drawing processes that could be extended to stand-alone operations.

Sweden and Austria were among the few Member States that provided a response with regards to the current regulatory framework for forging presses, stand-alone cold rolling and wire drawing installations in their Member States. They have stated that these plants are currently being regulated under the General Binding Rules. Therefore it would not be possible to estimate how many of the potentially eligible plants for the IED scope extension across EU 27 would need to make upgrades to their current abatement systems in order to achieve the BAT-AELs stated in the FMP BREF for cold rolling and wire drawing.

Competitiveness and level playing field

The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to **negatively impact upon businesses**. The exact level, however, is to be determined by the BREF process. If these costs cannot be passed on in the price of products, these costs will be incurred by businesses, impacting upon profitability.

Inclusion of these activities within the Annex I of the IED imposes a singular set of requirements towards installations and operators. It therefore offers the potential to level the playing field by providing minimum criteria for all member states, notably towards the use of emission limit values. This is likely to continue to be the case under new sectors adopted, including for downstream ferrous metal processing, as in the case of this measure.

Position of SMEs

The exact impact of this measure towards SMEs remains **unclear**, especially due to gaps in the evidence available. According to EUROFORGE, an association for the forging industry in Europe, more than 90% of the forging industry is operated by SMEs. The picture is somehow different for the cold rolling industry where the majority of the production capacity across EU 27 is expected to be operated by large enterprises[63]. There is not much data available about the role of SMEs in the wire drawing industry.

Innovation and research

Including downstream ferrous metal processing within Annex I of the IED may have a **limited impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the Sevilla Process, with emerging techniques considered within the eventual BREF.

Public authority impacts

This measure is likely to have **weakly negative impacts** on public authorities. Competent authorities would primarily need to engage with the permitting process, permit reconsiderations and updates, maintain information systems and gather evidence provided through monitoring and reporting, lead inspections, and participate in the BREF process.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for public authorities, additional administrative costs have been estimated between €0.5m/year to €7m/year, with a central estimate of €4m/year, on average over the period of 20 years from adoption. This high and wide range is due to the uncertainty in unit administrative costs and the uncertainty on the number of installations. These costs, in isolation, are not expected to represent a significant burden on public authorities.

Input from both national and regional member state authorities, via the Targeted Stakeholder Survey, indicated that, for the 8 local/regional respondents for the activity, who supplied a definitive response, 3 would anticipate their costs to be increase by between 5-15%, whilst 2 respondents expect costs greater than 15%. 3 would anticipate a variation of + or – 5% or little to no impact. The same results the 12 national respondents, who supplied a definitive

[63] Based on Ricardo's analysis of plant facts provided by Boston Consulting Group

response, 4 would anticipate their costs to be increase by between 5-15%, whilst 4 respondents expect costs greater than 15%. 4 would anticipate a variation of + or – 5% or little to no impact. The vast majority of respondents chose not to respond, perhaps not having particular thematic expertise.

Environmental impacts

Forging operations are typically associated with the following environmental pressures:

- Emissions to air: The key sources of emissions to air are from the reheating furnaces (e.g. NOx) and diffuse dust from material storage and handling.
- Noise and vibrations: Noise emissions and vibrations are expected from forging presses and hammers. As an indication, an average A-weighted Leq values are of the order of 108 dB for hammer operators and 99 dB for press operators.
- Energy consumption: The estimated net specific energy consumption for smitheries operating with hammers is in the range 1000-5000 kWh/t of input material. The net specific energy consumption for presses is expected to exceed 5000 kWh/t[9].

The Key Environmental Issues (KEI) for the **cold rolling processes** are identified to be[64]:

- Emissions to air:
  - HCl, H_2SO_4, SO_2, NO_x and HF emissions from the respective pickling and acid regeneration processes;
  - emulsion fumes from rolling operations; and
  - NO_x and SO_2 from combustion heat treatment processes such as annealing. The SO_2 emissions are typically associated with the fuel type, for instance on integrated iron and steelmaking sites, Blast Furnace Gas (BFG) and Coke Oven Gas (COG) are captured and stored for combustion applications. The application of such gases is not however expected in stand-alone operations.
- Emissions to water:
  - COD/TOC from pickling operations;
  - TSS and HOI from rolling processes;
  - Pb, Hg, Cd and Cr (VI) and fluoride emissions in pickling of stainless steel; and
  - Fe, Crtot, Ni, Zn from pickling and rolling.

The KEI for the **wire drawing processes** are identified to be:

- Emissions to air:
  - HCl, H_2SO_4, SO_2, NO_x and HF emissions from pickling operations;
  - Dust, NO_x and SO_2 emissions from heat treatment processes (e.g. annealing, patenting);
  - Pb and TVOC from lead bath heat treatment operations.
- Emissions to water:
  - HOI emissions from the use of lubricants in wet drawing;
  - Pb emissions from water quenching baths;
  - Cr^{VI} from pickling of stainless steel;

[64] FMP BREF data collection, EIPPCB, 2021

- TSS from wet drawing operations.

The European Wire Drawers Association believe that the majority (more than approximately 70%) of the wire drawing operations by output in Europe is for production of meshes that do not require any of the pre-treatment, heat treatment or galvanisation processes, and would therefore have relatively limited environmental impacts in comparison to operations that do require such pre or post treatments of wire rods.

Climate

This measure is likely to have **unclear or limited positive impacts** on the climate. The evidence available is limited by it suggests that the introduction of these activities within the scope of the IED could reduce GHG emissions as a by-product to improving their environmental performance.

Air quality

The measure is likely to have **weakly positive impacts** on air quality.

The data collated as part of the current project indicate at least 35 standalone cold rolling installations with capacities of more than 10 t/h. The estimation of the exact number of forging and standalone wire drawing plants that would fall under a revised IED was not possible at the time of preparation of this report. It is expected that there are 400 of such plants across EU 27 that may fall under the new regulation as the result of the revised IED implementation. These plants may have an outsized contribution towards air pollution

Water quality and resources

The measure is likely to have **positive impacts** on water quality and resources.

Cold rolling plants generally consume greater quantities of water than hot rolling. Including the large standalone cold rolling plants, detailed above, within the IED, would therefore consider this increased water consumption within its remit.

Soil quality or resources

No releases to soil have been identified.

Waste production, generation, and recycling

The measure is likely to have **positive impacts** on waste production, generation and recycling.

Regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC).

Efficient use of resources

The measure is likely to have **positive impacts** on efficient use of resources.

Regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

The measure is likely to have **limited social impacts**.

The sectors will increase the costs of doing business. If these costs cannot be passed on through the price of services or products, they may affect profitability and, therefore, potentially impact on employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

Measure 37: Extend the current sectoral coverage to also include finishing activities with the existing capacity thresholds in activity 6.2 (pre-treatment or dyeing of textile fibres or textiles

Description of the measure and requirements for implementation

Revise the activity definition for activity 6.2, to include finishing activities, in addition to pre-treatment or dyeing. The capacity threshold would remain unchanged. A revised wording would be 'Pre-treatment (operations such as washing, bleaching, mercerisation) dyeing or finishing of textile fibres or textiles where the treatment capacity exceeds 10 tonnes per day'. This will encompass a larger proportion of the sector's emissions and impacts, particularly from waste water impacts.

Objective(s):

The following objectives apply:

- Levelling the playing field for installations across the EU.
- Reducing the environmental impact of industry across the EU-27, via the amendment/expansion of coverage of the IED in Annex I.

Implementation needs:

The measure will need to be further defined with regards to the proposed wording to be included in Annex I, however wording and capacity thresholds in this case are already substantiated by prior research. For example, according to the data collected for the review of the Textiles BREF, 76 (out of 106) IED plants reported at least one type of functional finishing of textiles.

Further evidence and activity data

Textile manufacturers are typically small and highly specialised businesses[65]. Companies in the textile finishing sector usually specialise in one type of process. However, there are companies with several different production processes and integrate other textile activities as part of the production process. The following type of companies in the finishing sector can be distinguished, according the TXT BREF:

- Commission or merchant yarn dyers
- Commission or merchant fabric dyers
- Commission or merchant yarn printers

[65] The changing profile and map of the EU textile and clothing industry

- Integrated companies

The textile finishing industry in the European Union is currently led by four countries (Italy, Germany, Spain and Portugal), which together account for almost 72% of the market share for the entire EU, according to data from Eurostat[66]. However, Italy is by far the leading European textile finishing producer, followed by Germany and Spain.

The main processes involved in the textile finishing industry include softening, finishing, water-/oil-/soil-/repellent finishing, flame-retardant finishing, antistatic finishing, easy-care finishing, biocidal/fungicidal/mothproofing finishing and shrink-proof finishing. Functional finishing processes require consideration since these are the processes with the greatest potential for pollution. Functional finishing includes processes that further enhance the performance properties of the fabric and/or potentially add new desired qualities[67]. Many such finishes add more than one property to a fabric, and some are more common for certain types of fibre (e.g., easy-care finishes for cotton, antistatic treatment for synthetic fibres and mothproofing and anti-felt treatments for wool). Other finishes have a broader application, such as softening, as detailed in the TXT BREF (D1, 2019).

A number of textiles activities (pre-treatment or dyeing) are already covered by the European legislation under Article 6.2 of the IED[68]. According to E-PRTR, there are currently 132 installations covered under this IED Article in the EU[69].

Using this information and data from Eurostat, it is estimated that the measure would cover an additional 50-100 installations.

Although there are no figures on the sizes of stand-alone functional finishing installations, it is plausible to assume that the majority of these sites are SMEs according to information provided by experts from EURATEX and the German Textile and Fashion Association (Gesamtverband Textil und Mode e.V.). Therefore, in the context of the European trend in the textile finishing industry of moving away from intermediate sectors and towards the production of final products, the production capacities of stand-alone installations may typically fall below the capacity IED threshold of 10 tonnes per day, while the majority of these activities are already incorporated as part of integrated plants and covered under the IED as directly associated activities.

On the other hand, the Belgian associated FEDUSTRIA also provided qualitative information regarding the high variability on the size of the different textile companies, primarily distinguishing between commissioning companies, which are solely dedicated to finishing processes, and integrated companies, which include a variety of manufacturing processes, including finishing.

[66] Eurostat - Data Explorer (europa.eu)
[67] Functional Finish - an overview | ScienceDirect Topics
[68] L_2010334EN.01001701.xml (europa.eu)
[69] Installations by country: 33 DE, 26 SP, 17 FR, 15 BE, CZ 12, NL 10, BU 7, RO 4, SW 3, PL 2.

Assessing impacts

Economic impacts

Six specific categories of economic impacts were selected for an in-depth assessment of the policy options for the revision of the IED. These include administrative burden on businesses, operating costs and conduct of businesses, competitiveness of businesses and levelling the playing field, the position of SMEs, innovation and research and public authority impacts.

Administrative burden on businesses

This measure is likely to have **weakly negative impacts** on administrative burden. Businesses would primarily need to engage with the permitting process, permit reconsiderations and updates, monitoring and reporting, host inspections, and participate in the BREF process. In this case, there is already some baseline activity across Member States, suggesting that there might already be some permitting. The data is very limited. However, it is assumed that only 50% of baseline permitting and baseline report costs would be incurred. The rest of the core baseline costs are included in full, that is, permit reconsiderations and updates, monitoring and reporting, hosting inspections and BREF contributions.

The number of installations that would be covered by this extension in scope is uncertain. Current estimates suggest that there might be 50-100 sites, with a central estimate of 75.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for operators, administrative burden on businesses has been estimated between €0.2m/year to €3m/year, with a central estimate of €1.4m/year, on average over the period of 20 years from adoption. This high and wide range is due to the uncertainty in unit administrative costs and the number of installations. These costs are not expected to represent a significant burden on the sector.

Input from industry via the Targeted Stakeholder Survey, indicated that, for 7 industry respondents for Textiles, who supplied a definitive response, 4 would anticipate their administrative costs to increase by between 5-15%, whilst 1 respondent expect costs greater than 15%. 1 respondent anticipated administrative costs to decrease by 5-15% and another respondent expected little to no impact. The vast majority of industry respondents chose not to respond, perhaps not having particular thematic expertise

Operating costs and conduct of business

Compliance costs are thought to be **negative**, that is to assume that there will be costs to achieve BAT for the activities, but the exact level is to be determined by the BREF process. There is uncertainty as to what would be considered BAT for each process. Such uncertainty means compliance costs cannot be readily determined.

Competitiveness and level playing field

The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon businesses. The exact level, however, is to be determined by the BREF process. If these costs cannot be passed on in the price of products, these costs will be incurred by businesses, impacting upon profitability.

Inclusion of these activities within the Annex I of the IED imposes a singular set of requirements towards installations and operators. It therefore offers the potential to level the playing field by providing minimum criteria for all member states, notably towards the use of emission limit values.

Position of SMEs

No means to identify the costs per employee or businesses have been identified. The impact of this measure towards SMEs, therefore, remains unclear.

Innovation and research

Revising the activity definition for textiles within Annex I of the IED may have a limited impact on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the Sevilla Process, with emerging techniques considered within the eventual BREF.

Public authority impacts

This measure would have weakly negative impacts on public authorities. Competent authorities would primarily need to engage with the permitting process, permit reconsiderations and updates, maintain information systems and gather evidence provided through monitoring and reporting, lead inspections, and participate in the BREF process. As with businesses, an assumption that only 50% of baseline costs from new permitting and baseline reports would be incurred due to already existing administrative activity.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for public authorities, additional administrative costs have been estimated between €0.3m/year to €2.7m/year, with a central estimate of €1.3m/year, on average over the period of 20 years from adoption. This wide range is due to the uncertainty in unit administrative costs and the number of installations. These costs, in isolation, are not expected to represent a significant burden on public authorities.

Input from both national and regional member state authorities, via the Targeted Stakeholder Survey, indicated that, for the 7 local/regional respondents for the activity, who supplied a definitive response, 3 would anticipate their costs to be increase by between 5-15%, 4 would anticipate a variation of + or – 5% or little to no impact. The same results the 13 national respondents, who supplied a definitive response, 4 would anticipate their costs to be increase by between 5-15%, whilst 3 respondents expect costs greater than 15%. 6 would anticipate a variation of + or – 5% or little to no impact. The vast majority of respondents chose not to respond, perhaps not having particular thematic expertise.

Environmental impacts

Finishing processes are considered one of the most pollutant aspects of textiles. The main environmental issues and concerns in the textile finishing industry are those related to the amount of polluted water discharged and the chemical load it carries, including organic compounds. Moreover, the textile finishing sector consumes high rates of energy, water and chemicals. Other relevant issues to consider in this sector are those related to air emissions, solid wastes and odours, which can be of significant nuisance in certain treatments.

However, likewise to other finishing treatments such as dyeing, emissions are highly dependent on the chemical treatment employed and whether the manufacturing process is continuous or discontinuous.

Climate

The measure will likely lead to **limited to weakly positive impacts** on climate.

E-PRTR data indicates no emissions of CH_4, CO_2 or N_2O from E-PRTR Annex I activity 9a, 'Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles'. It is thought, therefore, that the activity has a limited impact towards GHG emissions.

Air quality

The measure will likely lead to **limited to weakly positive impacts** on air quality.

Data for E-PRTR Annex I activity 9a, 'Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles' is associated with emissions of NMVOC, NO_X and SOx. Comparing the totals for this activity with the E-PRTR industrial totals for the EU27, comparable in scope to the E-PRTR, indicates that the activity contributes at most 0.03% towards totals (SOx in 2018). This indicates that emissions from this activity, at least at the industrial and EU scale, as thought to be minimal. This minimal contribution suggests a limited potential for the IED to further reduce the environmental impact. Though the measure represents a minor change in the activity definition to encompass all processes thought to occur at these installations, this is unlikely to change the overall magnitude or importance of emissions.

Water quality and resources

This measure is likely to have limited to weakly positive impacts on water quality and resources. The main environmental issues and concerns in the textile finishing industry are those related to the amount of polluted water discharged and the chemical load it carries, including organic compounds, as these contain substances which might be hazardous, persistent and/or bio accumulative.

Additionally, data for E-PRTR Annex I activity 9a, 'Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles' is associated with a range of heavy metal releases to water, including arsenic, cadmium, copper and nickel has been associated with water discharges from these processes. These releases equate, at their maximum, to 0.4% of the total release to water for any one of these pollutants, relative to the

baseline scope of the IED. They are therefore, a relatively minor contributor. Nevertheless, adjusting the activity definition within the IED to capture all processes occurring within textile manufacturing may help ensure these processes reduce these releases, albeit with a minor impact.

Soil quality or resources

The measure will likely lead to **limited to weakly positive impacts** on soil quality.

Waste production, generation, and recycling

The measure will likely lead to **limited to weakly positive impacts** on waste production, generation and recycling.

Regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC). Any impact is likely to be minor, as there are already a range of baseline legislation that regulate waste production and management.

Efficient use of resources

The measure will likely lead to **limited to weakly positive impacts** on climate, air quality, waste production, generation and recycling; soil quality; efficient use of resources.

Regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

Public health impacts would be spill over effects from the environmental benefits already captured within the previous section of this assessment. Further, this measure may result in an increase in costs towards business. If these costs cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

Measure 38: Extend the current sectoral coverage to also include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW in activity 2.3(b) (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW).

Description of the measure and requirements for implementation

The measure is to revise IED Annex I activity 2.3b to include smitheries of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW in activity 2.3(b) (from the current limit of 50 kilojoule per hammer and where the calorific power used exceeds 20 MW).

The smithery operations can be as stand-alone or an integrated part of steelmaking/foundry operations with forging hammers being used to shape ingots. The hammers are used in forging installations in both closed and open die configurations.

The operation of smitheries with hammers with the energy of more than 50 kJ per hammer, where the calorific value of the associated preheating operations exceeds 20 MW is currently included in the scope of the IED. This measure is to include operations where the capacity of such hammers is below this limit.

Objective(s):

The following objectives apply:

- Levelling the playing field for installations across the EU.
- Reducing the environmental impact of industry across the EU-27, via the amendment/expansion of coverage of the IED in Annex I.

Implementation needs:

The measure will need to be further defined with regards to the proposed wording and capacity threshold to be included in Annex I, however wording and capacity thresholds in this case are already substantiated by prior research. For example, research by the German Industrial Association for Solid Forming (Industrieverband Massivumformung), indicates that there are currently only 3 smitheries operating hammers in Germany that are above the current IED criteria, out of a total of 200.

Further evidence and activity data

The latest data from the European Pollutant Release and Transfer Register (E-PRTR) for 2019 show 213 entries that are associated with Activity 2.3 (b) of the IED. There are 197 entries for France, followed by five for Germany and the rest for Czech Republic, Estonia, Denmark, Hungary, Poland, Romania and Spain[70].

During the last two decades, a change of the forming unit from hammer to forging press has occurred in the European industry (based on the information submitted in the frame of initial positions for the review of the SF BREF – April 2019).

Information from Germany (April 2019) shows that from a total of 200 smitheries (data includes both hammers and forging presses of all sizes), only 3 are IED relevant (fulfil the criteria of point 2.3 (b) of IED Annex I). It is estimated that about 25 smitheries in Europe (out of 400 to 500) are currently IED relevant.

The data collected during the SF BREF data collection process indicates a range of 25 to 630 kJ per hammer. The calorific value of these plants was shown to range from 3 850 to 15 206 kW_{th}[71].

It is expected that the environmental relevance of smitheries with hammers with a lower threshold than the current IED threshold is nearly the same regarding emissions to air and

[70] Note: The provided number of entries appear to be excessive, particularly for France. We will investigate this by getting in touch with the European Environment Agency.
[71] SF BREF development, EIPPCB, Oct 2021

water. The energy consumption might be lower due to a lower threshold of hammers and lower total calorific power required for carrying out such activities. However, regarding the information from EUROFORGE, new developments of light materials (in weight) that will be used in future to meet the requirements of the customers might result in a higher energy consumption compared to the current situation.

The main environmental impacts from forging hammers include:

- Emissions to air (e.g. NO_x, CO, dust, diffuse emissions, noise and vibration),
- Emissions to water from cleaning procedures, storage areas, possible from cooling processes (however, mostly closed cooling circuit applied). These are however expected to be minor emissions compared to emissions to air.
- Residues: process residues (recycling/reuse), packaging materials,
- Energy consumption.

Typical pollutants emitted or KEIs (Key Environmental Issues) for smitheries include NO_x and CO emissions as well as noise and vibration[72]. Others would include material, water and energy consumption.

Assessing impacts

Economic impacts

Six specific categories of economic impacts were selected for an in-depth assessment of the policy options for the revision of the IED. These include administrative burden on businesses, operating costs and conduct of businesses, competitiveness of businesses and levelling the playing field, the position of SMEs, innovation and research and public authority impacts.

Administrative burden on businesses

This measure is likely to have **weakly negative impacts** on administrative burden. Businesses would primarily need to engage with the permitting process, permit reconsiderations and updates, monitoring and reporting, host inspections, and participate in the BREF process.

The number of installations that would be covered by this extension in scope is uncertain. Current estimates suggest that there might be 400-500 sites, with a central estimate of 450. It should however be noted that there is uncertainty about the current regime of regulations across the EU with regards to the emissions from the smitheries with hammers sector. Among the respondents to the survey carried out in this study Sweden and Austria have indicated that they currently have a permitting system in place for such installations. It would however be unclear for instance that if IED is extended to include forging hammers at lower capacity, that what level of BAT-AELs would be required from the industry to adhere to.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for operators, administrative burden on businesses has been estimated between €0.8m/year to €13.5m/year, with a central estimate of €7.1m/year, on average over the period of 20 years from adoption. This high and wide range is due to the

[72] Kick-off meeting (KoM) conclusion of the SF BREF review, EIPPCB, Sep 2019

uncertainty in unit administrative costs and the number of installations. These costs are not expected to represent a significant burden on the sector.

A different pattern was shown for smitheries. For the 19 industry respondents for the activity, who supplied a definitive response, 5 would anticipate their administrative costs to increase by between 5-15%, whilst 12 respondents expect costs greater than 15%. 1 respondent anticipated administrative costs to decrease by 5-15% and another respondent expected little to no impact. Similar to the above, the vast majority of industry respondents chose not to respond, perhaps not having particular thematic expertise.

Operating costs and conduct of business

It is expected that to achieve BAT, operators would need to incur additional compliance costs, directly and indirectly. The evidence available to estimate the scale of these costs is, however, limited.

Sweden and Austria were among the few Member States that provided a response with regards to the current regulatory framework for forging hammer installations in their Member States. They have stated that these plants are currently being regulated under the General Binding Rules. Therefore it would not be possible to estimate how many of the potentially eligible plants for the IED scope extension across EU 27 would need to make upgrades to their current abatement systems in order to achieve the required BAT-AELs.

Competitiveness and level playing field

The total costs of doing business are **likely to increase** when compared to the baseline. The extent to which these affect the sector's competitiveness is unclear, given the evidence available.

Revising the activity definition for textiles and lowering the capacity threshold for smitheries, within the Annex I of the IED imposes a singular set of requirements towards these newly introduced installations and operators. It therefore offers the potential to level the playing field by providing minimum criteria for all member states, notably towards the use of emission limit values. This has largely been supported within the IED evaluation, where, for industry stakeholder surveyed, 69% agreed or strongly agreed with the statement 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations'. This is likely to continue to be the case under these new installations, as in the case of this measure.

Position of SMEs

The impact of this measure towards SMEs is likely to be **weakly negative**, as evidence suggests that smaller players in the smitheries sectors may be disproportionately impacted. According to EUROFORGE, an association for the forging industry in Europe, more than 90% of the forging industry is operated by SMEs.

Innovation and research

This measure is likely to have a **limited positive impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and

development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the BREF Process.

Public authority impacts

This measure would have weakly negative impacts on public authorities. Competent authorities would primarily need to engage with the permitting process, permit reconsiderations and updates, maintain information systems and gather evidence provided through monitoring and reporting, lead inspections, and participate in the BREF process.

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for public authorities, additional administrative costs have been estimated between €0.6m/year to €8m/year, with a central estimate of €4.9m/year, on average over the period of 20 years from adoption. This high and wide range is due to the uncertainty in unit administrative costs and the number of installations. These costs, in isolation, are not expected to represent a significant burden on public authorities.

Input from both national and regional member state authorities, via the Targeted Stakeholder Survey, indicated that, for the 7 local/regional respondents for the activity, who supplied a definitive response, 3 would anticipate their costs to be increase by between 5-15%, whilst only 1 respondent expect costs greater than 15%. 3 would anticipate a variation of + or – 5% or little to no impact. The same results the 11 national respondents, who supplied a definitive response, 2 would anticipate their costs to be increase by between 5-15%, whilst 3 respondents expect costs greater than 15%. 6 would anticipate a variation of + or – 5% or little to no impact. The vast majority of respondents chose not to respond, perhaps not having particular thematic expertise.

Environmental impacts

Climate

The measure will likely lead to **limited impacts** on climate.

Activity 2(c)ii, 'Smitheries with hammers' is associated with emissions of GHGs, and equates to 0.0004 – 0.0006% of GHG emissions, relative to the baseline scope of the IED. This data is partial, however, arising from a single site. This minimal contribution suggests a limited potential for the IED to further reduce the environmental impact.

Air quality

The measure will likely lead to **positive impacts** on air quality.

Data for E-PRTR Annex I activity 2(c)ii, 'Smitheries with hammers' is associated with a wider array of pollutants, with emissions of NMVOC, NO_X, SO_x and PM_{10}. The comparison of emission profiles from the model plants with those reported in E-PRTR for activity 2 (c)ii (smitheries with hammers) indicate a potential total contribution of 199 to 662 tonnes per

annum of NO_x as the result of inclusion of 500 operational smitheries with hammers in EU 27 within the scope of the IED. This indicates an average of 0.4 to 1.3 tonnes of NO_x per smitheries installation. This is in comparison to the current report of 1.5 tonnes of NO_x per installation from a single installation that reported to E-PRTR in 2019. This figure could also be compared with an average installation for the processing of ferrous metals (activity 2 (c)) that has reported 154 tonnes of NO_x emissions per annum for 2019.

Water quality and resources

The measure will likely lead to **positive impacts** on water quality and resources.

Data for E-PRTR Annex I activity 2(c)ii, 'Smitheries with hammers', suggests the activity is not associated with releases to water, above the thresholds specified in Annex II of the E-PRTR Regulation. As such, efforts to reduce the capacity threshold, introducing new installations within the scope of the IED, would likely have a limited impact towards releases to water, and thus water quality.

Soil quality or resources

No releases to soil have been identified.

Waste production, generation, and recycling

The measure will likely lead to **limited to weakly positive impacts** waste production, generation and recycling.

Regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC).

Efficient use of resources

The measure will likely lead to **positive impacts** on efficient use of resources.

Regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

The revision of the capacity threshold for smitheries within Annex I of the IED will incur costs towards business and operators. If these costs cannot be passed on within the price of products, these costs will impact upon profitability and therefore upon employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

Measure 39: Facilitate the adoption of BAT conclusions for activity 5.4 landfills.

Description of the measure and requirements for implementation

Landfills are currently considered under the IED with the following being defined under Activity 5.4 of Annex I:

Landfills, as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (1) OJ L 182, 16.7.1999, p. 1. receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste.

Although BATC exist for 'waste treatment' covering those activities under 5.1, 5.3, 5.5 and 6.11 of Annex I of the IED, no BATC exist for landfills, considered under activity 5.4. This is owing to the coverage of this activity under Council Directive 1999/31/EC, the Landfill Directive.

The Landfill Directive aims to protect both human health and the environment. In particular, it aims to prevent, or reduce as much as possible, any negative impact from landfill on surface water, groundwater, soil, air and human health. It does this by introducing rigorous operational and technical requirements[73]. The Landfill Directive applies unless Members States have declared this not applicable to either:

1. landfill sites for non-hazardous waste with total capacity not exceeding 15 000 tonnes or with annual intake not exceeding 1 000 tonnes serving islands.
2. landfill sites for non-hazardous waste or inert waste in isolated settlements.

Alongside defining waste that can be accepted in different classes of landfill (Article 6), the Landfill Directive also defines

- waste acceptance procedures (Article 11 – including checking documentation, visual inspection at entrance, keeping a register of quantities and characteristics, etc.), and
- control and monitoring procedures in the operational phase (Article 12 – including carrying out a control and monitoring programme (covering collection of emission and groundwater data), notifying competent authorities of any significant adverse effects, reporting, and quality control of analytical operations).

Recital 16 to the Landfill Directive intimates that measures should be taken to reduce the production of methane from landfills (amongst other things to reduce global warming) through a reduction in the landfilling of biodegradable waste and requirements to introduce landfill gas control. The general design and operational requirements for all classes of landfills are set out in Annex I of the Landfill Directive. They require the following gas control measures:

- appropriate measures must be taken in order to control the accumulation and migration of landfill gas;
- landfill gas must be collected from all landfills receiving biodegradable waste and the landfill gas must be treated and, to the extent possible, used;
- landfill gas which cannot be used to produce energy must be flared;
- the collection, treatment and use of landfill gas must be carried on in a manner, which minimises damage to or deterioration[74].

Currently the Landfill Directive provisions are deemed to constitute BAT (Art 1(2) of Directive 1999/31). This measure considers amendments to allow the adoption of BAT

[73] https://ec.europa.eu/environment/topics/waste-and-recycling/landfill-waste_en
[74] https://www.sepa.org.uk/media/28986/guidance-on-the-management-of-landfill-gas.pdf

conclusions for landfills covered by the IED (IED Annex I activity 5.4). That said, some stakeholders (EEB) disagree with this understanding of the Landfill Directive's provisions constituting BAT, given this provision was adopted prior to the revision of the IPPC-Directive and the IED.

The EU has also published guidance on landfill gas control which is non-binding and aims to:

- help competent authorities improve methane collection through the enforcement of the Landfill Directive requirements
- provide clarity on landfill gas control requirements within the context of the technical and regulatory requirements of the landfill directive
- set out the most important criteria in ensuring effective collection, treatment and use of landfill gas.

Objectives:

An updated BREF and BATC for landfill would allow the consideration of techniques that are nowadays more prevalently used in the sector, such as methane capture. BAT conclusions would cover the key environmental issues for which BAT has evolved since the 1990s, including methane capture. Adopting BATC could also maximise the circular economy aspects of landfill operation.

Implementation needs:

While pollution can be captured and well-regulated by setting up suitable BAT AELs, so far, the other environmental goals of the Directive are only addressed by the weaker narrative BAT conclusions and non-mandatory BAT AEPLs respectively. It is necessary to add appropriate provisions and BAT-based requirements. BATC for landfill would need to be defined.

Further evidence and activity data

A 2018 report by the European Commission (EC, 2018) highlighted that amounts of landfilled municipal waste have steadily fallen in the EU as a whole, dropping by 18% during the 2013-2016 period (although the average landfilling rate for municipal waste in the EU still stood at 24% in 2016).

Large differences across the EU persist: in 2016 10 Member States still landfilled over 50% of municipal waste, while five reported rates above 70%. This is supported by data from the European Parliament, which notes: "*Landfilling is almost non-existent in countries such as Belgium, the Netherlands, Denmark, Sweden, Germany, Austria and Finland). Here incineration plays an important role alongside recycling. Germany and Austria are also the EU's top recycling countries. The practice of landfilling remains popular in the eastern and southern parts of Europe. Ten countries landfill half or more of their municipal waste. In*

Malta, Cyprus and Greece this is more than 80%. In Croatia, Romania, Bulgaria and Slovakia it is more than 60%, while it is also half or more in Spain and Portugal"[75].

The 2018 European Commission report also noted that despite the closures of non-compliant landfills reported by the Member States, the number of facilities that are not in line with the requirements of the Directive remains a matter of concern, **perhaps suggesting that the ambition set out in the Landfill Directive is not necessarily being achieved**. A study by Milieu in 2017 (EC, 2017) found: "*significant problems of compliance (…) across the Member States. These include improper transposition of pre-treatment provisions, the persistent practice of landfilling significant amounts of untreated waste, and inadequacy of separate collection systems. In some Member States, the lack of sufficient pre-treatment infrastructure hinders compliance with pre-treatment requirements".*

In 2018, the EU-27 produced 2 170 Mtonnes of waste, of which 834 Mtonnes went to landfill. In 2016, there were 5 076 landfill disposal facilities reported in Eurostat across the EU-27 (of which 296 were for hazardous waste, 2 568 for non-hazardous waste and 2 585 for inert waste).

The E-PRTR Waste transfer dataset provides varying data over three years from 2017-19. This may reflect changes in the actual number of sites, or simply variance in data collection. Taking the largest numbers as an upper bound, this suggests there were around 2 950 landfill sites in the EU-27 in 2018 (excluding those handling inert waste) – see Table 36. This is consistent with the EU Registry reporting which includes 2 944 landfill installations in 2018.

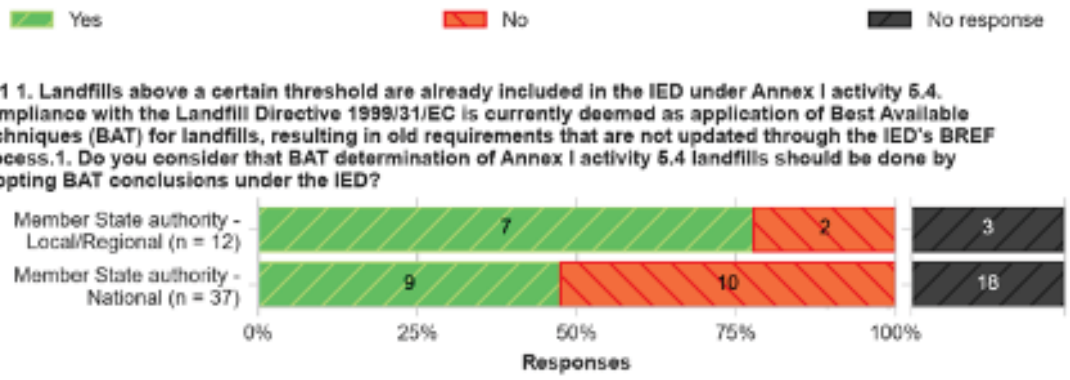
Table A8-36: E-PRTR waste transfer data for landfill sites (EU-27)

	2017	2018	2019
Total waste quantity (tonnes)	18 544 012	22 880 827	18 670 696
Number of facilities	2 916	2 950	2 675

Stakeholders are broadly supportive of the development of BATC for landfills (Figure A8-26). Based on the TSS, generally speaking most (77%) of the local and regional Member State authorities believe that the BAT determination of Annex I activity 5.4 landfills should be done by adopting BAT conclusions under the IED. However, the national Member State authorities show a higher level of contrasting opinions with a split majority (47/53%) showing more resistance to the adoption of BATC under the IED. Stakeholder engagement for this report did not provide any further evidence for this reasoning.

[75] https://www.europarl.europa.eu/news/en/headlines/society/20180328STO00751/eu-waste-management-infographic-with-facts-and-figures

Figure A8-26: Distribution of responses to question 16.1 to the targeted stakeholder survey: "Do you consider that BAT determination of Annex I activity 5.4 landfills should be done by adopting BAT conclusions under the IED?



Assessing impacts

Economic impacts

The key economic impacts are expected to be **weakly negative impacts** on business due to the additional administrative and possible compliance costs of this measure. However, these are expected to be small due to the existing requirements already in place through the Landfill Directive. Nevertheless, a formal BAT conclusions document will still need to be developed and agreed.

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses.

As landfills already fall under the scope of the IED (with the exception that no BATC are developed under the IED), it is unlikely to pose an increase in administrative burden towards businesses, beyond the current system already imposed by the IED. That said, there may be a transitional cost to the revision of permits, should new BATC be developed which go beyond the existing requirements as defined in the Landfill Directive, but it would be expected that permit revisions for landfills would be occurring as a matter of course in the baseline.

There will be costs to industry of the development of a Landfill BREF and BATC. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). Around a third of these costs are likely attributed to businesses. Therefore, assuming two BREFs are carried out over a period of 20 years, average annual costs of the BREF process for businesses would range from €0.1m/year to €0.7m/year, with a central estimate of €0.2m/year.

In response to the stakeholder engagement, the majority of MS authorities stated that no impact or only a slight impact would be seen from this measure. Of note in an open text response, the MS National German Environment Agency (German UBA) highlighted that the cost of the landfill, and therefore the acceptance fees for the waste to be deposited, will be

higher if the administrative requirements for operating the landfill are increased. This suggests that even if a greater burden is placed on businesses, this could be somewhat (or wholly) passed on.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on total operating costs. The costs of the measure will depend on the BATC proposed. At this stage there is uncertainty as to what would be considered BAT for each process.

The Landfill Directive already defines requirements that landfills should meet, including collection and treatment of gases. For an illustrative reference, these measures appear to be broadly in line with the measures set out for other sectors – for example gas treatment in the Chemicals sector in the CWW BREF, and in the Waste Treatment BREF. As such it is questionable whether more ambitious BATC would be defined if included in the IED.

Where BAT Conclusions are defined that go beyond existing requirement of the Landfill Directive, compliance costs will be negative – there will be costs to achieve BAT. But the exact level is to be determined by the BREF process. Such uncertainty means compliance costs cannot be readily determined.

In response to the TSS, the majority of MS authorities stated that no impact would be seen from this measure. The overall consensus from Local/Regional MS was that economic impacts would be still dependent on the Landfill Directive 1999/31/EC in conjunction with Council Decision 2003/33/EC. That said, some MS stakeholders stated that if the BAT conclusions are stricter than current legislation then there would be some additional economic impacts. In an open text response, Italian National MS - Ministero della transizione ecologica highlighted the economic impacts could be significant.

Competitiveness and level playing field

This measure is likely to lead to **weakly negative impacts** on competitiveness. The total costs of doing business, primarily compliance costs, will increase for landfill operators where BAT Conclusions goes beyond the existing requirements of the Landfill Directive. The exact level, however, as noted in the above, is to be determined by the BREF process. If these costs cannot be passed on in the price of waste management services, these costs will be incurred by businesses, impacting upon profitability. Given the nature of the operation, landfill is deemed not to be at significant risk from international competition.

However, where landfill operators face additional costs, this may favour other operators in the waste stream (e.g. those involved in recycling operations). Hence landfilling may become less competitive with these alternative waste stream activities. But to that end, these measures could also serve to encourage these alternative means of waste treatment within the waste hierarchy, achieving additional (indirect) environmental impacts. On balance of these impacts, we would expect the small negative effects could outweigh the small positive effects.

Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Position of SMEs

This measure is likely to lead to **limited impact** on the position of SMEs. Given the threshold for inclusion of landfills in the existing IED definition, this should limit impacts on SMEs. That said, there is limited evidence and no means to identify the costs per employee of businesses have been identified. Hence, the impact on SMEs remains uncertain.

Innovation and research

This measure is likely to lead to **weakly positive impacts** on innovation. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, emerging techniques considered within the eventual BREF may add to the current state of innovation and research. That said, given the nature of the process, the potential for innovation is deemed more limited relative to other sectors.

Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Public authority impacts

This measure is likely to lead to **weakly negative and weakly positive impacts** on public authorities**.** The addition of an additional set of BATC for landfill could introduce an additional requirements (if new BATC go beyond existing requirements of the Landfill Directive) to be reflected in permits and monitored, and the potential for additional derogation cases, all of which may add to the costs of implementation for public authorities.

That said, there could also be positive impacts: inclusion of BATC for landfill could improve coherence with the way BATC are defined for environmental permits in other sectors, making things easier for permitters; and it would enable more regular reviews of BATC in the sector as part of the BREF cycle.

There will be the costs to public authorities of the development of the Landfill BREF and BATc. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). Around two thirds of these costs are likely incurred by public authorities. Therefore, assuming two BREFs are carried out over a period of 20 years, average annual costs of the BREF process for businesses would range from €0.3m/year to €1.4m/year, with a central estimate of €0.5m/year. It could be expected that the costs of a landfill BREF would be on the lower end of this range if requirements from the Landfill Directive can be built upon.

Environmental impacts

Overall, the key environmental issues relate to releases to water, soil and air (GHG and air pollutants). The existing requirements of the Landfill Directive are not shown to be out of date and may still represent state-of-the-art. Therefore, it is unclear as to whether shifting the definitional authority to the IED would lead to mitigation of the key environmental issues through IED-defined BAT conclusions implemented in IED permits.

Climate

This measure is likely to lead to **limited or weakly positive impacts on climate.**

Landfills remain an important source of GHG emissions: E-PRTR Activity 5(d), which refers to landfills as defined by the Landfill Directive and aligned with the capacity threshold currently contained in Annex I of the IED, is associated with emissions of GHGs, equating to 1.6% – 2.4% of GHG emissions, relative to the baseline scope of the IED.

The Landfill Directive already defines BAT for landfill and has driven broad environmental improvements. Where new BATC go beyond the existing requirements of the Landfill Directive, this could drive further benefits. That said, BREFs typically focus on environmental pressures other than emission of GHGs. Furthermore, comparison to other BREFs (CWW, WT) suggests that the existing requirements of the Landfill Directive may be broadly in line with those that may be defined under the IED. The impact of the measure towards climate is uncertain and dependent upon the eventual BREF and therefore cannot be readily assessed.

Stakeholders have identified that small benefits could be gained by raising the bar for certain subsectors (e.g. organic wastes). In response to the TSS (Q16.3) '*What impacts would you expect of an amendment to move the definition of BAT for landfills from the Landfill Directive to the IED*?' stakeholders had mixed responses to whether the measure to move the definition of BAT for landfills from the Landfill Directive to the IED would be beneficial for emission reductions. However, it should be noted that the majority of the 'yes' answers were circumstantial to if the BAT was stricter than the Landfill Directive. Overall, the consensus from stakeholders was that these environmental impacts are already covered in the Landfill Directive. However, it was noted that any environmental impacts that are missed in the Landfill Directive will be regulated, which would be an important additional benefit.

In an open text response, the National MS German Environment Agency (German UBA) stakeholder provided a detailed response and explanation. It was highlighted that the requirements for landfills defined in the Landfill Directive 1999/31/EC in conjunction with Council Decision 2003/33/EC on waste acceptance still represent the state of the art. This would not change by shifting the definitional authority to the IED. The existing requirements for the geological barrier, liners, and leachate collection and treatment protect the soil and groundwater below and in the vicinity of the landfill from contamination. The existing requirements for landfill gas capture, treatment and recovery protect the atmosphere from emissions including greenhouse gases. In addition, EU law already stipulates that no waste collected separately for recycling and waste that can be recycled may be accepted at the landfill from 01.01.2024 at the latest. In addition, from 01.01.2035, the disposal of municipal

waste in landfills may only amount to a maximum of 10% of the total volume of municipal waste. However, an improvement in the environmental impact is achievable if there were stricter requirements for the landfilling of residual organic waste. The stakeholder provided a context-specific example that: in some MS, not in Germany, a relevant share of organic waste is still landfilled resulting in gas formation (GHG, methane emissions). This, however, would not require any displacement of the necessary regulations to the IED, but the inclusion of such additional regulations in Council Decision 2003/33/EC would suffice, e. g. the limitation of TOC (Total Organic Carbon). Such a limitation would require additional treatment of the residual waste before it is deposited, e.g., mechanical-biological or thermal, and permanently prevent the formation of methane as a climate-relevant gas in the landfill.

In addition, it was noted from an open text response that it would be useful to consider integrating the Landfill Directive in the IED with an annex as a safety net. Vlaamse Overheid (Belgium, Local/Regional MS) thought a BREF on landfills might propose BAT for existing activities and potentially diminish emissions (CH_4, odour, dust) and the inclusion of Landfill mining activities in this BREF could be an option.

Air quality

This measure is likely to lead to **limited or weakly positive impacts on air quality.**

Landfill remains an important source of air pollution: Data for E-PRTR Annex I activity 5(d), which refers to landfills as defined by the Landfill Directive, is associated with emissions of NH_3, NMVOC, NO_X, PM_{10} and SOx. Comparing the totals for this activity with the E-PRTR industrial totals for the EU-27, comparable in scope to the E-PRTR, indicates that the activity can, for some pollutants, moderately contribute to overall pollutant totals. For example, the activity contributes on average 1.3% of total NMVOC, relative to the baseline scope of the IED for the years available. Similarly, the activity contributes 1.9% towards NH_3 totals across available years, and 1.4% for SOx.

The Landfill Directive already defines BAT for landfill and has driven broad environmental improvements. Where new BATC go beyond the existing requirements of the Landfill Directive, this could drive further improvements. However, the impact of the measure on air quality is uncertain and dependent upon the eventual BREF and therefore cannot be readily assessed. Stakeholder opinion on air quality was summarised in 'Climate' impact above.

Water quality and resources

This measure is likely to lead to **limited or weakly positive impacts on water quality.**

Landfill remains an important source of water pollution. Data for E-PRTR Annex I activity 5(d), which refers to landfills as defined by the Landfill Directive, is associated with releases to water (leachate) of several heavy metals, including cadmium, zinc and chromium. These releases, relative to the baseline scope of the IED, can be sizeable, e.g. 4.7% – 9% of cadmium releases are associated with this activity. Depending on the degree of containment, small releases through leakage may end up in groundwater and/or surface water. Collected leachate can be subject to dedicated treatment prior to release to sewage systems.

The Landfill Directive already defines BAT for landfill and has driven broad environmental improvements, e.g. the collection and recirculation of leachate to prevent contamination of land, groundwater and waterways, as well as requiring the monitoring of potential water releases in pathways and receptors during and after landfill closure. Where new BATC go beyond the existing requirements of the Landfill Directive, this could drive further improvements. However, the impact of the measure towards water quality is uncertain and dependent upon the eventual BREF and therefore cannot be readily assessed. Stakeholder opinion on water quality was summarised in 'Climate' impact above.

Soil quality or resources

This measure is likely to lead to **limited or weakly positive impacts on water quality.**

Similar to the above detail on releases to water, E-PRTR data indicates that the activity is also associated with releases to land, including multiple heavy metals, such as arsenic, zinc, and lead.

The Landfill Directive already defines BAT for landfill and has driven broad environmental improvements. Where new BATC go beyond the existing requirements of the Landfill Directive, this could drive further improvements. However, the impact of the measure towards soil quality is uncertain and dependent upon the eventual BREF and therefore cannot be readily assessed. Stakeholder opinion on soil quality was summarised in 'Climate' impact above.

Waste production, generation, and recycling

This measure is likely to lead to **limited or weakly positive impacts** on waste production/generation**.** As discussed under economic impacts above, any increase in costs for landfill operators, which may be passed through to gate fees will increase the incentive to direct waste to other treatments and/or reduce waste overall. Furthermore, regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC). However, the size of the impact will depend on the BATC set out.

Efficient use of resources

This measure is likely to lead to **unclear or limited impacts** on resource use. Water and energy use is not a key environmental impact of landfill. BATC such as methane capture could positively impact indirectly on energy use in other sectors. Furthermore, regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process. However, factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Social impacts

This measure is likely to lead to **limited impacts** on employment. The drawing up of a BREF for landfills and the associated BAT conclusions will incur costs towards business and operators. If these costs are significant and cannot be passed on within the price of waste management services, these costs will impact upon profitability and could therefore impact

upon employment. Given the existing BAT requirements of the Landfill Directive, these costs and impacts are considered to be limited. Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Measure 40: Revise the capacity threshold in Annex I for activity 5.4 landfills.

Description of the measure and requirements for implementation

This measure proposes to lower the capacity threshold for activity 5.4, landfills, with Annex I of the IED. This, in turn, will require a number of landfills across the EU-27, that are smaller in size or capacity, to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED.

The EU wants to promote the prevention of waste and the re-use of products as much as possible. If this is not possible it prefers recycling (including composting), followed by using waste to generate energy. The most harmful option for the environment and people's health is simply disposing of waste, for example on landfill, although it is also one of the cheapest possibilities.

From 2005 to 2021 the average amount of municipal waste as measured per capita declined in the EU. However, trends vary by country. For example, while municipal waste generation per capita increased in Greece, Malta and the Czech Republic, it decreased in Bulgaria, Spain, Hungary, Romania and the Netherlands (European Commission, 2021). Future trends indicate that with increased stringency and uptake in policy developments, increased recycling and circular waste management are expected to contribute to declining landfilling activities.

Objective:

The follow objectives apply:

- Levelling the playing field for installations across the EU.
- Reducing the environmental impact of industry across the EU-27, via the amendment/ expansion of coverage of the IED in Annex I.

Implementation needs:

The measure will need to be further defined with regards to the proposed wording and/or capacity threshold to be included in Annex I. Currently, the IED includes activity 5.4, which details that '*Landfills, as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste'* are to be considered. Article 2(g) of Council Directive 1999/31/EC refers to the legal definition of a landfill within the Landfill Directive and is not anticipated to be amended.

Both the receiving rate and total capacity are to be amended, however the specific values will need to be determined with stakeholders, as currently there is no means or existing data sources identified through which an appropriate capacity threshold could be defined. This

could be solved if more specialist data on the size or financial performance of smaller landfill sites could be obtained.

A local/regional Member State authority (County Administration Board, Sweden) highlighted in the TSS that it is important to keep the Landfill Directive (for landfills) below the IED Annex I threshold, in particular where a BREF and BATC will be developed under the revised IED, for landfills above a certain threshold (see measure 39 above). One option would be to align the threshold in the IED with that in the Landfill Directive.

As the IED introduced a system of regulation, it is also important to ensure that any associated costs of compliance with the IED are practical for these smaller landfill sites, adding to the need to define the threshold with stakeholder input.

Further evidence and activity data

Very limited data could be found regarding the distribution of landfills by capacity size, which limits the ability to assess impacts of this measure.

Data compiled by EURELCO suggests the number of landfills in the EU not covered by the IED could be much higher than the number of landfills reported to the EU Registry and described in measure 39 (~2 950 landfill sites). EURELCO record: "*The figure for the total amount of landfills in Europe is most likely even bigger than initially thought. With a reasonable safety level, we can now state that Europe hosts more than 500 000 landfills. 90% of those landfills are in reality non-sanitary landfills, predating the Landfill Directive (1999). In most cases non-sanitary landfills lack the required environmental protection technologies and will eventually require costly remediation. The Landfill Directive is therefore rather irrelevant for at least 450 000 landfills*[76]. Excluding those landfills that pre-date the Landfill Directive and removing landfills in the UK (24 000), and assuming around half of the remaining landfills handle inert waste (based on Eurostat data, assuming that inert waste sites continue to be excluded from the IED), that suggests there may be around 23 800 landfills in the EU which do not pre-date the Landfill Directive, handling non-inert waste. This is a much larger figure than the 2 950 registered in Eurostat in 2018. However, it is unclear what the distribution across capacities is.

Some data from SEPA in Scotland, whilst outside of the EU, suggests that most landfills are above the 25 000 tonnes capacity threshold of the IED (all 63 out of 63 landfills registered in 2019 were above the threshold).[77]

For the TSS question (16.2) *'should the threshold of Annex I activity 5.4 for inclusion within the scope of the IED be reduced, to what level?*' the majority of MS stakeholders were strongly against reducing the threshold of Annex I activity 5.4 for inclusion within the scope of the IED. The consensus was that they are already set so low that they are exceeded by practically all landfills that meet the requirements of the Landfill Directive 1999/31/EC in conjunction with Council Decision 2003/33/EC and are also operated economically and affordably (German UBA). Below the thresholds, only landfills on islands or isolated settlements are conceivable, for which the Landfill Directive already allows exemptions from

[76] https://eurelco.org/2018/09/30/data-launched-on-the-landfill-situation-in-the-eu-28/
[77] https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/

the requirements. In an open text response, a MS National stakeholder response from the National Environmental Protection Agency (Romania) stated they were against the measure, as European and national policies already encourage prevention or reduction of waste generation.

Assessing impacts

Economic impacts

Overall, this measure is expected to have only rather limited impacts because of the limited number of additional sites this measure would be likely to affect, given the existing requirements of the Landfill Directive. The overall economic impacts may be limited or weakly negative, with the key costs of this measure anticipated to be the administrative burden on businesses and authorities for the new sites brought into scope, and because these would be smaller landfills, there is the potential for this measure to disproportionately impact SMEs.

Administrative burden on businesses

This measure is likely to lead to **limited or weakly negative impacts** on the administrative burden on businesses, although the evidence is **unclear**. No robust assessment of administrative burden can be made as the number of sites affect cannot be readily determined from available data sources.

The Landfill Directive already places requirements on sites with a capacity above 15 000 tonnes. Hence some sites (those between 15 000 and 25 000 tonnes) may see only very marginal impacts. More significant burden will be placed on smaller sites (those < 15 000 tonnes) that come into scope not covered by the Landfill Directive. That said, based on stakeholder feedback, the number of sites relative to those already covered may be fairly small.

Operating costs and conduct of business

This measure is likely to lead to **limited impacts** on operating costs. Assuming that the measure IED#39 is not introduced in parallel, the key costs of this measure are anticipated to be administrative burden on new sites brought into scope of the IED rather than additional compliance costs. This is because BAT Conclusions would not apply to these additional sites if IED#39 is not implemented, and landfills are only required to perform broader monitoring and reporting under the current IED.

Competitiveness and level playing field

This measure is likely to lead to **weakly negative impacts** on competitiveness. As discussed above, there is unlikely to be additional compliance costs for business, but the total costs of doing business could increase for landfill operators as a consequence of an additional administrative burden. If these costs cannot be passed on in the price of waste management services, these costs will be incurred by businesses, impacting upon profitability.

Given the nature of the operation, landfill is deemed not to be at significant risk from international competition. However, if landfill operators face additional costs, this may

favour other operators in the waste stream (e.g. those involved in recycling operations). Hence landfilling may become less competitive with these alternative waste stream activities. But to that end, these measures could also serve to encourage these alternative means of waste treatment, achieving additional (indirect) environmental impacts.

Furthermore, given larger landfill operators already fall under the scope of the IED, any additional costs will only fall on smaller operators. Although technically this harmonises the set of requirements across a wider array of installations and operators and proposes a more level playing field (the IED evaluation confirmed that industry stakeholders perceived in general that inclusion of a sector in the IED contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations), given that these costs fall solely on smaller operators will place a greater burden on entering the market and their ability to grow. This will impact on the ability of small operators to provide competition for larger operators.

Factual evidence has been limited for contributing to analysis of this impact.

Position of SMEs

This measure is likely to lead to **uncertain or weakly negative impacts** on the position of SMEs**.** Reduction of a threshold will bring smaller operators solely into scope. The Landfill Directive already places requirements on sites with a capacity above 15 000 tonnes. Hence some sites may see on very marginal effects.

More significant burden will be placed on smaller sites that come into scope not covered by the Landfill Directive. That said, the number of operators affected in anticipated to be small (stakeholder feedback). Given the lack of data on number of sites in each capacity bound (and on what the resulting threshold might be), the impact of this measure towards SMEs, therefore, remains uncertain.

Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Innovation and research

This measure is likely to lead to **negligible impacts** on innovation. Assuming no BATC are implemented alongside the threshold change, there is no key driver to innovate. The smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements.

Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Public authority impacts

This measure is likely to lead to **weakly negative impacts** on public authorities. The expansion of scope to smaller landfill operators could introduce an additional burden for public authorities, as a larger number of permits need to be defined / amended (where these already reflect the requirements of the Landfill Directive) and enforced, as well as remaining IED Chapter II requirements. However, the Landfill Directive already places requirements on

sites with a capacity above 15 000 tonnes. Hence some sites may see on very marginal effects.

This report has found no means to assess public authority impacts. This is because the predicted number of new installations that may be introduced within the scope of the IED, requiring regulation via the lowering of the capacity threshold within Annex I of the IED, cannot be accurately determined from available data sources. Stakeholder opinion has also been limited for contributing to analysis of this impact.

Environmental impacts

This measure is likely to lead to **negligible environmental impacts**. Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no significant direct impact.

Climate

E-PRTR Activity 5(d), which refers to landfills as defined by the Landfill Directive and aligned with the capacity threshold currently contained in Annex I of the IED, is associated with emissions of GHGs, equating to 1.6 – 2.4% of GHG emissions, relative to the baseline scope of the IED. However, it is assumed that the emissions from smaller landfill sites would be lower.

This measure is likely to lead to **negligible impacts** on climate. Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no direct impact.

Air quality

Data for E-PRTR Annex I activity 5(d), which refers to landfills as defined by the Landfill Directive, is associated with emissions of NH_3, NMVOC, NO_X, PM_{10} and SOx. Comparing the totals for this activity with the E-PRTR industrial totals for the EU-27, comparable in scope to the IED, indicates that the activity can, for some pollutants, moderately contribute to overall pollutant totals. For example, the activity contributes on average 1.3% of total NMVOC, relative to the baseline scope of the IED for the years available. Similarly, the activity contributes 1.9% towards NH_3 totals across available years, and 1.4% for SOx. However, it considered unlikely that this data captures emissions from smaller sites given the number reporting in the E-PRTR.

This measure is likely to lead to **negligible impacts** on air quality. Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no direct impact.

Stakeholder opinion has been limited for contributing to analysis of this impact.

Water quality and resources

Data for E-PRTR Annex I activity 5(d), which refers to landfills as defined by the Landfill Directive, is associated with releases to water of several heavy metals, including cadmium, zinc and chromium. These releases, relative to the baseline scope of the IED, can be sizeable, e.g. 4.7 – 9% of cadmium releases are associated with this activity. However, it considered unlikely that this data captures emissions from smaller sites given the number reporting in the E-PRTR. Depending on the degree of containment, small releases through leakage may end up in groundwater and/or surface water. Collected leachate can be subject to dedicated treatment prior to release to sewage systems.

This measure is likely to lead to **negligible impacts** on water resources. Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no direct impact.

Stakeholder opinion has been limited for contributing to analysis of this impact.

Soil quality or resources

Similar to the above detail on releases to water, E-PRTR data indicates that the activity is also associated with releases to land, including multiple heavy metals, such as arsenic, zinc, and lead. However, it considered unlikely that this data captures emissions from smaller sites given the number reporting in the E-PRTR.

This measure is likely to lead to **negligible impacts** on soil quality. Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no direct impact.

Stakeholder opinion has been limited for contributing to analysis of this impact.

Waste production, generation, and recycling

This measure is likely to lead to **weakly positive impacts** on waste production. As discussed under economic impacts above, any increase in costs for landfill operators (in this case just administrative burden), which may be passed through to gate fees will increase the incentive to direct waste to other treatments and/or reduce waste overall. Furthermore, regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EC). However, the size of these impacts is likely to be small, in particular given the number of sites is likely to be limited.

Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Efficient use of resources

This measure is likely to lead to **unclear or limited impacts** on resource use. Water and energy use is not a key environmental impact of landfill. Furthermore, assuming no BATC

are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no direct impact.

Social impacts

This measure is likely to lead to **limited impacts** on employment. Some smaller landfill operators may face additional costs associated with monitoring and reporting. If these costs cannot be passed on within the price of waste management services, these costs will impact upon profitability and could therefore impact upon employment. However, such impacts are likely to be small, in particular considering only a limited number of sites are affected. Factual evidence and stakeholder opinion have been limited for contributing to analysis of this impact.

Measure 41: Include minerals extraction activities (E-PRTR Annex I activities 3a and 3b) within the scope of the IED

Description of the measure and requirements for implementation

The measure consists of including mineral extraction activities within the scope of the IED. The measure relates to the non-energy extractive sector[78], to the extraction and treatment of metallic, industrial, and construction minerals. This, in turn, will require the mining activities to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED.

Mining activities are covered by the E-PRTR (E-PRTR Annex I activities 3a and 3b), including mining activities for energy and for non-energy purposes. For activities under 3a ('underground mining and related operations') no capacity threshold is applicable, in other words all facilities are subject to reporting (for pollutants above the Annex II threshold for releases). While, for activities under 3b ('opencast mining and quarrying'), operators are subject to reporting when the surface of the area effectively under extractive operation equals 25 hectares.

As far as environmental risks are concerned, the overarching legislation applied at the EU level to minerals extraction activities stems from Environmental Impact Assessment (EIA) according to the EIA Directive (2011/92/EU) and, in relation to extractive waste, the Extractive Waste Directive (EWD, 2006/21/EC). In accordance with the EWD (pursuant to Article 21(3)), a BREF for the Management of Waste from Extractive Industries is published (MWEI BREF, 2018), which presents data and information on the management of waste from extractive industries, including information on BAT, associated monitoring and developments in them. Furthermore, other relevant EU environmental legislation includes, inter alia, the Water Framework Directive (WFD) and the Birds and Habitats Directives.

[78] Exploration and production of oil and gas is covered under measure IED#43; other energy related mining (coal) is excluded from measure #41 as one of the main environmental issues (methane emissions) is addressed by DG ENER initiatives under the methane strategy.

The assessment indicates, as outlined below, that given the higher number of quarries (extraction of aggregates) in the EU, compared to the mining of metallic and industrial minerals, there would be significantly more permits to issue/review for these types of activities. Furthermore, it is considered that quarrying is associated with fewer environmental issues compared to the other types of extraction activities. Therefore, it is concluded that the measure, the related **BAT requirements and their implementation in permits need to focus on the most significant sources of emission of pollutants** (extraction and processing of metallic and industrial minerals).

Objective(s):

The following objectives apply:

- Levelling the playing field for installations across the EU.
- Improving the environmental effectiveness of the IED, via the expansion of coverage of the IED in Annex I. The measure is anticipated to result in the reduction of emissions to air, water, and soil. The extent of this reduction is contingent upon the level of BAT conclusions reached during the BREF process with respect to the minerals extraction activities.

Implementation needs:

The measure will need to be further defined with regard to the proposed wording and capacity threshold (or lack of) to be included in Annex I.

In addition to further defining the scope and wording of the IED, the following actions will need to be taken to implement the measure:

- EU to amend the IED to bring minerals extraction activities inside the scope of the IED, primarily by including the activities in Annex I.
- Mining operators to engage in the BREF process and take steps to ensure that BAT conclusions are met.
- EU to make legislative change to the IED text.
- EU to develop BAT conclusions for minerals extraction activities.
- Member States to transpose changes into national law.
- Member States to regulate minerals extraction activities according to the new requirements, to the extent this requires changes from their existing regulatory approaches. This will require upfront and ongoing implementation actions.

Further evidence and activity data

Extraction sites and minerals

Minerals extraction activities involve the extraction (surface or subsurface mining) and primary treatment of metallic, industrial or construction minerals (see table below).

Table A8-37: Overview of minerals extraction activities and type of minerals

	Type of mineral	Extraction method	Treatment methods
Mining	**Metallic minerals**: Base metals (Cu, Ni, Pb, Sn, Zn); Precious metals (Ag, Au, Pt); Iron ores and others (Fe, Co, Mn, Mo, V, W, ilmenite or titanium minerals or Ti); Bauxite. **Industrial minerals**: Limestone and gypsum; Kaolin; Potash; Feldspar; Phosphate rock; Other industrial minerals (e.g. magnesite).	• Surface; • Subsurface; • Borehole mining; • Solution mining	• Comminution (size reduction, e.g. crushing and grinding); • Size control (screening, mineral sorting and classification); • Beneficiation (physical separation - chemical separation - biological separation); • Upgrading (dewatering, sedimentation, drying).
Quarrying	**Construction and ornamental stones** **Aggregates** (gravel, sand, clay, etc)	• Surface; • (subsurface)	• Comminution (size reduction, e.g. crushing and grinding); • Size control (screening, mineral sorting and classification); • Beneficiation (physical separation); • Upgrading (dewatering, sedimentation, drying).

Under E-PRTR, there were in total 1 706 facilities in the EU27 registered in 2018 falling under the mining activities, split as follows:

- Activity 3(a) - Underground mining and related: 579 facilities; and
- Activity 3(b) - Opencast mining and quarrying: 1 127 facilities.

Quarrying and mining data from Eurostat Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E)[79], split by sector, are presented below for the EU27 overall. This addresses specifically the **number of enterprises** operating in the sector (Note: this data is also available, split by Member State in some cases).

Table A8-38: Number of enterprises – Mining and quarrying (source: Eurostat, NACE Rev. 2, B-E)

Activity/sector	Number of enterprises EU27 (2018)
Mining of metal ores (iron and non-ferrous metal ores)	382
Mining and quarrying n.e.c.	1 574
Quarrying of stone, sand and clay	12 261
Mining and quarrying (total)	**14 217**

Whilst general extractive activities are spread across a number of Member States, when considering specific types of mining activity – namely metals and other industrial chemicals – the number of Member States concerned changes rather dramatically, with ES, RO, SE, FI, PT, PL, BG, GR and FR in particular containing a number of enterprises involved in these

[79] [SBS_NA_IND_R2__custom_1220764]

activities and a large number of the remaining Member States containing no or a small number of enterprises within their territory.
Furthermore, the MWEI BREF presents an estimate of the number of mines in the EU28 compiled using different comprehensible databases and sources of information. In summary, for the EU27, the estimates of mineral resources extraction sites in 2012 were as follows (non-energy minerals)

Table A8-39: Estimates of mineral resources extraction sites in the EU-27 in 2012 (based on MWEI BREF, 2018)

Mineral resource	Estimated number of extraction sites
Aggregates	24 869
Industrial and other construction minerals	2 961
Bauxite, alumina, magnesite, ilmenite	46
Cu, Ni, Pb, Sn, Zn ores	52
Fe, Co, Cr, Mn, Mo, V, W ores	22
Ag, Au, Pt ores	106
Other metalliferous ores	7
Total	**28 063**

The draft final report of the study for the European Commission 'Study supporting the development of general guidance on the implementation of the Extractive Waste Directive' (2021) included a description of the extractive sectors. A summary of the number of sites per category of mineral in the EU is presented in the table below. A more detailed overview of this data is available in the study supporting the impact assessment of the IED revision (per type of mineral)[80]. The study indicates that the number of production sites per mineral commodity is difficult to ascertain with absolute precision as it not always being clear whether the reported numbers relate to individual mining sites or to mining companies. However, the data presented below is considered to be the most comprehensive dataset available.

[80] Trinomics, Ricardo, Wood, 2021. Gathering of complementary evidence for assessing the impacts of extending the scope of the IED to additional sectors. Draft final report

Table A8-40: Number of non-energy mineral extraction sites in the EU-27, split by sub-sector[81]

Member State	Number of extraction sites		
	Aggregates and construction minerals	Industrial minerals	Metallic minerals
AT	1 363	27	2
BE	112		
BG	295		14
CY	25		1
CZ	387	70	1
DE	2 733	148	1
DK	417		
EE	300		
EL	198		32
ES	1 874	214	10
FI	2 140	18	11
FR	2 822		
HR	225	5	
HU	525	7	1
IE	430		1
IT	2 800		
LT	210		
LU	13		
LV	105		
MT	10		
NL	295		
PL	2 786	35	9
PT	247	125	4
RO	1 120	27	2
SE	1 391	15	14
SI	153	33	
SK	270	20	1
EU-27 total	**23 246**	**744**	**104**

[81] Based on EC (2021). Study supporting the development of general guidance on the implementation of the Extractive Waste Directive. Draft Final Report.

The aggregates sector represents the bulk of the non-energy extractive industries. Almost 2.7 billion tons of aggregates are produced and used in Europe annually based on European Aggregates Association (UEPG) data.

The EU mining industry produces mainly basic metals (copper, lead, iron ore), bulk commodities, specialty commodities, industrial minerals and precious metals (gold, silver, and platinum group metals)[82]. Industrial minerals are used mostly in the manufacture of mineral products (e.g. glass, cement) or chemicals (e.g. mineral fertilisers, plastic additives, pharmaceuticals).

Industrial minerals extraction represents a total amount of c. 160 Mt (in 2016). Potash (33 Mt), chalk (10 Mt), rock salt (22 Mt), gypsum (24 Mt), lime (29 Mt) and kaolin (10 Mt) sum up to 79% of the exploited amount of industrial minerals in the EU in 2016. Bentonite (2 Mt), potash dolomite (9 Mt), feldspar (6 Mt), magnesite (2 Mt), quartz (5 Mt) and sulfur (2 Mt) counts for another 17%. Germany is by far the biggest producer of industrial minerals, with potash (32 Mt), gypsum (4 Mt) kaolin (5 Mt) and rock salt (6 Mt) as the largest contributors.

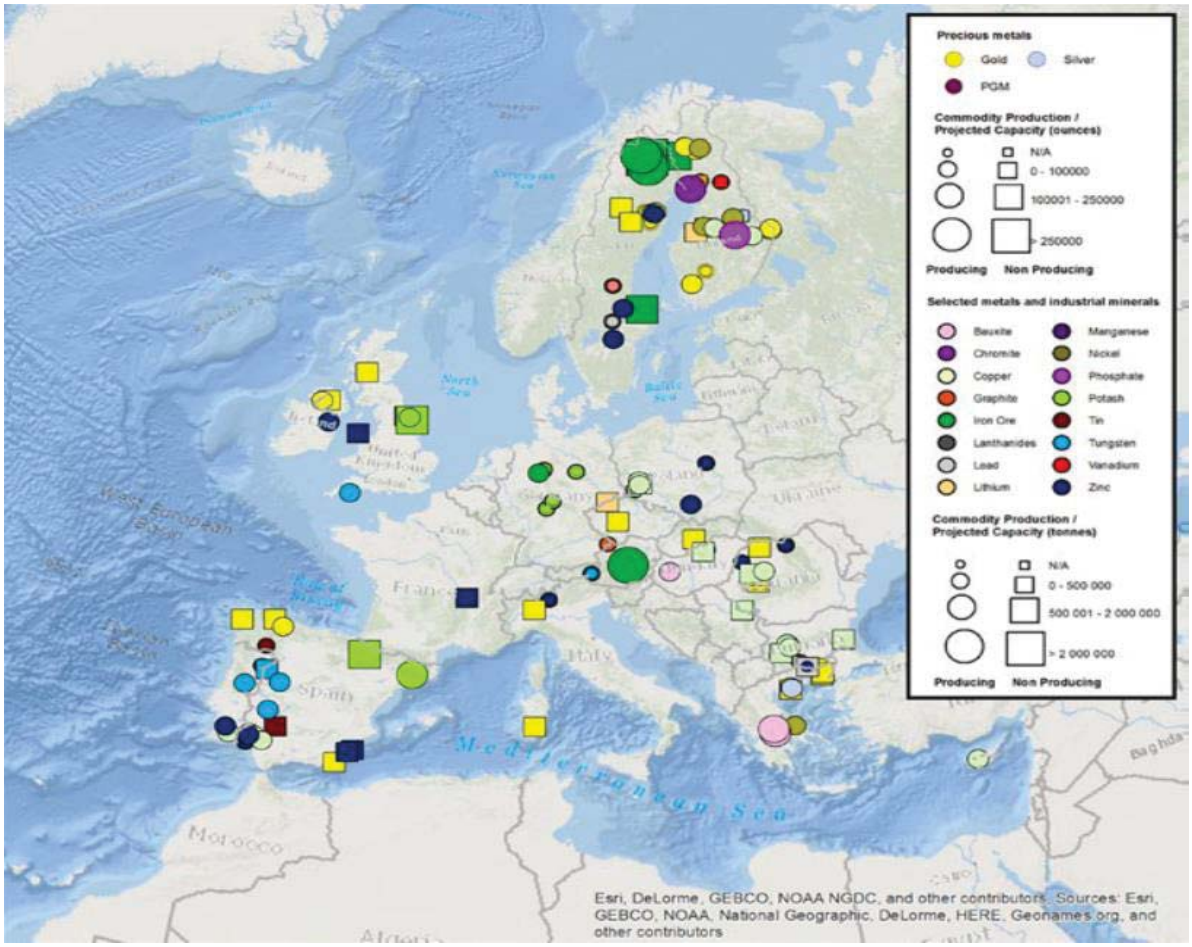
Europe's contribution to world metal ore production is limited to the following metals: aluminum/bauxite, copper, lead, zinc, chromium, nickel, iron, and tungsten. There is also production to a lesser extent of precious metals (gold and silver), cobalt, manganese, and tin. In the EU-27 (2017) 70 active metallic mineral mines (including the treatment of mineral resources with integrated mine location, operated as a complete entity, where one operator excavates material from more than one site), with 104 active metallic mineral excavation sites have been identified, which are located in Austria, Bulgaria, Cyprus, Finland, France, Greece, Hungary, Ireland, Poland, Portugal, Romania, Slovakia, Spain, and Sweden. Additionally, 11 projects have been identified that are under development or in an exploration stage.

Based on all data collected for the period 2015 – 2017 under the study supporting the development of general guidance on the implementation of the Extractive Waste Directive, it has been estimated that all metallic mineral extraction sites together produced about 223,000 Kt of ore per year. The annual production of copper sulfide and polymetallic copper ore in the period 2015 – 2017 amounted to 132,500 Kt, and iron extraction produced about 38,000 Kt of ore. Together, they amount to almost 80% of the metallic mineral ores produced in the EU. The annual production of nickel ore was about 15,000 Kt, of lead-zinc ore 11,500 Kt and of gold ore 10,500 Kt.

The figure below gives an idea of the importance of the mining sector for metals and selected industrial material in each MS in 2017.

[82] European Commission (2021). Raw Materials Scoreboard 2020 https://op.europa.eu/en/publication-detail/-/publication/eb052a18-c1f3-11eb-a925-01aa75ed71a1/language-en/format-PDF/source-233015861

Figure A8-27: Mining production of metals and selected industrial material



Source: EC, 2021. Raw Materials scoreboard 2020.

Employment in the sector

The table below shows the Eurostat data on the number of **full-time employees** employed in the Mining of coal and lignite, Mining of metal ores, Other mining and quarrying sub-sectors for 2018. For completion the persons employed in all mining and quarrying sub-sectors from Eurostat are presented.

Table A8-41: Number of persons employed in each subsector per Member State and relative share of the total (Eurostat, data for 2018)

Member State	Mining and quarrying total (incl. energy activities)	Mining of iron ores	Mining of non-ferrous metal ores	Quarrying of stone, sand and clay	Mining and quarrying n.e.c.*	Support activities for other mining and quarrying	Share of mining of iron ores over total mining and quarrying	Share of non-ferrous metal ores over total mining and quarrying	Quarrying of stone, sand and clay over total mining and quarrying	Mining and quarrying n.e.c. over total mining and quarrying	Support activities for other mining and quarrying over total mining and quarrying
AT	6,825	c	c	4,296	710	c	c	c	63.0%	10.4%	c
BE	2,160	0	0	c	c	c	0.0%	0.0%	c	c	c
BG	21,663	0	6,634	4,173	497	582	0.0%	0.0%	19.26%	2.3%	2.7%
CY	538	0	c	c	0	0	0.0%	c	c	0.0%	0.0%
CZ	24,237	0	c	5,254	249	c	0.0%	c	21.68%	1.0%	c
DE	47,392	c	0	27,715	4,750	387	0.0%	0.0%	58.48%	10.0%	0.8%
DK	5,073	0	0	687	329	19	0.0%	0.0%	13.54%	6.5%	0.4%
EE	4,200	0	0	721	808	33	0.0%	0.0%	17.17%	19.2%	0.8%
EL	7,703	c	c	4,372	712	32	c	c	56.76%	9.2%	0.4%
ES	17,751	66	2,185	10,606	3,024	805	0.4%	0.4%	59.8%	17.0%	4.5%
FI	7,281	c	c	1,651	2,244	1,091	c	c	22.68%	30.8%	15.0%
FR	12,723	c	c	10,207	1,000	77	c	c	80.22%	7.9%	0.6%
HR	4,040	0	0	1,895	154	39	0.0%	0.0%	46.9%	3.8%	1.0%
HU	3,979	0	3	2,682	121	583	0.0%	0.0%	67.4%	3.0%	14.7%
IE	4,113	c	c	c	c	c	c	c	c	c	c
IT	17,716	0	2	11,937	1,953	0	0.0%	0.0%	67.4%	11.0%	0.0%

Member State	Mining and quarrying total (incl. energy activities)	Mining of iron ores	Mining of non-ferrous metal ores	Quarrying of stone, sand and clay	Mining and quarrying n.e.c.*	Support activities for other mining and quarrying	Share of mining of iron ores over total mining and quarrying	Share of non-ferrous metal ores over total mining and quarrying	Quarrying of stone, sand and clay over total mining and quarrying	Mining and quarrying n.e.c. over total mining and quarrying	Support activities for other mining and quarrying over total mining and quarrying
LT	2,734	0	0	1,489	1,104	0	0.0%	0.0%	54.5%	40.4%	0.0%
LU	286	0	0	286	0	0	0.0%	0.0%	100.0%	0.0%	0.0%
LV	3,186	0	0	1,032	2,116	26	0.0%	0.0%	32.4%	66.4%	0.8%
MT	202	0	0	c	0	c	0.0%	0.0%	c	0.0%	c
NL	8,439	0	0	870	1,383	c	0.0%	0.0%	10.3%	16.4%	c
PL	144,917	0	c	18,835	2,667	12,587	0.0%	c	13.0%	1.8%	8.7%
PT	9,497	21	1,950	6,701	380	430	0.2%	0.2%	70.6%	4.0%	4.5%
RO	24,313	28	1,990	7,761	2,113	153	0.1%	0.1%	31.9%	8.7%	0.6%
SE	7,898	c	c	1,914	129	79	c	c	24.2%	1.6%	1.0%
SI	2,355	0	0	922	c	3	0.0%	0.0%	39.2%	c	0.1%
SK	6,777	0	c	1,740	1,169	118	0.0%	c	25.7%	17.3%	1.7%

*Note: *Mining and quarrying activities n.e.c. includes:- mining and quarrying of various minerals and materials: • abrasive materials, asbestos, siliceous fossil meals, natural graphite, steatite (talc), feldspar etc. • natural asphalt, asphaltites and asphaltic rock; natural solid bitumen • gemstones, quartz, mica etc.*

c indicates confidential information.

Among the non-energy related activities – quarrying of stone, sand, and clay seems to be the most important activity in the EU. The mining of metal ores (i.e. iron and non-ferrous metal ores) seems to occur especially in Portugal, Romania, Spain, Sweden, Finland, Greece, Poland and Bulgaria. However, a lot of information is confidential, so the above cannot be stated with certainty.

Future developments and policy action

The nature of the mineral industry in the EU is expected to change in coming years to address climate aspects in terms of i) considerable reduction of carbon footprint in extraction and processing, ii) higher circularity and increased recovery of minerals and metals (including CRMs) from mining waste, iii) and increased production of critical raw materials through extraction. In its assessment 'Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition'[83] the World Bank noted that a low-carbon future will be very mineral intensive because clean energy technologies need more materials than fossil-fuel based electricity generation technologies. In particular, graphite, lithium and cobalt will need to be ramped up by more than 450 percent by 2050 from 2018 level to meet demand for energy storage technologies. The International Energy Agency states that the energy sector's overall needs for critical minerals could increase by as much as six times by 2040, depending on how rapidly governments act to reduce emissions[84]. In some cases, extraction will venture into areas for which the EU has limited experience, particularly in the case of lithium mining, where there is only one mine presently in existence in Portugal, and cobalt mining, for which Finland operates the only EU cobalt extraction activities in four mines. In the case of lithium extraction for example, the expected growth is illustrated by plans to extract the mineral in western Serbia. Those reports estimate that over the expected 40-year life of the mine, 2.3m tonnes of battery-grade lithium carbonate would be produced, a mineral critical for large-scale batteries for electric vehicles and storing renewable energy[85].

In its Communication 'Critical Raw Materials Resilience Charting a Path towards greater Security and Sustainability'[86], the Commission has set forward a number of actions to increase EU resilience with regard to mineral needs to feed the green and digital transformations. In this respect a number of actions have been identified. A description of the Actions and their progress to date is indicated below.

[83] Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, 2020. The World Bank.
[84] The Role of Critical Minerals in Clean Energy Transitions, 2021. International Energy Agency.
[85] https://www.theguardian.com/global-development/2021/nov/19/rio-tintos-past-casts-a-shadow-over-serbias-hopes-of-a-lithium-revolution
[86] COM(2020) 474

Table A8-42: Status of actions under the Commission Communication COM(2020) 474

• Action number and description	• Progress (reported in October 2021)
• Action 1 – Launch an industry-driven European Raw Materials Alliance in September 2020, to build resilience and open strategic autonomy for the rare earths and magnets.	• Completed
• Action 2 – Develop sustainable financing criteria for the mining, extractive and processing sectors in Delegated Acts on Taxonomy by end 2021 (Platform on Sustainable Finance, Commission).	• Expected mid-2022
• Action 3- Launch critical raw materials research and innovation in 2021 on waste processing, advanced materials and substitution, using Horizon Europe, the European Regional Development Fund and national R&I programmes.	• Work ongoing
• Action 4 - Map the potential supply of secondary critical raw materials from EU stocks and wastes and identify viable recovery projects by 2022.	• Work ongoing.
• Action 5 - Identify mining and processing projects and investment needs and related financing opportunities for critical raw materials in the EU that can be operational by 2025. In collaboration with Member States and promoted by the European Raw Materials Alliance.	• Work ongoing.
• Action 6 – Develop expertise and skills in mining, extraction and processing technologies, as part of a balanced transition strategy in regions in transition from 2022 onwards (Commission, industry, trade unions, Member States and regions);	• Work ongoing.
• Action 7 - Deploy Earth-observation programmes and remote sensing for resource exploration, operations and post-closure environmental management (Commission, industry). The Commission is promoting an Earth Observation platform for Raw Materials.	• Work ongoing.
• Action 8 – Develop Horizon Europe R&I projects on processes for exploitation and processing of critical raw materials to reduce environmental impacts starting in 2021 (Commission, R&I community).	• Work ongoing.
• Action 9 - Develop strategic international partnerships and associated funding to secure a diversified and sustainable supply of critical raw materials, including through undistorted trade and investment conditions, starting with pilot partnerships with Canada, interested countries in Africa and the EU's neighbourhood in 2021 (Commission, Member States, industry and third country counterparts);	• Partnerships with Canada, Ukraine: completed. Partnerships with countries in Africa, Serbia: work ongoing.
• Action 10 - Promote responsible mining practices for critical raw materials through the EU regulatory framework (proposals in 2020-2021).	• Work ongoing. The Commission published the EU principles for sustainable raw materials in September 2021.

The above Communication also identifies the main locations of both critical raw materials as well as EU battery raw material resources, highlighting those Member States that have currently been identified as having the greatest potential for increases in mining activity in the future.

Mineral extraction activities are primarily addressed at the EU level in relation to environmental impact and mitigation and health and safety of operations. As far as environmental risks are concerned, the overarching legislation applied at the EU level to mining and quarrying activities stems from Environmental Impact Assessment (EIA) according to the **EIA Directive** (2011/92/EU) and, in relation to extractive waste, the **Extractive Waste Directive** (EWD, 2006/21/EC). The scope of the EWD includes energy fuels, metals ores, industry minerals and constructive minerals. Furthermore, other relevant EU environmental legislation includes, inter alia, the Water Framework Directive (WFD), the Birds and Habitats Directives, the Environmental Liability Directive, the Directive 2008/50/EC on ambient air quality and its fourth daughter Directive 2004/107/EC and the Waste Framework Directive.. The application of these pieces of legislation to extraction activities is not considered commensurate with the requirements of the IED as a result of:

- The fact that the EIA process does not explicitly set permit conditions – rather it looks to mitigate environmental effects before an activity is undertaken or when significant changes are made to the operation during the lifetime of an installation. The EIA process also looks at the compliance with other legislation. The results of assessments are generally implemented through planning controls rather than an operational permit that evolves over time to take into account changes in BAT as is the case under IED. Furthermore, in the absence of common emission levels at the EU level for emissions from the extractive sector it is likely that with further examination of the conditions set for the extractive sector across different Member States that the conditions set would vary significantly. This issue was identified in the Commission report of 2009 on the application and effectiveness of the EIA Directive that noted that the EIA Directive lays down essentially procedural requirements; it does not establish obligatory environmental standards. The ability to make valid decisions depends on the quality of the information used in the EIA documentation and the quality of the EIA process. Quality is therefore a crucial element for the effectiveness of the Directive and in this respect many Member States have pointed out that the lack of sufficient quality in the information used in the EIA documentation is a problem. There are major differences in the quality of EIA documentation, not only between different Member States but also within Member States themselves.
- The Extractive Waste Directive focusses on waste management on extraction sites and does not consider other operational activities on site that may also have an impact on the environment (such as emissions to air, water and soil). Legal coherence between the EWD and the IED will need to be ensured when including mining and quarrying activities under the IED.

GHG from non-fossil fuel extractive installations are excluded from the EU ETS. The Effort Sharing Regulation sets emission reduction targets for each MS based on the principles of

fairness, cost-effectiveness and environmental integrity for those sectors not covered by the EU ETS. Therefore, MS are responsible to set **national policies and measures to regulate the mining sector**. For example, potash mines are subject to extensive permitting and inspection systems in Spain and Germany – the only MS with such mines[87].

An important aspect on which national legislation intervene – at country, regional, and local level – is the land use change due to extractive activities. Member States may set an absolute ban, conditional clauses, or protective provisions in relation to extractive activities under national or regional regimes. In addition, 3D spatial planning is a common practice and part of the regulation in some MS[88].

Additional legislation has also been designated by some Member States for the protection of habitat and species, in cases not covered by EU law.

An examination of the approaches to permitting of the extractive sector by Member State was performed in the study supporting the impact assessment of the IED revision[89], using materials gathered under the Minlex study on the Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU. The detailed overview is provided in the supporting study. In general it can be concluded that all Member States appear to have a permitting regime in place for extractive activities taking place within their territory. Secondly, it is apparent that Member States generally maintain provisions in relation to environmental legislation for mining, albeit a large majority of the legislation is the transposing law for EU Directives and Regulations. However, there are examples of permitting approaches that go beyond EU law, for example in Germany where a BAT-based approach is applied to extractive permits.

Furthermore, there is significant variation in the permitting approaches of Member States in relation to the environment, ranging from single mining permits addressing all operational aspects of a site, to separation of environmental permits by theme (e.g. waste, water, air). In case where permitting approaches are subject to separate applications and authorisations it is less likely that an integrated consideration to environmental protection from extractive activities is being applied, albeit this is impossible to determine with absolute certainty without examining the permits issued. It is not apparent from the legislation examined how the key environmental impacts of the extractive sector are specifically addressed and for dust emissions in particular, as an example, it is difficult to see the manner in which national law currently specifies techniques for mitigating those emissions. This need for a more coherent approach is also illustrated by the one of the Commission's priority actions in 2022, i.e. streamlining permitting procedures for battery raw material projects in Member States, in line with highest environmental standards.

[87] European Potash Producers Association position paper attached to the OPC on the Revision of the Industrial Emissions Directive

[88] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

[89] Trinomics, Ricardo, Wood, 2021. Gathering of complementary evidence for assessing the impacts of extending the scope of the IED to additional sectors. Draft final report

Assessing impacts

Economic impacts

The costs of including the minerals extraction activities under the IED will depend, inter alia, on the BAT eventually defined and its current uptake.

Administrative burden on businesses

This measure will likely have **weakly negative impacts** on the administrative burden on businesses.

Annual additional administrative costs would be incurred if this measure is implemented, especially as there would be a need to review permits, expand business engagement in the BREF review process, monitor and report more data, and engage with inspections and other enforcement-related activities. These costs are unlikely to deviate significantly from the permitting costs applicable to the likes of cement and lime activities, given that these are the closest current IED activity to minerals extraction activities (they involve extraction and on-site processing so for metal ore extraction are likely to represent a good proxy).

Consideration also needs to be given to the nature of the extractive activities themselves. Quarries undertaking extraction of aggregates and construction minerals are generally deemed to be less of an environmental risk than extraction of industrial minerals and metallic minerals due to the generally inert nature of the materials extracted and the processing undertaken on site. The full application of IED permitting to quarries involved in aggregate and construction minerals is, therefore, unlikely to be proportionate to the benefits achieved via IED. Given the higher number of quarries (extraction of aggregates) in the EU (approximately 23 000 – 27 000 sites), compared to the mining of metallic and industrial minerals, there would be significantly more permits to issue/review for these types of activities. There would be an additional burden for an industry that consists of over 90% SMEs, with an average of 7-8 people working in every site. This is an important finding to be taken into account in order to ensure that the measure, related BAT requirements and their implementation in permits focus on the most significant sources of emission of pollutants.

By focussing the measure on the **extraction of metallic and industrial minerals** it is estimated that, based on the estimates above, **c. 800-900 minerals extraction installations** would be regulated under the IED (c. 750 industrial mineral extractive sites and 100 metallic mineral sites).

Based on the estimated number of installations for these sectors and the assumptions of unit costs for the main requirements for operators, administrative burden on businesses has been estimated between €1m/year to €19m/year, with a central estimate of €12m/year, on average over the period of 20 years from adoption. In this case, this range is due to the uncertainty in administrative burden (see earlier sections) since there is one central estimate of the number of installations. These costs are not expected to represent a significant burden on the sector.

Operating costs and conduct of business

This measure will have **negative impacts on the operating costs** and conduct of business. This will be due to operators needing to implement techniques to mitigate the environmental

impacts as will be identified in a BAT conclusions document for the sector. Note that in some Member States, techniques are already applied as a result of national policy. The measure's impacts on operating costs and conduct of business in the mining sector are unclear. The magnitude of these costs would be primarily dependent upon the BREF process.

There is uncertainty as to what would be considered BAT, for each process and type of mineral. There is variation between the types of extraction and treatment processes and minerals, which creates uncertainty when calculating the abatement costs.

The JRC Science for Policy Report on available techniques for the prevention or reduction of environmental impacts in non-energy extractive industries (NEEI) [90], indicates a number of techniques are used within the sector to minimise environmental impacts across stages of extractions, transport, treatment and storage, but no formal evaluation of the measured effectiveness or cost of these techniques has taken place.

Competitiveness and level playing field

Inclusion of minerals extraction activities within the Annex I of the IED imposes a singular set of requirements towards mining sites and operators in the EU. It therefore offers the **potential to level the playing field** by providing minimum criteria for all Member States through BAT Conclusions. The measure would therefore likely lead **to weakly positive impacts** on level playing field.

This measure will have **weakly negative impacts on competitiveness**. Mining sites, depending on the existing requirements, could see additional cost impacts, and the relative competitiveness of these sites would be expected to decrease. The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon the sites. The exact level, however, is to be determined by the BREF process.

Position of SMEs

Looking at the number of persons employed in each MS in the mining industry and the number of enterprises, there can be a considerable number of mining sites defined as SME. As stated above, the majority of extraction sites in the EU correspond to small mines with a relatively limited number of employees (less than 10 workers). This is particularly the case for the extraction of aggregates.

By focussing the measure on the extraction of metallic and industrial minerals it is estimated that the measure will likely have **weakly negative impacts on SMEs**. Focussing on industrial minerals and metallic mineral extractive sites is likely to still impact on some SMEs, but the size of sites is likely to be significant higher in terms of number of employees than for the aggregates and construction sector.

Innovation and research

[90] Garbarino, E., Orveillon, G., Hamor, T., Saveyn, H.G.M., Eder, P., Collection of available techniques for the prevention or reduction of environmental impacts in non-energy extractive industries (NEEI), EUR 30827 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-41493-3, doi:10.2760/622092, JRC125247.

This measure may have a **limited impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, such activities would be subject to the Sevilla Process, with emerging techniques considered within the eventual BREF.

Public authority impacts

This measure will have **negative impacts on public authority costs**. The largest impact will be on permitting and inspecting authorities, due to a significant number of mining sites that would require (a review of) an environmental permit, with requirements on BAT use and adherence to emission limit values.

There will be the costs to the Commission for the development of a BREF. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for public authorities, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for public authorities would be expected to range from €0.3m/year to €1.4m/year.

There will be one-off costs to the Member States for transposition of new requirements, as well as ongoing regulatory costs.

Based on the estimated number of installations for these sectors (c. 800-900, excluding extraction of aggregates and construction minerals) and the assumptions of unit costs for the main requirements for public authorities, additional administrative costs have been estimated between €1m/year to €12m/year, with a central estimate of €8m/year, on average over the period of 20 years from adoption. In this case, this range is due to the uncertainty in administrative burden. These costs, in isolation, are not expected to represent a significant burden on public authorities.

Environmental impacts

According to the JRC EIA report[91], the upstream activities of the non-energy extractive sector (i.e. extraction and primary processing) generate relatively low quantities of GHG emissions, as the energy intensive processing occurs off the mining sites. Given the nature of the activity, emissions to air during extractive practices are represented by dust and particles,

[91] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

which are easily dispersed by the wind[92]. Such emissions differ substantially based on the techniques used and the composition of the ore, even within subsectors[93].

Sources of air pollution during mining and quarrying activities include mobile sources like vehicles for excavation, as well as movement of materials on site. The main sources of emissions to air from the extractive sector vary somewhat for opencast and underground mining. Opencast activities result in emissions from digging, drilling and blasting, material processing such as crushing, screening and transfer, internal transport, material handling including loading and unloading and wind erosion from stockpiles. Underground mining is subject to less direct air emissions from digging, drilling and blasting, with any emissions taking place emitted through ventilation shafts whose primary purpose is to maintain the health and safety of workers underground. However, similar overground activities such as processing, transport, loading and unloading and erosion from stockpiles are likely to take place once materials have been brought up to the surface from underground extraction.

Additionally, noise pollution, vibrations, odours, light pollution, heat anomalies that can have an impact on the local climate, ionizing radiation because of the common presence of naturally occurring radioactive materials, and toxic heavy metals[94] are also emitted during mining and quarrying activities.

Extractive activities are placed where the natural resources exist, with no or very limited possibilities to be relocated. In some cases, they involve high concentrations of certain elements due to natural background levels and/or diffuse pollution. If suitable measures are not implemented, mining activities can affect freshwater ecosystems in different ways through changes in the groundwater and surface water hydrology, or through the release of chemicals and/or sediments in water. Impacts on water will depend on the type of mineral, mining practices, substances used at the processing stage, and the way mining waste is handled[95].

The figure below presents a summary of the Key Environmental Issues (KEI) for about 25.000 extraction sites in the EU-27[96]. The figure differentiates the category of minerals (construction, industrial, and metallic) and presents a relative impact of the extraction and treatment activities on the environmental issues studied, i.e. the structural, physical, and chemical stability, emissions to soil, water, and air, noise, vibration, odour, biodiversity and

[92] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

[93] European Potash Producers Association position paper attached to the OPC on the Revision of the Industrial Emissions Directive

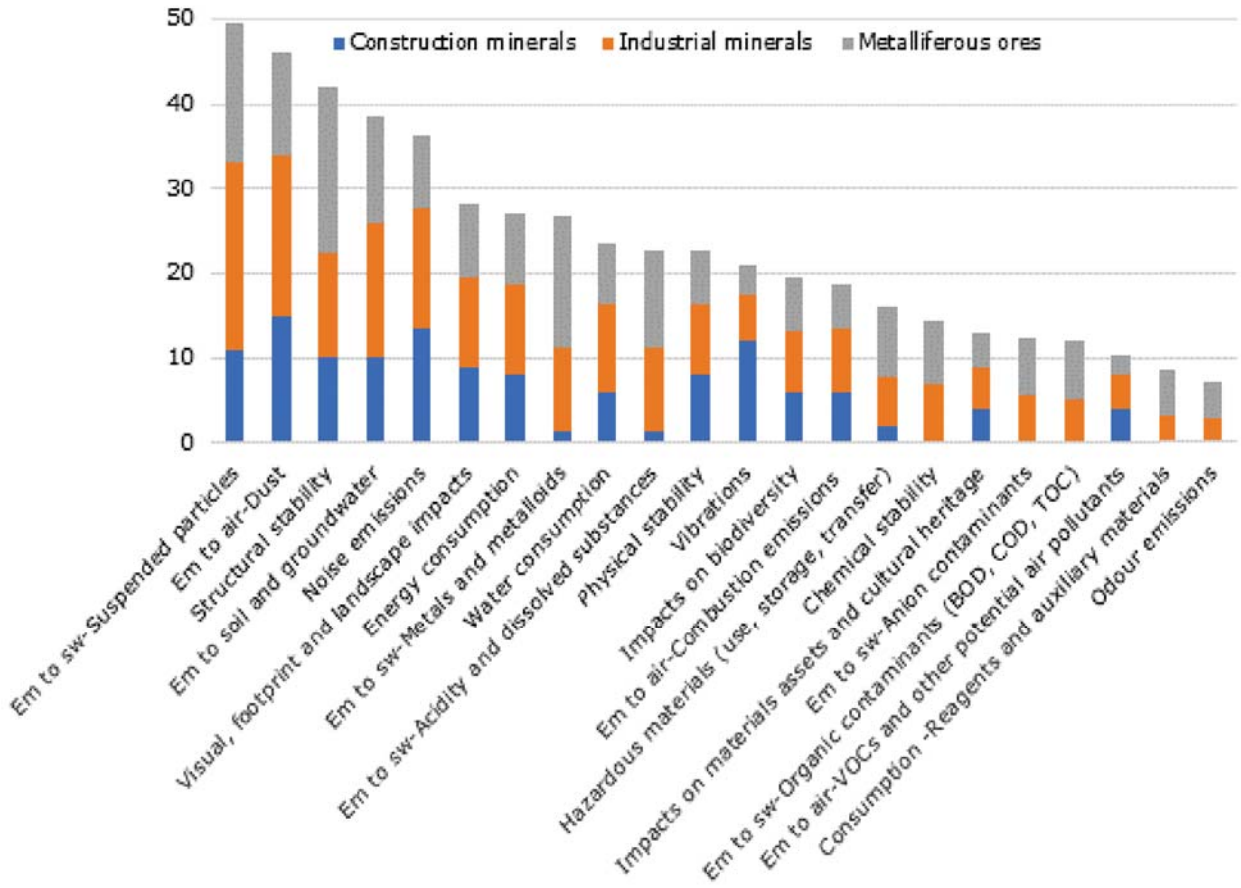
[94] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

[95] SWD(2019) 439 final

[96] Garbarino, E., Orveillon, G., Hamor, T., Saveyn, H.G.M., Eder, P., Collection of available techniques for the prevention or reduction of environmental impacts in non-energy extractive industries (NEEI), EUR 30827 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-41493-3, doi:10.2760/622092, JRC125247.

land use, energy, water, and material consumption, and hazardous materials[97]. Metallic minerals have the highest aggregated impact, followed by industrial and construction minerals. Among the KEI, the strongest impacts across all mineral categories can be seen on structural and physical stability, emissions to soil and groundwater, and the discharge of suspended particles and metals in surface water. Differences across mineral categories on the most relevant KEI are related to the extraction methodology (e.g. the use of explosive leads to nitrate emissions, vibrations, and odour).

Figure A8-28: Relative environmental impact of each mineral category where on the Y axis the distribution of the impact is represented, while on the x axis each environmental issue is shown.



The benefits of including the non-energy extractive sector under the IED corresponds to BAT that can be implemented to prevent or reduce the KEI listed and to ensure a level playing field in the EU. The BREF would thus contribute to the mitigation of the KEI identified. It would also provide the basis to build a data frame displaying a more representative picture of the size of the (non-energy) minerals extraction sector in the EU27, and of the related emissions.

Stakeholders, in their opinion on the matter, collected in the TSS, on average attributed the most significant impact to water, followed by land and air, in the form of fugitive dust.

[97] The JRC study does not include extractive waste among the environmental issues studied, as it is detailed explored in the MWEI BREF.

The analysis also indicates that quarrying, i.e. the extraction of aggregates, has typically fewer environmental issues compared to the more complex extraction and treatment of metallic and industrial minerals. Extraction of aggregates mainly lead to (diffuse) emissions of dust, noise and vibrations, whilst the other minerals have also a high potential for emissions to water, soil and impacts on the (chemical, structural, physical) stability.

Through the BAT conclusions for the sector, the measure could be effective in addressing the KEIs, including emissions to air (dust and other pollutants), pollution of surface water, groundwater and soil, noise and vibrations.

Climate

This measure should provide **weakly positive impacts** on reducing greenhouse gas emissions. A benefit of introducing the non-energy extractive sector under the IED is related to the tonnes of GHG emissions that can be regulated and potentially avoided. However, precise data on the GHG emissions produced by the non-energy extractive sector are not currently available.

Air quality

This measure will have **positive impacts** on reducing air pollutant emissions. According to the JRC EIA report (2021)[98], sources of air pollution during minerals extraction activities include mobile sources like vehicles for excavation, processing as well as movement of materials on site. The main air pollutants related to all mining activities, as reported under E-PRTR activities 3a and 3b, were carbon dioxide and methane, followed by carbon monoxide, nitrogen oxides, sulphur oxides, and particulate matter. Particulate Matter would have expected to be significantly higher, being one of the primary substances produced during mining activities[99, 100].

Based on E-PRTR data, the sector appears to lead to substantial emissions of PM_{10}, equivalent to 4.4% of total industrial emissions covered by the IED in 2019. A similar degree of significance is observed for NO_X and SO_x, with a potential contribution of around 0.85% to 1% depending on the year assessed (2017-2019). NH_3 and NMVOC are not significant, with a maximum contribution of 0.17% of total industrial emissions covered by the IED. An examination of UNECE CLRTAP reported data also emphasises the importance of extractive activities in relation to dust emissions, with emissions for non-coal extraction contributing around 4.5% of total dust emissions in the EU.

[98] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D., A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, EUR 30743 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-38988-0, doi:10.2760/705726, JRC125111.

[99] Patra et al. (2016). Emissions and human health impact of particulate matter from surface mining operation—A review https://www.sciencedirect.com/science/article/abs/pii/S2352186416300153

[100] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

It appears, therefore, that there is significant potential to reduce emissions of PM from this activity by integrating it into the IED. That said, the size of impacts will depend on the outcome of the BREF process.

Water quality and resources

This measure should provide **positive impacts on water quality and resources.** The integrated approach of the IED and the range of environmental issues that could be covered by a BREF and BAT conclusions would be expected to lead to tighter controls on activities potentially affecting surface water quality and the use of water in extraction and treatment processes.

In particular, the extraction and treatment of metallic and industrial minerals have the potential of emissions to water. Different extracted materials have different impacts on the water quality and the quantity used[101]. Different pollutants can enter the surface water depending on the extraction activity. For example:

- sulphidic rocks and treatment chemicals may lead to acidity or extreme alkalinity in water pH and to sulphur-bearing compounds;
- suspended particles and sediments can enter in circulation;
- explosives can lead to deposits of nitrites, nitrates and ammonium;
- rocks, local fertilizers and flotation reagents introduce inorganic and organic phosphate species
- potash extraction is responsible for chloride.

The JRC assessment of the relative impact of the extraction and treatment activities per mineral category on the environmental issues studied,[102] indicates that the strongest impacts across all mineral categories can be seen on structural and physical stability, emissions on soil and groundwater, and the discharge of suspended particles and metals in surface water. Addressing these risks is likely to have a weakly positive impact on water pollution.

Soil quality or resources

This measure should provide **weakly positive impacts** on soil quality. Land is also affected by extractive activities. Land use change practices have numerous consequences, including the loss of soil functions and of biodiversity. Incidents can have severe consequences on the land, by damaging the surface and threatening its physical stability and integrity. The subsoil quality is also negatively affected because of the oxidation of the organic material[103].

[101] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

[102] Garbarino, E., Orveillon, G., Hamor, T., Saveyn, H.G.M., Eder, P., Collection of available techniques for the prevention or reduction of environmental impacts in non-energy extractive industries (NEEI), EUR 30827 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-41493-3, doi:10.2760/622092, JRC125247.

[103] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

Mining activities can cause the habitat degradation whose scale depends on the features of the extraction site and may result in the habitat loss. Similarly, certain species can be subject to significance disturbance because of noise, dust, and pollution affecting their ability to bread, feed, or rest. Significant disturbance can lead to species migration, changes in species composition, and the colonisation from invasive species[104].

The penetration in the subsoil during the extractive activities impacts surface and groundwater, changing its baseline condition, as well as polluting it in the presence of chemicals. As a result, changes in water quality and its physical status, water volume and balance, and water ecosystems can occur. Mitigation and control measures could avoid these impacts.

Waste production, generation, and recycling

This measure should provide **limited impacts on waste production**. The extraction sector produces important volumes of waste material in the form of extractive residues and extractive waste. The first is described as the part of the co-excavated material which ends up unsold or unprocessed. While the second is defined by the extractive waste directive[105] as the extractive waste resulting from excavation of mineral resources, such as waste rocks and tailings. The amount of extractive residues generated during the whole extractive process depends on the extracted commodity, the extraction method and the site-specific local conditions. As a result, this can vary between one unit per unit of final product to several hundred thousand units per unit of product[106]. Requirements for the management of waste in the extractive sector are already set under the MWEI BREF[107]. Therefore, unless stricter BAT and/or BAT-AEPLs would be set under a new BREF, including the mining activities under the scope of the IED would not lead to significant improvements in terms of waste generation and recycling. As noted above, legal coherence between the EWD and the IED will need to be ensured.

Efficient use of resources

Unclear impacts. No means of assessing the efficient use of energy or water have been identified, however, regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

This measure has **unclear social impacts**. Public health impacts would be spillover effects from the environmental benefits already captured within the previous sections of this

[104] Hamor, T., Vidal Legaz, B., Zampori, L., Eynard, U. and Pennington, D. (2021), A review of European Union legal provisions on the environmental impact assessment of non-energy minerals extraction projects, JRC. https://publications.jrc.ec.europa.eu/repository/handle/JRC125111

[105] Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006L0021-20090807

[106] JRC (2018). Best available techniques (BAT) reference document for the management of waste from extractive industries. https://op.europa.eu/en/publication-detail/-/publication/74b27c3c-0289-11e9-adde-01aa75ed71a1/language-en

[107] JRC (2018) Best Available Techniques (BAT) Reference Document for the Management of Waste from Extractive Industries in accordance with Directive 2006/21/EC https://eippcb.jrc.ec.europa.eu/sites/default/files/inline-files/jrc109657_mwei_bref_-_for_pubsy_online.pdf

assessment. Furthermore, this measure will incur costs towards business and operators. If these costs cannot be passed on within the price of produce, these costs will impact upon profitability and could therefore impact upon employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

Measure 42: Include aquaculture within the scope of the IED

Description of the measure and requirements for implementation

The measure seeks to include aquaculture (E-PRTR Annex I activity 7b) within the scope of Annex I of the IED. This, in turn, will require aquaculture installations to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED.

Objectives:

The following objectives apply:

- Levelling the playing field for installations across the EU.
- Improving the environmental effectiveness of the IED, via the extension of coverage of the IED in Annex I.

Implementation need(s):

The Commission will need to further define the definition of an aquaculture installation and capacity threshold to be included in Annex I.

- Currently, the E-PRTR uses the following threshold and activity definitions: 7(b) – 'Intensive aquaculture', 'with a production capacity of 1 000 tonnes of fish or shellfish per year' (EC, 2006).

An option in the implementation of this measure is to adopt the E-PRTR definition in the Annex I of the IED, aligning the IED with the E-PRTR. However, the IED and the E-PRTR are associated with different levels of regulation. The IED subjects installations to a regulatory framework, whereas the E-PRTR is predominantly to collate environmental data. Therefore, it is not clear whether adopting the E-PRTR definition is appropriate when considering the system of regulation required under the IED. The capacity threshold, therefore, remains an evidence gap. Other options pertain to interviews or other means of determining an appropriate capacity threshold. There may be a basis in which a separate threshold for shellfish and fish is necessary, given the different environmental pressures that apply, i.e., whether only certain aquaculture systems warrant regulation.

In addition, to further defining the scope and wording of the IED, the following actions will need to be taken to implement the measure:

- EU to amend the IED to bring aquaculture activities inside the scope of the IED, primarily by including aquaculture in Annex I.
- EU to broaden the IRPP BREF to include aquaculture, and to produce BAT Conclusions for aquaculture installations.

- Aquaculture operators to engage in the BREF process and take steps to ensure that BAT Conclusions are met.
- EU/ Public institutions to establish a common reporting system that encompasses the aquaculture industry via channels such as the EEA EU Registry and other piscatorial-/ agricultural-related databases.
- Member States to monitor aquaculture operators to ensure compliance with IED.

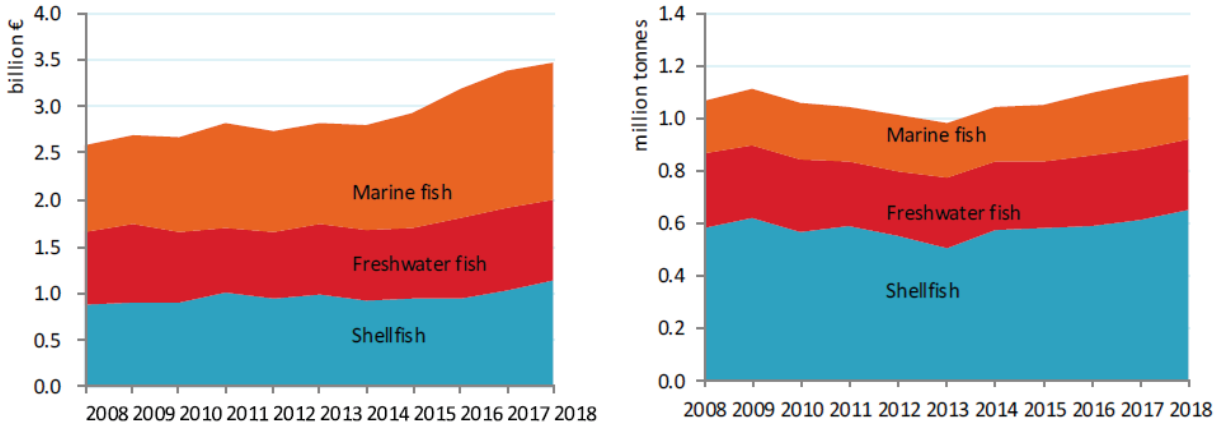
Further consideration of scope and baseline

The EU demand for fish is met by EU aquaculture (10%) and EU fisheries (30%),; the remaining 60% of wild and farmed fish consumed in the EU is imported from third countries (EC, 2016)[108]. In 2018, EU annual aquaculture production was 1.32 million tonnes[109], with a total value of €4.8 billion (EUMOFA, 2020). The EU represents 1.0% of the world aquaculture production in volume and 1.5% in value.

Between 2009 and 2018, gross annual production grew slightly (3%) while in real terms the value of this production grew significantly (36%) (EUMOFA, 2020), due to increased production of high value species and organic products as well as a rise in demand (EUMOFA, 2020).

The most important farmed species in the EU are mussels, oysters, salmon, trout, carp, seabass and seabream. Relatively small quantities of other species are also produced, for example turbot, Bluefin tuna, clams and catfish. The freshwater species (carp and trout) are reared in semi-intensive ponds and intensive recirculation systems, while marine finfish (salmon, seabass and seabream) are usually farmed in cages located in more protected inshore waters. In 2018, marine fishes, freshwater fishes and shellfish accounted for 21%, 23% and 56% of the EU production of aquaculture in terms of weight, respectively. In value terms, marine fishes, freshwater fishes and shellfish accounted for 42%, 25% and 33% of the production value (Figure A8-29).

Figure A8-29: Aquaculture production in the EU27, in value and weight, by subsector: 2008-2018.



Source: JRC, 2021 and FAO, 2021

[108] SWD(2016) 178 final
[109] Includes UK aquaculture produce

In 2018 there were about 15 000 EU companies involved in the aquaculture sector, employing 69 000 people and producing 1.2 million tonnes of produce in the same year (EC, 2021). In 2012, approximately 90% of aquaculture enterprises in the EU employed fewer than 10 people (FAO, 2015). In terms of sector forecasts, aquaculture sector and farmed fish production in the EU is set to remain stable with some estimating a slight increase. Using the number of installations which report to the E-PRTR as a proxy for the number of aquaculture installations which produce >1000 tonnes a year, there are 55-250 aquaculture installations in the EU. In 2018, 62 aquaculture installations (EU27) in operation, reported under the regime of the E-PRTR regulation.

According to the industry representative for FEAP, aquaculture production has stagnated. The value per tonne of fish produced has increased, however, gross output has fallen. The representative for FEAP argues strict environmental regulation has contributed to declining production rates. The representative for FEAP also noted that organic aquaculture, with the exception of salmon farming in Ireland, has been unsuccessful.

- According to the TSS, there are approximately 2 550 aquaculture installations. However, it is unclear whether the TSS respondents reported total aquaculture enterprises or only enterprises which produce >1000 tonnes a year. Therefore, this estimate does not appear to be reliable. Where respondents clarified whether their response referred to all enterprises in a Member State or only those which produce >1000t a year, the data has been used to inform this analysis.

- According to data collection and analysis conducted by Ricardo for the purposes of this Study, there may be around 12 000 aquaculture enterprises and/or aquaculture farm sites in the EU-27 (EC, 2019). Table 43 details the breakdown of the number of aquaculture enterprises in Member States. Unfortunately, Member State reporting does not always differentiate between enterprises and farms – an enterprise may represent several farms. This could explain the slightly lower total figure in comparison to EU analysis (EC, 2021), which suggests there are around 15 000 aquaculture farms in the EU.

Table A8-43: Output from aquaculture production for 2018 and 2019 and the number of aquaculture enterprises by Member State. Output data from EC (2019)**. Enterprise data from FAO (2015).**

Member State	Production output (tonnes in live weight)		Enterprises
	2018	**2019**	
EU27 Total (from 2020)	1 132 966	1 114 379	11 855
Austria	4 084	4 250	n/a
Belgium	111	86	n/a
Bulgaria	10 758	11 959	163
Croatia	19 680	20 444	174

Member State	Production output (tonnes in live weight)		Enterprises
Cyprus	7 347	8 079	10
Czech Republic	21 750	20 989	40
Denmark	32 167	40 221	127
Estonia	944	1 062	6
Finland	14 323	15 296	120
France	188 327	194 328	3 249
Germany	31 796	37 998	8
Greece	132 375	128 748	1 051
Hungary	17 900	17 315	279
Ireland	35 252	34 977	587
Italy	142 726	126 477	6
Latvia	828	626	n/a
Lithuania	3 450	3 775	n/a
Malta	19 291	13 823	n/a
Netherlands	53 004	45 750	115
Poland	36 806	39 731	840
Portugal	11 766	12 881	1 443
Romania	12 298		420
Slovakia	2 247	2 689	n/a
Slovenia	1 938	2 138	11
Spain	318 702	306 507	3 032
Sweden	13 094	11 600	174

- Using the data collected, it is possible to estimate the number of enterprises and/or farms, out of the ~11 000 identified, which align with the E-PRTR definition of aquaculture, that is, producing >1000 tonnes a year. According to the FAO, around 90% of aquaculture enterprises in Europe employ fewer than 10 people. Member State reports in the European Commission aquaculture report (2021) supports the FAO's findings. Based on quantitative and qualitative evidence from Member State reporting in the (2021) study, it is likely that between 1-2% of all aquaculture farms identified produce >1000 tonnes a year. This would mean that there are likely between 95 and 236 farms which produce >1000 tonnes a year across the EU-27. Complemented by a reported number of 55 installations in 2018, a range

between 55 and 250 aquaculture installations is proposed for the number that may covered by the IED if the E-PRTR definition is retained.

- There is a range of EU-level and national legislation focussed on mitigating the environmental impacts of aquaculture. This includes: the Water Framework Directive (WFD) (inland and coastal waters), the Marine Strategy Framework Directive (MSFD) (marine waters) and the 'SEA Directive'. The WFD and MSFD require all new aquaculture installations to apply for a permit to establish a farm. The permit includes a limit on production and emission limits for Nitrogen and Phosphorus, the main emissions from aquaculture installations. Emission limits are set at various distances in relation to the installation, such as, the sea floor, the immediate marine environment and downstream of the installation. According to a representative for the Federation of European Aquaculture Producers (FEAP), it takes 8 to 9 years to acquire a new permit. It is not clear how regularly permits are reviewed.

- Under the WFD and the Priority Substances or Environmental Quality Standards Directive, (EQSD), a variety of chemicals used in aquaculture practices – such as copper and zinc are already regulated. The WFD's objective for good chemical and ecological status is supported by other EU legislation, the Urban Waste Water Treatment Directive, the REACH legislation, the Biocidal Products Regulation, the Veterinary Medicines Directive, the Plant Protection Products Regulation and the Sustainable Use of Pesticides Directive, as well as the IED (EC, 2016). In addition, the Commission has set out new guidelines[110] seeking to help build an EU aquaculture sector that is competitive and resilient; ensures the supply of nutritious and healthy food; reduces the EU's dependency on seafood imports; creates economic opportunities and jobs; and, becomes a global reference for sustainability (EC, 2021). In order for the EU to reach these aims, the implementation of this measure could be essential for the better regulation of aquaculture facilities and fisheries.

Different approaches are used by Member States to issue permits to new facilities, conduct Environmental Impact Assessments and monitor environmental management within and across countries. In Germany, fish farms with a fish yield of more than >1000 tonnes per year are subject to an Environmental Impact Assessments. In France, aquaculture is covered under "Installations Classées pour la Protection de l'Environnement (ICPE)" classification 2130 (AIDA, 2021). The threshold here is 20 tonnes a year, in comparison to the E-PRTR threshold of >1000 tonnes a year. 180 installations are covered by ICPE authorisation in France. France does have installations above the E-PRTR threshold, such as Aquanord in Hauts-de-France, which produces 1 800 tonnes of finfish a year, or Acquadea in Corisca, which produces 1 000 tonnes of finfish a year. Additionally, French National MS authority MET stated in its response to Question 7 in the TSS that they would look to increase the current ICPE authorisation threshold from 20 to 100 tonnes a year in order to regulate fewer aquaculture installations.

Moreover, Table 44 outlines the legislative framework for aquaculture for another three of the largest aquaculture-producing Member States, namely Italy, Spain and the Netherlands.

[110] SWD(2021) 102 final

The analysis demonstrates how aquaculture is affected by a wide range of regulation in Member States where the industry is well-established. The legislative frameworks examined are relatively similar, employing permits and Environmental Impact Assessments to control emissions. Aquaculture regulation is particularly well-established in the Netherlands, with different layers of regulation and harmonisation between regions. By contrast, there is a lack of harmonisation between different regions in other Member States, such as Spain or Italy.

Table A8-44: Illustration of legislative frameworks affecting aquaculture production in Italy, Spain and the Netherlands

Member State	Legal Area	Description
Italy	Basic Legislation	The National Fisheries and Aquaculture Plan for 2004 (Ministerial Decree of May 7th, 2004) sets out policy for competitiveness, associations and pooling, environmental sustainability, and products certification (FAO, 2021a).
	Guidelines	Reported in Commission Communication establishing a Strategy for the Sustainable Development of European Aquaculture (COM (2002) 511), registration in the scheme requires an organisation to adopt an environmental policy containing commitments to achieve continuous improvements in environmental performance and to comply with all relevant environmental legislation (FAO, 2021a).
	Water and Wastewater	Legislative Decree No.152 concerning the Protection of Waters against Pollution (1999, as amended in 2000) sets minimum environmental quality objectives for main waterbodies, and quality objectives for waterbodies intended for specific purposes, including fish and molluscs life, to be met by 2016 (FAO, 2021a). The legislation provides quality parameters and methods of analysis (FAO, 2021a).
	EIA	According to the Food and Agriculture Organisation, Italy lacks a systematic legislative framework for EIA (FAO, 2021a). Council Directive 85/337/EC, states that Member States decide whether aquaculture projects are subject to an EIA (FAO, 2021a). Italy has laws which provide for transitional procedural rules for the assessment of projects that are likely to significantly affect the environment (FAO, 2021a).
Spain	Code of conduct	Spain has established the following strategic priority for the development of aquaculture throughout period 2007–2013: "Establishment of methods or means of aquaculture exploitation that reduce adverse consequences or improve positive effects on the environment" (FAO, 2021b).
	EIA	The administrative procedure for the EIA in Spain varies among the Autonomous Communities (FAO, 2021b). An environmental impact assessment carried out by aquaculture producer should include the following information (FAO, 2021a): • General description of the project and foreseeable requirements in relation to the use of land and of other natural resources as applicable • Analysis of technically feasible alternatives and justification of

Member State	Legal Area	Description
		adopted solution • Assessment of the direct or indirect foreseeable effects of the project • Adoption of preventive and corrective measures; Environmental Monitoring Scheme • Summary of the study and its conclusions (FAO, 2021b).
	Authorisation System	The following administrative procedures are relevant to aquaculture (FAO, 2021b): • An application for occupation of the public zone • Identification of the applicant (person or company) • The works endorsed by a certified technician • A financial feasibility study • Scheme for the execution of the operation endorsed by a certified technician • Proof of payment of duties • The EIA and the sanitary requirements, as applicable.
Netherlands	Authorisation System	There are no specific authorisations required to engage in and set up an inland aquaculture farm (FAO, 2021c). Each business in the Netherlands must have a number of permits to be allowed to conduct its activities (FAO, 2021c). According to the Food and Agriculture Organisation (FAO), the Dutch system of permits, defined by various laws and controlled by different ministries, is elaborate and complex (FAO, 2021c). The permits mainly deal with environmental protection and are prescribed in different environmental laws (see below) (FAO, 2021c). In addition, the setting up of a farm should stroke with land use planning regulations (FAO, 2021c).
	EIA	The Environmental Management Act (1993, as amended) (Wet Milieubeheer) provides that certain business entities need an environmental protection act permit (EPA permit) (FAO, 2021c). These include entities engaged in aquaculture and entities engaged in the processing of fish and shellfish. The competent authority for these permits is the municipality (FAO, 2021c).
	Water and Wastewater	According to the Surface Waters Pollution Act (2002) every discharge of wastewater into a surface water (and in some listed cases into municipal sewers) requires a permit from the competent authority. All dischargers are liable to pay a pollution levy (FAO, 2021c).
	Aquaculture Investment	Priority is given to projects which boost employment including support for small enterprises and also for the processing and marketing of fisheries and aquaculture products (FAO, 2021c).

Finally, the new strategic guidelines for EU aquaculture set out the vision and an operational path to transform the industry[111]. They outline best practice actions that would ensure good environmental performance and encourage circular practices in aquaculture, for instance through environmental monitoring of sites and waste management. The action plan for the development of the organic food sector contains a number of initiatives specifically aimed at boosting organic aquaculture production in the EU (EC, 2021).

Outside the EU, nations have varying levels of regulation over aquaculture. Table 45 outlines the legislative frameworks for China and Vietnam. Vietnamese regulations for aquaculture have a strong legal baseline, definition, and authorisation system. Further, Vietnam has an integrated environmental management approach where regulatory powers are decentralised to below state-level, and environmental regulations in Vietnam are thus often seen as inclusive and effective. It should be noted that the farming of different species in Vietnam has seen varying extents of success; while shrimp farming is well regulated and maintains good standards of environmental protection, *pangasius* aquaculture has relatively poorer standards due to certification issues and high production costs (UNEP, 2016). In comparison, China – despite being the world's largest contributor towards aquaculture production – has relatively poor regulations for aquaculture. There is no legal definition for the sector, and there is no EIA process that specifically applies to aquaculture. China's environmental framework is often poorly enforced due to its macro-scalar nature, poor environmental legislative structure and ineffective policy enforcement at the provincial and municipal levels. Consequently, even where there are some regulations that cover aquaculture and environmental protection for the sector, their implementation is questionable.

Table A8-45: Legislation regulating the environmental impacts of aquaculture in Vietnam and China

Nation	Legal Area	Description
Vietnam	Basic Legislation	The basic legislation applicable to aquaculture is the Fisheries Law of 2003 (FAO, 2021d). Chapter IV is dedicated to the regulation of aquaculture, with 14 Articles that establish a master plan, rights and obligations for those practicing aquaculture, allocation and lease of land and area, feed and control of decease among others (FAO, 2021d). In addition, other legislation that has implications for aquaculture include: the Law on Land, the Law on Water Resources and the Law on Environment Protection (FAO, 2021d). There also exists secondary legislation, mainly decrees, adopted on the basis of these laws. The Ministry of Natural Resources and Environment (MONRE) and the Ministry of Agriculture and Rural Development (MARD) serve as the competent national authorities responsible for all related matters (FAO, 2021d).
	Legal Definition	There is no legal definition of the practice of aquaculture in the Fisheries Law (FAO, 2021d). However, Article 2 of that Law defines

[111] SWD(2021) 102 final

Nation	Legal Area	Description
		"aquaculture land", which includes land with inland water surface; coastal and riverine alluvial land, coastal sandy beaches; land used for farming economy purposes, non-agricultural land with water surface allocated and leased for aquaculture purposes, and "marine areas for aquaculture", which includes sea areas that are planned for aquaculture purposes (FAO, 2021d).
	Authorisation System	Chapter IV on Aquaculture in the Fisheries Law outlines the provisions for the access to land and marine areas for aquaculture purposes (FAO, 2021d). The basis for access and development decisions made by the ministry of fisheries is found in the master plan on aquaculture development, as established by Article 23 of the Law (FAO, 2021d).
	EIA Process	The Fisheries Law Chapter on Aquaculture establishes the general principle that individuals and organizations engaged in aquaculture activities must comply with the regulations relating to environmental protection (FAO, 2021d). There are two parts to the EIA process (FAO, 2021d): 1. The strategic environmental assessment, an analysis and forecast of the environmental impacts of a project are undertaken 2. The EIA reports are appraised by local government.
China	Basic Legislation	The Fisheries Law (1986, amended 2000) enhances the production, increase, development and reasonable utilization of the nation's fishery resources (FAO, 2021e). The law requires the state to adopt a policy that calls for simultaneous development of aquaculture, fishing and processing, with special emphasis on aquaculture (FAO, 2021e).
	Legal Definition	There is no legal definition of aquaculture in Chinese law.
	Authorisation System	According to the Fisheries Law and its implementing Regulation (1987), the government at or above the county level may grant licenses to state and collectively owned units to use state-owned water surfaces and tidal flats for aquaculture purposes. Natural spawning, breeding and feeding grounds of fish, shrimp, crab, shellfish and algae in state owned water surfaces and tidal flats as well as their major migration passages must be protected and cannot be used as aquaculture grounds (FAO, 2021e). Licences can be revoked if water surfaces and tidal flats are neglected for a period of 12 months without a proper reason (FAO, 2021e). The use of state-owned and collectively owned land is regulated under the Land Administration Law (1998) (FAO, 2021e). Units or individuals who wish to use designated aquaculture areas must apply for an aquaculture permit through the competent fisheries administration at or above the county level, and the aquaculture permit will be granted by the government at the same level to allow using the

Nation	Legal Area	Description
		area for aquaculture activities (FAO, 2021e).
	EIA	Provisions on EIA requirements can be found in various environmental laws. None of the laws refer specifically to aquaculture. The main body of China's environmental legislative framework is the Environmental Protection Law (1989). The State Environmental Protection Administration (SEPA), (ministerial status, under State Council) plays the lead role in overall environmental management. The environmental impact statement of construction projects – including large-scale aquaculture projects – should contain an assessment regarding the water pollution hazards the projects are likely to produce, including their impact on the ecosystem, and a description of measures for prevention and control. There is no mention of smaller-scale projects (FAO, 2021e).

Assessing impacts

Economic impacts

The analysis indicates the measure is likely to have **weakly negative** economic impacts additional to the baseline, which may already be burdensome for industry. The number of installations which would be subject to IED regulation (if the E-PRTR threshold and definition is used) would be very small. Therefore, there are limited overall economic impacts related to administrative burden. Consequently, implementing the measure would be unlikely to lead to large increases in operating and capital expenditure costs. Economic spill over effects from positive environmental impacts, such as positive effects on reducing sickness, healthcare costs and improving productivity, are captured within the environmental impacts section.

Administrative burden on businesses

The measure would likely lead to **weakly negative impacts** on the administrative burden on businesses. The analysis conducted by Ricardo estimates there are between 55 and 250 aquaculture installations which produce >1000t a year. The resources required for the permitting process and administrative activities required under the IED may range from €0.2 million to €7.1 million of additional administrative costs each year, with a central estimate of €1.8m/year, primarily depending on the number of installations potentially covered by the IED and the type of permitting framework that would be introduced. These estimates are based on adjusted assumptions from the 2007 IED IA and additional analysis carried out for this Study.

There will be costs to industry of the development of a BREF. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for businesses, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF

process for businesses would be expected to range from €0.1m/year to €0.7m/year, with a central estimate of €0.2m/year.

These ballpark estimates would, therefore, suggest, once again, that administrative burden from the proposed legislative change would not necessarily affect the sector in a significant way (based on the assumption that this affects 1-2% of aquaculture installations), although these marginal increase in burden would be additional to already burdensome legislative frameworks across EU Member States.

Industry stakeholders participating in the TSS suggested that their administrative costs may increase as a result of including aquaculture in the IED, as estimated. Moreover, Member State stakeholders from France's Ministry of Ecological Transition stated that they would expect **little to no impact** on administrative burden of business from the implementation of this measure. That said, anecdotal evidence suggests that France's legislative framework may already include burdensome requirements, including impact studies, waste control and monitoring.

Operating costs and conduct of business

The measure's impacts on operating costs and conduct of business in the aquaculture sector are **unclear**. The magnitude of these costs would be primarily dependent upon the BREF process. There is uncertainty as to what would be considered BAT, for each process and type of aquaculture system. There is variation between the types of processes and species farmed in aquaculture, which creates uncertainty when calculating the abatement costs. Aquaculture can take place in saltwater, freshwater and artificial environment. Aquaculture farms can be divided between open and closed systems. In open aquaculture systems, emissions are released directly into the natural environment. Closed aquaculture systems recycle water used, removing harmful emissions before they are discharged or reused. Many different species are farmed in aquaculture. According to FEAP, different species have varying environmental impacts and require varying technologies and approaches. Such uncertainty means that substantive compliance costs resulting from aquaculture's inclusion within the IED cannot be readily determined.

According to a representative from FEAP, the available abatement techniques in the aquaculture industry are the type of feed, the methods of feeding and the location of the ponds. The main source of pollution from aquaculture are emissions of Nitrogen and Phosphorus. Nitrogen and Phosphorus emissions originate from uneaten feed and fish faeces which are released in high concentrations into the surrounding environment. High quality feed can be used to reduce; the amount fish need to be fed, and the food's ability to leach into the natural environment. Suitable feeding patterns and processes can also reduce the amount of feed which is required. According to FEAP, the location of pens is the most significant determinant for a farm's environmental impact. Deep water and strong currents distribute emissions of Nitrogen and Phosphorus, allowing the nutrients to be recycled into the natural environment without causing eutrophication. Pens located in shallow water with no current will cause a higher build-up of Nitrogen and Phosphorus emissions than a farm located in deep water with a strong current.

According to the representative for FEAP, high quality feed is used consistently across producers. The FEAP representative could not comment on the costs of feed, or the costs of different feed distribution processes and technologies. Moving pens to locations where there is sufficient flow and depth of water would be highly disruptive to farms.

The representative for FEAP believed there were nascent technologies being trialled in Danish Fjords which trapped uneaten food and faeces. According to FEAP these technologies are not well-developed.

Analysis in the environmental impacts section of this measure suggests that aquaculture installations are potentially responsible for a considerable proportion of industrial releases to water of Nitrogen and Phosphorus (c. 3-5% of total industry releases, based on E-PRTR data). Therefore, a consequence of including aquaculture in the scope of the IED could be to improve environmental performance by investing and/or adjusting their operations to reduce Nitrogen and Phosphorus emissions to water.

Overall, therefore, this evidence could suggest that implementing the measure would be unlikely to lead to large increases in operating and capital expenditure by businesses, but this remains very uncertain.

Competitiveness and level playing field

Inclusion of aquaculture within the Annex I of the IED imposes a singular set of requirements towards installations and operators. It therefore offers the **potential to level the playing field** by providing minimum criteria for all Member States through BAT Conclusions. This would be supported by findings from the recent IED evaluation, where 69% of the industry stakeholder surveyed agreed or strongly agreed that 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations." This is likely to continue to be the case under new sectors adopted, including for aquaculture, as in the case of this measure.

In the position paper submitted by the European Environmental Bureau, the E-NGO state a number of arguments in favour of including aquaculture in the scope IED based on improving harmonisation across Member States. The position paper argues that including aquaculture in the IED could help to define common standards for limits on emissions associated with marine and land-based aquaculture (e.g., use of antibiotics, use of chemicals and pesticides, escapees, water quality); lead to an integrated EU aquaculture license, easier to control and monitor with a centralised database and, Support the delivery of the Farm to Fork Strategy's goals in relation to aquaculture (which include a significant increase in organic aquaculture).

Position of SMEs

Limited analysis is available from data sources such as Eurostat on the nature of SMEs within the aquaculture industry. A 2020 EU call for economic data (JRC, 2021), however, identifies that, in 2017 and 2018, around 80% of all aquaculture enterprises are 'micro-enterprises' comprising of fewer than 10 employees, and are often 'family-owned', though use extensive production methods and systems. Further analysis of the data collated as part of the JRC 2021 survey of aquaculture in the EU further delineates by employment size class, with 80% of enterprises have less than 5 employees within the EU27, out of the survey sample (20 012 out

of the 25 164 enterprises surveyed in 2018). This underlines that the industry consists primarily of small enterprises, requiring consideration within the measure's design. If the measure were to use the E-PRTR's definition of an aquaculture installation (>1 000t a year production), this would exclude smaller aquaculture enterprises and, therefore, it would be **unlikely to affect the position of SMEs**.

Industry stakeholder FEAP stated in the TSS that aquaculture production is already subject to strict environmental permits, and further requirements will not provide extra benefits for the protection of the environment but will be an **extra burden for enterprises, including SMEs if applicable**, which comprise the industry.

Innovation and research

This measure may have a **weakly positive impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e., 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, aquaculture would be subject to the BREF process, which will include the consideration of novel and emerging techniques.

Public authority impacts

This measure may have a **weakly negative impact** on public authorities. Member State competent authorities would be charged with implementing the IED nationally or sub-nationally, which will mean that they would have a greater number of installations under this measure. This will come with additional costs from a range of provisions within the IED, such as inspections under Article 23, or the facilitation of access to information requirements under Article 24. Based on current assumptions of enterprises that would be affected, the implementation of this measure will incur between €0.3 and €4.7 million per year of additional administrative burdens each year over a 20-year period, with a central estimate of €1.5m/year.

There will be the costs to the Commission of the development of a BREF. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for public authorities, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for public authorities would be expected to range from €0.3m/year to €1.4m/year, with a central estimate of €0.5m/year.

Environmental impacts

Aquaculture is a very diverse industry, and environmental impacts cannot be generalised across the sector (EC, 2015). Impacts vary with species, farming methods and management techniques, precise location and local environmental conditions and wildlife. An overview of the main aquaculture systems used in the EU is provided below (CEFAS, 2014).

Table A8-46: Aquaculture systems used in the EU

Cultivation system	Environment	Species group cultured
Net-pen systems	Freshwater & marine	Finfish
Flow-through land-based systems	Freshwater & marine	Finfish
Land-based recirculation systems	Freshwater & marine	Finfish (crustaceans)
Extensive and static water earth ponds	Freshwater	Finfish (crustaceans)
Lagoon & valliculture	Marine	Finfish
Rafts and longlines	Marine	Bivalves
Intertidal shellfish culture	Marine	Bivalves
Sub-littoral bottom shellfish culture	Marine	Bivalves

Source: CEFAS, 2014.

The research conducted for this measure indicates that aquaculture **may not contribute significantly to the emissions of pollutants regulated by the IED**, other than releases of nutrients. The main environmental issue caused by aquaculture which falls within the scope of the IED is nutrient loading, caused by excessive release of Nitrogen and Phosphorus into the natural environment (IEEP, 2006). Nitrogen and Phosphorus releases lead to eutrophication, ammonia foundation and formed solids. Aquaculture also contributes to environmental issues that may be regulated by other frameworks, issues such as, climate change, salinisation, nutrient pollution, pharmaceuticals contributing to antibiotic resistance, damaging wild fish populations by reducing genetic diversity, introduction of invasive species, and, finally, diseases. Resource efficiency, such as, using wild fish as feed for aquaculture and use of potable water are issues that could be addressed by BAT-AEPLs, especially if their legal status is strengthened through the revision of the IED.

Proponents of freshwater aquaculture argue that good practices lead to ecosystem benefits, ecosystem services and cultural values, including, water management, biodiversity, landscape management, education, and regional identities (EUMOFA, 2021). When best practices are used, freshwater aquaculture can contribute to control of water quality and biodiversity conservation. Currently, some freshwater fish farmers adopt voluntary Codes of Best Practice to maintain or improve environmental standards (EUMOFA, 2021).

Different techniques and processes in aquaculture have varying environmental impacts. For example, Recirculating Aquaculture System (RAS), which has seen a 25% increase in production volume between 2009 and 2018, allows more efficient control of inputs and effluents, as well as a reduction in water consumption (EUMOFA, 2021). However, the simulation of a marine or freshwater environment required in RAS facilities is energy and water intensive. Multifunctional pond farming is where pond farming is associated with other activities, such as ecosystem and tourist services (EUMOFA, 2021). There has been particular focus in this area in Central and Eastern Europe, where pond fish farming plays an important role in food supply and rural development. This approach makes farmers more economically resilient and places greater emphasis on preservation and improvement of the surrounding natural environment. As environmental regulations get stricter, the future points

to less production from traditional farms and more from model farms and RAS. The Danish model farms show that a transition of the sector is possible while keeping up with the environmental regulations and bureaucracy. The strategy of partial RAS farms in show that increased production can be achieved without increasing the environmental impact (EUMOFA, 2020b).

The Marine Strategy Framework Directive (MSFD) regulates the introduction of non-indigenous species (NIS), nutrients, organic matter, contaminants including pesticides and litter, the disturbance to wildlife, and the possibility for escape of farmed fish (EC, 2016). The role of the MSFD is becoming increasingly important to ensure that aquaculture activities provide long-term environmental sustainability. The table below outlines the potential interactions between aquaculture and the environment based on MSFD descriptors derived from impact statements from various Member States. Noticeably, all but one descriptors are categorised as having a small degree of interaction, with non-indigenous species having a large degree of interaction between aquaculture farms and the environment. This emphasises the range of potential environmental impacts posed by aquaculture farming. Out of this selection, the IED only regulates eutrophication, which mainly applies to Member States around the Baltic Sea and inland aquaculture farms.

Table A8-47: The potential interactions between aquaculture and the environment. Adapted from EC (2016)

Descriptor	Degree of interaction	Evidence and mitigation
1. Biodiversity	Small	If unmanaged, escapees, diseases and parasites may have localised effects on biodiversity. These should be addressed through the implementation of the EIA, SEA and Habitats Directives. Siting is a critical factor in reducing the potential impacts on biodiversity.
2. Non-indigenous species	Large	Aquaculture provides a potential route for introduction of NIS; introduction of alien species in aquaculture is regulated by Regulation 708/2007 requiring a specific authorisation for any introduction of alien species.
3. Commercial fish & shellfish	Small	If unmanaged escapees (gene flow), diseases and parasites may have localised effects on wild commercial fish and shellfish.
4. Foodwebs	Small	If unmanaged escapees (gene flow), diseases and parasites may have localised effects on foodwebs. Siting is a critical factor in reducing the potential impacts on foodwebs.
5. Eutrophication	Small	Some impact at local scale, but generally unlikely to occur at sufficient scale at present to have significant impact except in enclosed seas like the Baltic that already have significant nutrient inputs. In such cases, Member States may consider the application of nutrient-neutral schemes or other approaches that remove nutrients from the sea.
6. Sea-floor integrity	Small	Some impact at local scale due to siltation or scour, but unlikely to occur at sufficient scale at present to have significant impact. This can be mitigated

Descriptor	Degree of interaction	Evidence and mitigation
		by moving cages, by fallowing areas or by relocation to more energetic sea areas (areas with a greater circulation.
7. Hydrographical conditions	Small	Some impact at local scale due to formation of small scale features including eddies, but unlikely to occur at sufficient scale at present to have significant impact unless large scale facilities.
8. Contaminants	Small	Some impact at local scale due to contamination by hazardous substances and microbial pathogens, but unlikely to occur at sufficient scale at present to have significant impact. Mitigation comes from the regulatory limits set within food safety legislation. However, these regulatory limits, which are set to protect the health of consumers, are not specifically designed to protect the environment. Therefore, additional action may be necessary to ensure adequate environmental protection.
9. Fish & seafood contaminants	Small	Impacts are assessed using regulatory limits set within food safety legislation.
10. Marine litter	Small	Aquaculture may be a source of marine litter alongside urban discharges and fisheries.
11. Underwater energy (e.g. noise)	Small	Some impact at local scale close to cages, but unlikely to occur at sufficient scale at present to have significant impact. Little information available on potential mitigation.

In the position papers from E-NGOs, ClientEarth and the EEB highlight that environmental challenges associated with aquaculture which are not regulated under the IED. This includes escapes of non-native species into the environment impacts on marine and freshwater ecosystems.

ClientEarth also argue including aquaculture within the scope of the IED would support, more consistent environmental regulation of the aquaculture sector. In ClientEarth's response to Question 2A of the Targeted Stakeholder Survey, the E-NGO highlight that Regulation 1380/2013 of the Common Fisheries Policy aims to boost the development of aquaculture by having all Member States draw up multi-annual national strategic plans aimed at facilitating the sustainable development of aquaculture. However, they stated that there is no single EU aquaculture license and aquaculture permit systems are developed at the Member State level. Consequently, there are different regulatory regimes from one MS to another and therefore different levels of implementation for the same sector.

On the other hand, Fertilizers Europe commented in the TSS that aquaculture should be excluded from the revised IED scope, because there are already national and EU level legislation that focus on reducing harmful environmental impacts of these sectors and efforts should be made to avoid multiple regulations. Similarly, the aquaculture business association Federation of European Aquaculture Producers (FEAP) stated in the TSS that aquaculture production is already subject to strict environmental permits.

Further, stakeholders responding to the TSS had mixed views about the contribution of aquaculture to environmental pollution and/or emissions to air, water, soil and GHG emissions, energy use, resources and materials use, waste generation, and water use. E-NGOs noted high significance for all environmental pressures. Industry stakeholders noted a moderate significance for all pressures. Local and regional MS authority stakeholders stated a varying significance for environmental pressures with higher significance for emissions to water, energy use, materials and resource use, and waste generation.

Climate

The measure is likely to have **limited to no impact** on aquaculture's greenhouse gas emissions. If GHG were included in the scope of the IED, the measure may have some weakly positive impacts on emissions, although these are not expected to be significant. The latest available E-PRTR data indicates no emissions of CH_4, CO_2 or N_2O from activity 7b, on aquaculture. It is thought, therefore, that the aquaculture has no, or a limited, direct impact to GHG emissions.

Aquaculture may contribute to climate change indirectly. A life-cycle analysis of Asian aquaculture plants highlights that aquaculture feed production requires energy to grind and mix the raw materials, make the pellets and dry them (FAO, 2017).

In response to the TSS, the EEB stated that emissions of GHG arise during production of raw materials used for feed for the fish (for example, energy used by vessels that capture fish to produce fishmeal, and NOx emissions arising from crop cultivation), and during their subsequent processing and transportation.

In response to the TSS, Danish Industry stakeholder European Fishmeal (EFFOP) stated that CO_2 and SO_2 emissions depend on the species in fisheries. Salmon and mollusc rank lower than beef, chicken and pork on both CO_2-eq, whereas catfish rank higher on CO2-eq and roughly on par regarding CO_2-eq in comparison to beef (Hilborn, Banobi, Hall, Puclyowski, & Walsworth, 2018).

E-NGO stakeholder ClientEarth also stated in the TSS that when it comes to aquaculture the upstream supply chain (specifically the production of feed ingredients) can have a considerable emissions footprint and many sectors of the aquaculture industry rely heavily on soy, palm and other intensively grown crops with well-documented environmental impacts.

Air quality

This measure is likely to have **limited to weakly positive** impacts on air quality. The latest available E-PRTR data indicates emissions of ammonia, NH_3, but no other relevant emissions to air. Data for activity 7b on aquaculture, from the E-PRTR indicates that the addition of aquaculture would be equivalent to adding 0.01-0.02% to the total industry emissions of NH_3 within baseline scope of the IED.

Water quality and resources

This measure is likely to have **weakly positive** impact on water quality and resources. The latest available E-PRTR data indicates no releases to water of heavy metals, only data pertaining to nitrogen and phosphorus releases is reported. These data indicate that the

addition of aquaculture to the scope of the IED's Annex 1 included sectors could be equivalent to adding approximately 3% of total industry releases of nitrogen and approximately 5% of total industry releases of phosphorus for the industry sectors reporting under the E-PRTR, (data from 2018).

A study by CEFAS (CEFAS, 2014) suggests that these releases could lead to changes in water chemistry, leading to eutrophication within water bodies. By weight, the majority of aquaculture production is accounted for by shellfish, totalling 56% in 2018. However, these cultivation systems are likely less to be directly associated with effluent discharge into surrounding water bodies when compared to finfish cultivation (e.g. trout), even though this is the smaller activity by weight. Shellfish, according to the 2014 CEFAS study, may have many positive benefits to the surrounding aquatic ecosystem, such as the maintenance of nutrients. There exists, therefore, examples of certain co-cultivation aquaculture systems, such as finfish and shellfish or algae systems being located together to help manage the balance of excess nutrients[112], known as integrated multi-trophic aquaculture (IMTA). In terms of environmental impact, it would appear plausible that the releases of nitrogen and phosphorus, cited above, would originate primarily from finfish systems. Table 48 shows the quantity of pollutants released from aquaculture installations in the EU. The variation between the types of permit conditions makes it challenging to compare emissions between installations.

Table A8-48: Permits for aquaculture installations

MS	Farm/ Company name	Species	Annual limits on N	Annual limits on P	Annual production limits	Annual feed limits	Year
FR	Aquanord (GEORISQUES, 2008)	Sea bass & sea Bream	280 tonnes	10.7 tonnes	1,800 tonnes		2008
NO	Fredrikstad Seafoods AS (Norskeutslipp, 2019)	Salmon	72 tonnes	0.85 tonnes	800 tonnes		2019
NO	Aqua Gen AS (Fylkesmannen, 2018)	Rainbow trout, salmon and trout	216 tonnes	7 tonnes		300 tonnes	2018
NO	Profunda AS (Fylkesmannen, 2017)	Rainbow trout, salmon and trout	3.9 tonnes per 100 tonnes of feed	0.4 tonnes per 100 tonnes of feed		100 tonnes	2017
NO	Bjølve Bruk AS (Fylkesmannen,	Juvenile salmon & aura	35 tonnes per 100 tonnes of	4 tonnes per 100 tonnes of feed	788 tonnes	945 tonnes	2014

[112] European Commission (2015), FUTURE BRIEF: Sustainable Aquaculture, available at: https://ec.europa.eu/environment/integration/research/newsalert/pdf/sustainable_aquaculture_FB11_en.pdf

MS	Farm/ Company name	Species	Annual limits on N	Annual limits on P	Annual production limits	Annual feed limits	Year
	2014)		feed				
NO	Fishbase Group AS (Fylkesmannen, 2020)	Salmon, roe rainbow trout, gilthead seabream	45 tonnes	5 tonnes	<2,000 tonnes	<2,000 tonnes	2020
NO	Lerøy Vest AS (Fylkesmannen, 2020)	Juvenile salmon & aura	32 tonnes	3.3 tonnes	1,100 tonnes	1,100 tonnes	2020
NO	Havlandet Havbruk AS (Fylkesmannen)	Salmon	12 tonnes	0.27 tonnes	200 tonnes		2017
NO	Eidesvik Settefisk AS (Fylkesmannen, 2018)	Juvenile salmon & rainbow trout	66 tonnes	8 tonnes	<3,000 tonnes		2018
NO	Salmo Terra AS (RAS) (Fykesmannen, 2018)	Salmon & aura	175 tonnes	21 tonnes	<8,000 tonnes		2018
NO	Havlandet Havbruk AS (Fylkesmannen, 2019)	Salmon & aura	288 tonnes	12 tonnes	<10,000 tonnes	11,250 tonnes	2019

Heavy metal compounds copper and zinc are also released from aquaculture. Elevated levels of copper adversely affect fish and other aquatic life. For instance, it has found to reduce growth and reproduction levels in clams (Munari & Mistri, 2007[113]), damage gills of fish (Mochida et al., 2006[114]) and inhibit phytoplankton growth (Cid et al., 1995[115]; Franklin, Stauber & Lim, 2001[116]). Additionally, a 2007 study of a Scottish salmon farm found copper in sediment up to 300 meters away from the cages.[117] The highest concentration detected, 805 micrograms of copper per gram of sediment (µg g−1), was well above Scottish regulatory

[113] Munari, C. & Mistri, M. (2007) Effect of copper on the scope for growth of clams (*Tapes philippinarum*) from a farming area in the Northern Adriatic Sea. *Marine Environmental Research* 64 (3): 347–357.

[114] Mochida, K., Ito, K., Harino, H., Kakuno, A. & Fujii, K. (2006) Acute toxicity of pyrithione antifouling biocides and joint toxicity with copper to red sea bream (*Pagrus major*) and toy shrimp (*Heptacarpus futiliros- tris*). *Environmental Toxicology and Chemistry* 25 (11): 3058–3064.

[115] Cid, A., Herrero, C., Torres, E. & Abalde, J. (1995) Copper toxicity on the marine microalga *Phaeodactylum tricornutum*: effects on photosynthesis and related parameters. *Aquatic Toxicology* 31 (2): 165–174.

[116] Franklin, N.M., Stauber, J.L. & Lim, R.P. (2001) Development of flow cytometry-based algal bioassays for assessing toxicity of copper in natural waters. *Environ- mental Toxicology and Chemistry* 20 (1): 160–170.

[117] Dean, R.J., Shimmield, T.M. & Black, K.D. (2007) Copper, zinc and cadmium in marine cage fish farm sediments: an extensive survey. *Environmental Pollution* 145 (1): 84–95.

limits of 270 µg g−1 and indicates adverse benthic effects (EC, 2015). High levels of zinc can result in some fish accumulating zinc in their bodies, when they live in zinc-contaminated waterways.[118] When zinc enters the bodies of these fish, it bio-magnifies up the food chain. Both zinc and copper are covered as emissions in the IED. However, there are a range of other chemical discharges which are not covered by the IED, outlined in Table 49. Alongside the WFD, MSFD, and EQS Directive and a range of other regulations, the release of chemicals from aquaculture operations is typically tightly regulated nationally, with most Member States specifying what chemicals can be used as part of aquaculture operations and their maximum permitted discharge levels, irrespective of whether they are considered as river basin specific pollutants under the WFD.

Table A8-49: A list of chemicals used in aquaculture operations and their uses. Adapted from EC (2016).

Chemical	Aquaculture uses	Covered by the IED?
Zinc	Feed supplement and anti-foulant	Yes
Copper	Antifouling	Yes
Diflubenzuron	Sea lice treatment	No
Cybutryne	Sea lice treatment	No
Formaldehyde	Antiparaciticide and antifungal treatment	No
Azamethiphos	Sea lice treatment	No
Cybutryne	Antifouling	No
EDTA	Improve water quality	No

Aquaculture has also been linked with depletion and salinization of potable water. Furethremore, aquaculture also relies on antifouling chemicals, abeit this would not necessarily be addressed by the IED. These chemicals can contaminate seafloor sediment around farms. For example, a study of a Scottish salmon farm found copper in sediment up to 300 metres away from the cages (EC, 2015). The highest concentration detected, 805 micrograms of copper per gram of sediment (µg/g), was well above Scottish regulatory limits of 270 µg/g and indicates adverse effects (EC, 2015).

Use of antibiotics in aquaculture has been flagged as a particular concern in open aquaculture where they enter the surrounding marine environment via fish faeces and can persist for long periods in sediment (EC, 2015). In Europe, they are typically administered via medicated feed, but only a percentage is absorbed by the fish. For instance, it is estimated that 60–73% of the antibiotic oxytetracycline administered to sea bass on Greek farms is released to the

[118] https://www.greenspec.co.uk/building-design/zinc-production-environmental-impact/

environment via the fishe faeces (EC, 2015). High concentrations of oxytetracycline and florfenicol, both active against furunculosis in salmon, inhibit growth of the wild alga *Tetraselmis chuii*, an important food source for other marine organisms. Such studies are largely limited to short-term laboratory studies and the concerns they raise highlight the need to further investigate the effects of 'real-world 'chronic, low-level exposure to antibiotics on wild species. While data on the environmental and human health effects of antibiotics used in aquaculture is limited, concerns raised by research so far would further support their prudent use, as in other veterinary and human medicine applications.

Aquaculture can have positive impacts on water quality. Species, such as, bivalves, seaweed and shellfish can return nutrient quantities in water to healthy levels. 50–60 tonnes of mussels per hectare in a eutrophic Danish fjord per year can extract 0.6–0.9 tonnes of nitrogen and 0.03–0.05 tonnes of phosphorus per hectare (EC, 2015).

In response to the TSS, the EEB added that aquaculture contributes to nutrient build-ups in the case of open water aquaculture (cages), which can lead to eutrophication and/or nitrification from non-consumed feed, faeces, dead fish. Furthermore, depending on feed material, pharmaceutical products, growth promoters, antibiotics, and anti-algae biocides can leach into the surrounding aquatic environment, impacting other species, causing localised pollution and leading to anti-microbial resistance.

In the TSS, ENGO European Environmental Bureau (EEB) stated that aquaculture contributed significantly to emissions to water, GHG emissions, waste generation, and contributed slightly to moderately to emissions to air, soil, and energy use in answer to Question 2A. The organisation commented that the implementation of this measure would significantly reduce emissions to water and soil, in answer to Question 2B in the TSS.

ClientEarth added in their response to the TSS that the simulation of a marine environment on land is energy and water intensive. Land-based operators may still require feed and antibiotics and include additional chemical water treatments. Waste water from recirculating systems is discharged back into the marine environment, which can create a steady stream of environmentally damaging outputs, polluting soils, rivers and the ocean.

Soil quality or resources

The effects that this measure is likely to have on soil quality and resources is **unclear**. Releases to land from aquaculture are expected minimal, even though some aquaculture systems may be found on land.

Waste production, generation, and recycling

This measure is likely to have **negligible positive impact** on waste production, generation, and recycling. Analysis of the E-PRTR 2017 dataset for activity 7b on aquaculture, suggest that this industry may be responsible for minimal volumes of waste, equivalent to 0.0001% of the E-PRTR total for the non-hazardous waste destined for disposal. No other waste or treatment types were reported.

The generation of waste features in the IED through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in

the Waste Framework Directive (Directive 2008/98/EC). The IED, therefore, can be seen to actively contribute towards the management of waste and circular economy principles.

This preliminary analysis suggests aquaculture generates a relatively limited volume of waste and, therefore, inclusion under the scope of the IED is unlikely to lead to any significant improvements on waste. The effectiveness of the IED, in this regard, however, is dependent on the BREF Process.

Efficient use of resources

The project team has not identified evidence to assess the efficient use of energy or water in this industry. However, regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the BREF Process.

One resource efficiency concern specific to aquaculture relates to the use of wild-caught fish as feed in aquaculture. According to the EC's 2015 report, *Sustainable Aquaculture*, the amount of fish used in feed to produce one unit of output should be reduced by at least 50% from current levels for aquaculture to be sustainable in 2050 (EC, 2015).

The EEB's position paper highlights that feed ingredients can also be heavily reliant on wild-caught fish. The paper highlights release of discards, so-called "ghost gear" from fishing vessels, and chemicals, waste water and organic waste from fishing vessels.

Social impacts

Public health impacts would be spillover effects from the environmental benefits already captured within the previous section of this assessment. Further, this measure may result in an increase in costs towards business. If these costs cannot be passed on through changes in prices of products sold, they may impact profitability and, therefore, employment. There is limited evidence available to quantify these impacts, but they are expected to be negative.

In some areas of the EU, freshwater fish consumption is often a key element in the way of life and tradition of communities living in wetlands areas, such as, Hungary, Poland, Romania, Finland and Lithuania (EUMOFA, 2021). Freshwater fish farming constitutes and important element of the long-standing cultural traditions in certain regions of these Member States. If the measure made aquaculture production economically unviable or caused a rise in prices such that produce was unaffordable, it is foreseeable that longstanding cultural practices could be harmed or changed.

Measure 43: Include upstream oil and gas industries within the scope of the IED.

Description of the measure and requirements for implementation

Include upstream oil and gas industries within the scope of Annex I of the IED. This, in turn, will require installations under a specific activity definition, and/or capacity threshold, to comply with the general regulatory framework set out by the IED, such as the provisions regarding permits or inspections, detailed in Chapter II of the IED. Currently, the IED does cover a range of downstream oil and gas activities, such as activity 1.2, 'refining of mineral

oil and gas', but does not cover explicitly upstream activities such as offshore or onshore exploration, prospecting and production.

The measure may need to be further defined with regards to the proposed wording and capacity threshold to be included in Annex I. There is no coverage of upstream oil and gas activities in E-PRTR to draw upon for this purpose. Reporting of GHG inventories under IPCC guidelines[119] includes category 1B2 to cover "*all [upstream] oil and natural gas activities*" with primary sources including "*fugitive equipment leaks, evaporation losses, venting, flaring and accidental releases*"; no capacity thresholds are specified due to GHG inventories needing to be comprehensive. Currently, no similar legislation or regulatory framework considers upstream oil and gas. There is therefore no former example of capacity thresholds upon which to draw.

The various sub-activities of the upstream oil and gas sector have been defined in more detail and in the context of BAT however. In 2015-2018, the European Commission initiated an information exchange to develop a Guidance Document on BAT in upstream hydrocarbon exploration and production. This resulted in the publishing of a Best Available Techniques Guidance Document on upstream hydrocarbon exploration and production, based on information provided by a Technical Working Group. This document set out non-binding guidance on best available techniques for organisations engaged in hydrocarbons activities and for regulatory authorities to draw upon.

The following activities were covered for **onshore** activities in the guidance document:

1. Site selection, characterisation, design and construction of surface activities
2. Handling and storage of chemicals
3. Handling and storage of hydrocarbons
4. Handling of drill cuttings and drilling muds
5. Handling of hydraulic testing water and of well completion fluids
6. Management of hydrocarbons and chemicals – Well stimulation using hydraulic fracturing
7. Energy efficiency
8. Flaring and venting
9. Management of fugitive emissions
10. Water resources management
11. Water resources management for hydraulic fracturing
12. Produced water handling and management
13. Environmental monitoring

The following activities were covered for **offshore** activities in the guidance document:

1. Handling of drill cuttings and drilling muds
2. Risk management for handling and storage of hydrocarbons
3. Risk management for handling and storage of chemicals

[119] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf

4. Energy efficiency
5. Flaring and venting
6. Management of fugitive emissions
7. Produced water handling and management
8. Management of drain water
9. Risk management for facility decommissioning
10. Environmental monitoring

The guidance document does not include any indication of different sizes/capacities of sites that could give indication of any potentially useful thresholds to then be potentially used to specify installations that would be regulated by the IED.

On number of active installations in this sector (Table 50). Responses to the TSS were provided by authorities in 11 Member States estimating the possible numbers of installations in the upstream oil and gas sector. These summed to approximately 1 400 to 1 500 installations counting fields rather than drillings (see table below). It is unclear however how many of the these would be installations, since some of the responses to the TSS have provided the number of fields; Germany reported the number of drillings and the number of fields. Taking also the information from the OSPAR inventory, which details discharges, spills and emissions from offshore oil and gas installations (i.e. not onshore activities) in Denmark, Germany, Ireland, the Netherlands, and Spain (non EU Member States also in the agreement are Norway and the United Kingdom), this identified 179 installations in 2018 for four of the EU27 Member States listed (no data for Spain), the majority belonging to the Netherlands (Netherlands: 154 installations, Denmark 21 installations, Germany 2 installations and Ireland 2 installations). Regarding data relating to the Netherlands, the TSS indicates there are 5 fields offshore, while OSPAR indicates there are 154 installations offshore. It is unclear the extent to which these two numbers are in agreement.

Table A8-50: Numbers of installations reported in TSS and in OSPAR for on/offshore sector

Member State	Number of installations reported in TSS (onshore and offshore)	Number of installations reported in OSPAR (offshore only)
Austria	10 or 50 to 100, depending on definition	-
Croatia	45	-
Czech Republic	93	-
Denmark	-	21
France	~60	-
Germany	77 fields; 469 drillings	2
Ireland	-	2
Italy	200	-
Latvia	1	-

Member State	Number of installations reported in TSS (onshore and offshore)	Number of installations reported in OSPAR (offshore only)
Netherlands	250 natural gas fields on shore and 5 fields off shore	154
Poland	170-180	-
Romania	476	-
Slovenia	1	
Spain	-	No data
Total	**~1 433 (counting fields not drillings)**	**179**

There are also a large number of inactive (disused) or abandoned offshore installations. The OSPAR Convention reporting for 2018 estimates there to be ~1 700 of these in 2017. These would not be considered in scope of the measure.

Noting that many countries are considering the phasing out of new oil and or gas extraction which would imply installation numbers will be in decline. That said, as an example, Denmark with its own 2030 climate target, is planning to end oil and gas extraction in 2050 (not in 2030).[120]

Overall, combining the TSS data with the limited Member State submissions for OSPAR, as well as the consideration of future climate targets and phasing out of oil and gas use, a range of 1 000-2 000 installations is estimated.

Objectives:

The follow objectives apply -

- Levelling the playing field for installations across the EU, where there is currently variation in national regulations (See section on Administrative burden on businesses).
- Improving the environmental effectiveness of the IED, via the extension of coverage of the IED in Annex I. The measure is anticipated to result in the reduction of emissions to air, water, and soil.

Implementation needs:

EU to make legislative change to the IED text

- EU to review and consolidate the guidance BAT document to develop it into a BAT Conclusions document
- Member States to transpose changes into national law
- Member States to regulate the installations according to the new requirements, to the extent this requires changes from their existing regulatory approaches. This will require upfront and ongoing implementation actions.

[120] https://euobserver.com/nordic/150287

Assessing impacts

Economic impacts

The main Economic impacts of extension of the scope of the IED to cover upstream oil and gas are:

- Administrative burden impacts on businesses as well as public authorities from permitting costs under the IED, as well as administrative burden associated with ongoing monitoring and reporting.
- Potential increases in up-front investment costs as well as ongoing operating costs from the application of BAT in installations not already applying BAT

Administrative burden on businesses

This measure is likely to lead to **weakly negative impacts** on administrative burden on businesses. Administrative burden, in this context, can be defined as the costs of meeting a range of administrative activities under the IED for the purposes of wider compliance, that do not directly pertain to the installation of specific technologies (as might be needed for compliance against ELVs, or BATC) or the adoption of specific practices. Such administrative activities, in the context of the IED legal text, include:

- Preparation and **application for a permit** under Article 12,
- Assisting **permit reconsiderations** by the competent authority under Article 21(2),
- Preparation of a **baseline report** under Article 22, if applicable,
- Facilitating environmental **inspections** under Article 23,
- **Monitoring and reporting** requirement, as laid out by permit conditions under provisions in Article 16,
- Notifying competent authorities of 'any planned change in the nature or functioning, or an extension of the installation which may have consequences for the environment', as detailed in Article 20.

This also depends on the current level of regulation and associated administrative burden for the sector in Member States. Some Member States provided information in the TSS in relation to this. In Germany, under conditions set out in the Ordinance on the Environmental Impact Assessment of Mining Projects (UVP-V Bergbau), an environmental impact assessment is required for projects over certain size thresholds (500 t/d crude oil, 500 000 m^3/d natural gas), as well as operating in coastal waters. Reference to permitting appears to cover only the right to mine/extract and not, for example, prescribe BAT to minimise environmental impacts. In France, oil and gas extraction are subject to the Mining Code[121]. The latest climate bill in France did include the ambition to bring the Mining Code more in line with the Environment Code, which currently appears to only be referenced for public consultation prior to opening new sites[122]. In the Netherlands, air quality limits have been prescribed for combustion plants in offshore platforms.[123] There are permit obligations in

[121] https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006071785
[122] https://www.legifrance.gouv.fr/codes/id/LEGISCTA000033038620/
[123] https://www.tweedekamer.nl/downloads/document?id=9c5cc436-d3cb-401a-9ef1-e0ae5b84e468&title=NOGEPA%20NOX%20REDUCTIE%20PROGRAMMA.%20EINDRAPPORT.pdf

Sweden which vary depending on geographic location.[124] There is therefore variation in how the sector is regulated between Member States. However, it appears that regulation mostly relates to the exploration and opening of new sites and does not include environmental inspections or prescription of BAT for environmental performance in most cases.

Based on the number of installations for this sector listed above in the introduction and applying the standard assumptions on the unit costs for the main requirements for operators, an estimate of the administrative burden on business is € 2m/year to €52m/yr , with a central estimate of €23m/year that could be added to the IED scope. This high and wide range is due to the large number of potential installations that could come into scope, and the high uncertainty on this number of installations.

This central estimate is equivalent to around 0.18% of GVA for the 'extraction of crude petroleum and natural gas'. As such, administrative burden is not expected to present a major impact to the sector.

There will also be costs to industry of the development of the BREF and BATc. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for businesses, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for businesses would be expected to range from €0.1m/year to €0.7m/year, with a central estimate of €0.2m/year. It could be expected that the costs of a BREF for this sector would be on the lower end of this range because of the existing non-binding BREF guidance document in place.

Operating costs and conduct of business

This measure is likely to lead to **weakly negative impacts** on operating costs. There will be costs to achieve BAT, but the exact level is to be determined by the BREF process (what would be considered BAT for each process), and in particular the degree of environmental protection already in place. Such uncertainty means compliance costs cannot be readily determined. The guidance document BREF for upstream oil and gas contains details of BAT to minimise the environmental impacts of the sector. However, it did not gather data on the cost of techniques.

Competitiveness and level playing field

This measure is likely to lead to **weakly positive impacts** on competitiveness and the level playing field. The total costs of doing business, that is the costs of administrative burden and compliance combined, are thought to negatively impact upon businesses within the upstream oil and gas sector. The exact level, however, as noted in the above, is to be determined by the BREF process. Administrative costs have been estimated and are thought to be small relative to the size of the sector. Compliance costs in the form of investment/operational costs are unknown but could be substantial. As this sector deals with a product that is a commodity, costs cannot be passed on in the price of products, and so the sector is particularly susceptible to large cost increases.

[124] Miljöprövningsförordning (2013:251) Svensk författningssamling 2013:2013:251 t.o.m. SFS 2021:731 - Riksdagen

Inclusion of upstream oil and gas within the Annex I of the IED imposes a singular set of requirements towards installations and operators. It therefore offers the potential to level the playing field by providing minimum criteria for all Member States, notably towards the use of emission limit values. This has largely been supported within the IED evaluation, where, for industry stakeholder surveyed, 69% agreed or strongly agreed with the statement 'the IED has contributed to achieving a level playing field in the EU for IED sectors by aligning environmental performance requirements for industrial installations'. This is likely to continue to be the case under new sectors adopted, including for upstream oil and gas, as in the case of this measure.

Position of SMEs

This measure is expected to lead to **limited to no impacts** on SMEs. There are expected to be few SMEs in the upstream oil and gas sector, as such no impacts are expected.

Innovation and research

Including upstream oil and gas within Annex I of the IED may have a **limited impact** on research and development. Provisions within the IED, such as Article 27 on emerging techniques, allow for research and development within the context of BAT. Each BREF includes a chapter on emerging techniques, which acts as an indication of future techniques that could in the future (i.e. 'if commercially developed') be considered as BAT. This pathway encourages the continual focus on further reducing the environmental impacts of industrial activities or innovating in ways to save costs when compared to existing BAT. If this measure was adopted, upstream oil and gas would be subject to the Sevilla Process, with emerging techniques considered within the eventual BREF.

Public authority impacts

The inclusion of upstream oil and gas within Annex I would have **weakly negative** impacts upon the costs to competent authorities. Based on the number of installations for this sector listed above in the introduction, and applying the standard assumptions on the unit costs for the main requirements for competent authorities, an estimate of the administrative burden on authorities is € 1.1m/year to €28m/yr, with a central estimate of €15m/year that could be added to the IED scope. This high and wide range is due to the large number of potential installations that could come into scope, and the high uncertainty on this number of installations.

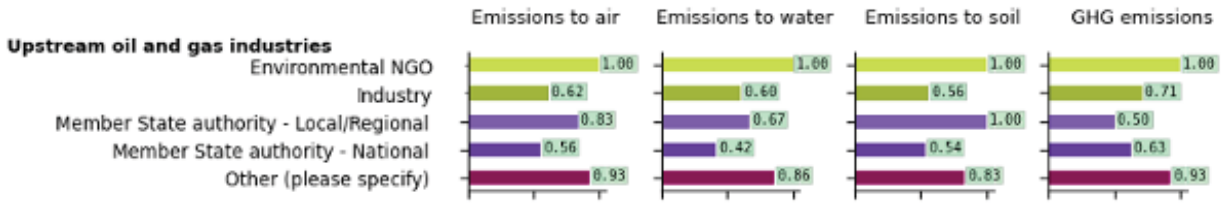
There will also be the costs to public authorities of the development of the BREF and BATc. The estimates in the IED evaluation for this one-off cost of a BREF development were €7.9m (range €3.6m to €20.7m). After apportioning the fraction of this cost for public authorities, and annualising over a period of 20 years assuming two BREFs in this period, the annualised cost of the BREF process for public authorities would be expected to range from €0.3m/year to €1.4m/year, with a central estimate of €0.5m/year. It could be expected that the costs of a BREF for this sector would be on the lower end of this range because of the existing non-binding BREF guidance document in place.

Environmental impacts

The upstream oil and gas non-binding BREF highlight the environmental impacts associated with each onshore and off-shore activity. Additionally, the BREF for the Management of Waste from Extractive Industries sets out the key environmental issues associated with extractive waste. These are outlined below.

Based on the TSS, overall, stakeholders agree that impacts from upstream oil and gas industries are significant for the following key environmental issues – greenhouse gases, and emissions to air, water, and soil (Figure A8-30). There is a very strong consensus amongst the Environmental NGOs and 'Other' stakeholders that there are significant environmental pressures resulting from emissions from oil and gas activities. There is a strong consensus from local and regional Member State authorities that these environmental pressures are significant for releases to soil and air. However, there is less certainty among these stakeholders in terms of emissions released to water and GHG. Regarding the industry and national Member State stakeholders there is a high level of uncertainty and variability among answers, with split majorities for every emission source.

Figure A8-30: TSS responses on impacts from upstream oil and gas industries



Climate

There are expected to be **weakly positive** impacts on climate from this measure. Hydrocarbons operations involve the separation and processing of reservoir fluid combinations of gas, oil and water, and incorporate flaring and venting to release gases to the atmosphere. Flaring and venting are a significant source of GHG emissions. Fugitive emissions are also a significant source of GHG emissions, most notably methane.

The OSPAR inventory, with details of discharges, spills and emissions from offshore oil and gas installations, includes 133 installations in 2017 for Member States within the EU27, the majority belonging to the Netherlands. These 133 installations emitted 12 700 tonnes of CH_4 in 2017, equivalent to around 1.6% of the E-PRTR total analogous to that of the IED. This analysis may be an underestimate, owing to onshore facilities and terminals, which do not feature in the OSPAR inventory.

The inclusion of upstream oil and gas activities within the scope of the IED, and thus making binding recommendations for BAT and BAT-AELs for the sector through a BAT Conclusions document would be expected to target methane releases as a key environmental issue of the sector. In this way, the measure would be expected to contribute to the EU's pending (currently being drafted) Methane Strategy; legislation specifically targeting

methane emissions from the energy sector is expected in the fourth quarter of 2021, as indicated in the "Fit for 55" package.

Air quality

There are expected to be **weakly positive** impacts on air quality from this measure. Flaring and venting are also a significant source of air pollution. LRTAP contains reported data from the EU27 on emissions associated with fugitive emissions from upstream oil and gas as well as emissions from venting and flaring. This shows that emissions in 2019 were 0.2 kt of PM2.5, 8.1 kt of NOx, 18 kt of SOx, and 102 kt of NMVOCs. The OSPAR inventory, with details discharges, spills and emissions from offshore oil and gas installations, includes 133 installations in 2017 for Member States within the EU27, the majority belonging to the Netherlands. These 133 installations emitted 8.3 kt of NO_X in 2018, 2.9 kt of NMVOCs, and 85 tonnes of SO_2. As a result, environmental benefits attained from regulation of the sector would be significant.

The MWEI BREF also sets out that emissions of particulates to air is a key environmental issue.

Water quality and resources

Handling and storage of chemicals is required for operations during both onshore and offshore exploration and production. The use of chemicals has potential to pose risks to the environment through planned discharges as well as accidental releases. Unintended releases can occur from loss of containment from handling chemicals to point of use, loss of containment during drilling, and spillages during routine operations. The BREF sets out BAT for site design as well as for operations, which includes the need for rEUord keeping, spill response, and routine inspections.

Unintended releases of hydrocarbons into the environment from failure of equipment, human error, or incidents/accidents can cause significant impact on water resources including surface waters and groundwater, however accidents are already regulated by the Seveso Directive.

The OSPAR Inventory includes rEUords of multiple accidental chemicals and oil spills (2 and 2 in 2018 respectively in the EU27), and with information on the quantity spilled as well as the composition relating to LC50/EU50, plonor list substances[125], LCPA and biodegradation. 20,566 tonnes of plonor list substances were spilled in 2018. A comparison to totals, such as those in the E-PRTR, and therefore an indication of their relative importance, compared to other Economic activities covered by the IED, is not possible. It serves, however, that inclusion within Annex I of the IED may serve to reduce the occurrence or impact of spills.

Extractive waste can contain chemical residues including nitrates, cyanides, xanthates and residues of caustic soda. Emissions of dissolved substances are also a KEI for the management of extractive waste, in the form of Acid/Neutral Rock Drainage and Saline Drainage, as well as discharge of extractive waste with high levels of salt content. These

[125] https://www.cefas.co.uk/data-and-publications/ocns/ocns-bulletin-board/new-plonor-list-issued/

issues can lead to high levels of metals and sulphates in drainage water, leading to potential impacts on acidification, bioaccumulation of metals, and subsequent impacts on ecosystems.

Soil quality or resources

The majority of impacts described for water quality and resources are also applicable to soil quality: Namely, planned and accidental releases of chemicals, chemical residues in extractive waste, unintended releases of hydrocarbons, and dissolved substances and chemical residues in extractive waste.

Waste production, generation, and recycling

The management of waste from upstream oil and gas is covered by the BREF on management of waste from the extractive industries (MEWI). Onshore activities generate waste including drill cuttings and drilling muds high in contaminants, which must be disposed of appropriately and managed to avoid accidental releases.

No means of assessing the volume or type of waste has identified, however regulation of the sector through the IED may further benefit the management of waste, through provisions such as Article 11, which requires installations are operated within the principles of the waste hierarchy, as laid out in the Waste Framework Directive (Directive 2008/98/EU).

Efficient use of resources

The hydrocarbons industry is energy-intensive, due to activities throughout drilling, hydrocarbon production and powering of utilities and auxiliary systems. Upstream hydrocarbon operations may need to use significant quantities of water and can have significant impacts on local water supply and demand.

No means of assessing the efficient use of energy or water have been identified; however, regulation of the sector through the IED may further benefit resource efficiency, with resource efficiency featuring within the Sevilla Process.

Social impacts

The inclusion of upstream oil and gas within Annex I of the IED will incur costs towards business and operators. If these costs cannot be passed on within the price of energy products, these costs will impact upon profitability and therefore upon employment. In the TSS, some Member States provided estimates of the number of employees in the upstream oil and gas sector. This showed that there are significant variations in the level of employment in this sector between Member States, with the Netherlands having by far the highest level of employment (Table 51).

Table A8-51: TSS responses on number of employees in the upstream oil and gas sector

Member State	Number of employees
France	About 300 employees
Germany	<3 400
Italy	7 000
Netherlands	16 500
Romania	2 315

Measure 44: Establish a watch mechanism to identify and include emerging activites/ sectors of concern

Description of the measure and requirements for implementation

The descriptions and impact assessment of this measure have been necessarily abbreviated compared to other IED measures, owing to its future orientated and hypothetical status at the time of compiling the impact assessment.

Objectives and implementation needs

This measure comprises the establishment of a dynamic system to identify and include emerging activities/sectors of concern ("sunrise list"), according to the significance of production and attendant (already occurring, or risk of) pollutant emissions, and the IED's potential to address these issues. This would entail, for example, enabling the Commission to identify and include new activities in the future via delegated acts.

Assessing impacts

Economic impacts

Overall this measure is likely to have **weakly negative economic impacts**, as it will lead to a greater number of activities being captured under the scope of the IED in the future, and more installations being subject to the IED's permitting requirements and governance system. It is not known which further activities may be included in the future and thus it is not possible to assess the impacts that may be incurred.

Time would be required for the European Commission and/or the EEA to maintain the sunrise list and identify activities of emerging concern.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative** for any new activities included in the future although the scale of such impacts are unclear at this stage. Operators in any new activities will have to obtain IED permits from the Competent Authorities, and submit required IED reporting data to these same Competent

Authorities as well as undergo IED controls and inspections. Some initial time would also be required to set up the appropriate data capture, calculation and reporting mechanisms.

Position of SMEs

Overall impacts on SMEs are expected to be **very limited**. Appropriate activity thresholds would need to be established for any new activities to ensure that smaller facilities (potentially including SMEs) would normally be exempt from the revised IED scope, except where the newly-included sector comprises highly polluting, energy-intensive or resource-intensive activities, in which case the intensity of the potential associated environmental impacts may require inclusion in the IED framework at relatively low activity thresholds.

Public authority impacts

Overall impacts on **public authorities** are expected to be **weakly negative**. This includes additional time for reporting of initial data as required, related to potential new activities to Member States' Competent Authorities.

The EEA and/or European Commission would incur some additional costs for maintaining the watch list/ sunrise list, and for the task of identifying and reviewing potential emerging activities. These costs have not been determined.

Once the potential need for a new activity to be included in the scope of the IED has been determined, that would require further assessment by the European Commission, eventually triggering the compilation of a BREF, the identification of BAT and the writing of BAT conclusions. As this scenario is presently hypothetical, these costs have not been determined. (In each case, these eventual costs would be at the level of the European Commission, and owing to the involvement of time and expertise of all stakeholders involved in the co-creation of BREFs in the activity-specific Technical Working Groups.)

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it will increase the coverage of activities that are covered in the scope of the IED. It will ensure that the IED activity list can be updated as and when emerging activities are identified, helping to support the objectives of wider environmental policies, as supported by the E-PRTR reporting mechanism, and associated to wider air, water and soils legislation.

Increasing the activity coverage will help to improve the environmental performance of those activities being included, as it will enable an EU-wide level playing field, and better management and comparison of installations' pollution prevention and emissions control methods, energy and resource efficiency, application of circularity methods and environmental management systems' performance management, as captured by the revised IED scope. There will be associated environmental, ecological and health benefits from the measures applied. In addition, inclusion of a new activity within the IED scope will ensure

greater engagement of citizens in environmental decision-making (as a result of access to information, and participation in permitting decisions).

Social impacts

Overall, this measure is likely to have **weakly positive social impacts**. As discussed immediately above, increasing the number of activities and installations included in the IED could potentially help to improve environmental performance of those activities newly within scope, which would have positive impacts for health. Furthermore, including new activities improves public access to information, potentially enabling greater participation in IED-related environmental decision-making.

Summary of problem area 5 measures

It is difficult to understand the relative scale of the burden that could result from expanding the scope of the IED. Industrial installations new in scope differ in size and activity significantly, covering a wide range of industrial sectors. It is, therefore, not straightforward to pick one single installation that could represent the 'typical' (or modal) implications of the change. Estimates of the administrative burden per installation for the IED scope extension measures in the preferred policy package, are based on numerous assumptions.

There are eight measures that seek to bring new sectors into the scope of the IED. These sectors are not currently regulated by the IED and, therefore, do not have baseline regulatory costs.

The Table below sets out the outputs of this analysis for comparison. The baseline costs of the 'typical' installation were included in this comparison, as no uplift has been considered or introduced for PO5 measures to account for potential interactions with Policy Options 1 through to 4.

Table A8-52: Administrative costs per installation

Type of installation	Baseline IED framework and cost components (€/year)		
	Operator	Public Authority	Total
'Typical' installation baseline (central estimate), for reference, although this excludes new permit issuance and baseline reports	*11 533 €/year*	*8 286 €/year*	*19 819 €/year*
Cattle farm	1 215 €/year	1 215 €/year	2 430 €/year
IRPP farm	1 039 €/year	1 039 €/year	2 079 €/year
Gigafactories	24 507 €/year	31 551 €/year	56 058 €/year
Forging presses, cold-rolling and wiredrawing	15 958 €/year	11 205 €/year	27 163 €/year
Textile finishing	18 369 €/year	16 944 €/year	35 313 €/year
Smitheries	15 812 €/year	10 857 €/year	26 669 €/year
Landfill	None/limited	None/Limited	None/limited
Mining and quarrying	13 621 €/year	9 451 €/year	23 072 €/year

First, bespoke analysis was employed to estimate the burden associated with cattle and IRPP farms. This was based on existing evidence, expert and stakeholder elicitation.

Secondly, for the rest of the scope extensions, the baseline assumptions outlined in Table 3 were employed. The reason for different administrative costs per installation across the sectors stems from BREF costs, which were assumed to be always the same, independent to the number of installations covered by the sector. This is unlikely to be the case. For example, costs closer to lower bound estimates of BREF costs are likely for sectors that may affect fewer installations (e.g., gigafactories).

Finally, if BREF costs are excluded, the per installation administrative costs for the scope extensions (excl. cattle farm and IRPP) would be around 15 300 €/year per installation for operators and 9 640 €/year per installation for public authorities over a period of 20 years. Costs per installation for mining and quarrying would be slightly lower based on assumptions about the ongoing baseline activity in the sector.

Table A8-53 summarises the economic, environmental and social impacts of the measures using the qualitative ratings. Table A8-54 similarly uses qualitative ratings to summarise costs and benefits for measures in problem area 5, with central estimates of administrative costs for businesses and public authorities also shown.

Table A8-53: Summary of economic, environmental and social impacts for measures in problem area 5

Policy measures	Economic impacts	Environmental impacts	Social impacts (employment focus)
#31	×××	✓✓✓✓✓✓	×
#32	×××	✓✓✓✓	×
#33	✓✓✓	O	✓
#34	×	✓	O
#35	Measure discarded in late Impact Assessment considerations		
#36	×	✓	O
#37	×	✓	O
#38	××	✓	O
#39	×	✓✓	O
#40	×	✓	O
#41	××	✓✓✓	O
#42	×	✓	×
#43	××	✓	×
#44	U	U	U

Table A8-54: Summary of costs and benefits for measures in problem area 5, with central estimates of administrative costs for businesses and public authorities shown

Policy measure	Administrative costs – businesses (€m/yr)	Administrative costs – public authorities (€m/yr)	Overall costs	Overall benefits
#31	102-401	102-401	✗✗✗✗	✓✓✓✓✓✓
#32	80-194	80-194	✗✗✗✗	✓✓✓✓✓
#33	-63-232(benefit)	-63-232 (benefit)	**O**	✓✓✓✓
#34	1.0	1.0	✗	✓
#35	Measure dicarded at a late stage in Impact Assessment evaluation			
#36	5.0	3.0	✗	✓
#37	1.0	1.0	✗	✓
#38	7.0	5.0	✗	✓
#39	0.2	0.5	✗	✓
#40	No/limited	Not estimated	✗	✓
#41	12.0	8.0	✗	✓
#42	2.0	2.0	✗	✓
#43	23	15	✗	✓
#44	No/limited	Not estimated	**U**	**U**

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PART 5/5

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the documents

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
amending

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

and

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on reporting of environmental data from industrial installations and establishing an Industrial Emissions Portal

{COM(2022) 156 final} - {SEC(2022) 169 final} - {SWD(2022) 110 final} -
{SWD(2022) 112 final}

Annex 9: Impacts of retained measures - E-PRTR Regulation

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Overview

This annex contains the impacts of each measure across specific impact categories structured by overall problem area.

All key economic, environmental, and social impacts of the policy measures across the core stakeholders – public authorities (including Member State competent authorities, the EEA and European Commission), industry (large and smaller businesses) and citizens and workers – have been identified, mapped, and screened. A rapid assessment of the expected absolute and relative magnitude of the impacts and their likelihood was carried out in line with Tool 19 of the Better Regulation Toolbox[1]. When selecting the most relevant and significant impacts, we have taken into consideration the following criteria:

- The **relevance** of the impact within the intervention logic developed for the evaluation: this assesses whether the impact is relevant to assess the direct contribution of the measures to the objectives for amending the E-PRTR Regulation.
- The expected absolute **magnitude** of the expected impacts.
- The relative size of expected **impacts for specific stakeholders:** this considers whether any of the impacts will be particularly relevant and significant for specific stakeholder groups, even if the impact overall may be small. In particular, this considers whether impacts will be concentrated on specific Member States or industry and whether it will add to the existing regulatory burden for any specific stakeholder group. Given the characteristics of the sectors involved in reporting to the E-PRTR, impacts on SMEs are not expected to be significant. However this will be further investigated and may be particularly relevant in the context of inclusion of any additional sectors e.g. cattle farms.
- The **importance for Commission's horizontal objectives and policies**: this considers whether the impact is relevant to determine any trade-offs between the objectives for amending the E-PRTR Regulation and other EU objectives and policies.

The outcome of this step is the final list of impacts that have been examined, indicating whether they are likely to be positive or negative (using the following signs: ++, +, o, -, --) and which stakeholder groups they are most likely to affect. The result of this screening is that the ten economic, environmental, and social impact categories were selected for in-depth impact assessment.

[1] European Commission. TOOL #19 Identification-screening of impacts (europa.eu)

Table A9-1: Significant impacts for in-depth assessment and those that have been screened out

Impact category	Significance	Impact on key stakeholder groups	Justification for inclusion / exclusion
Economic impacts included			
Administrative burdens on businesses	--	Industrial operators	The E-PRTR and any potential revisions have cost implications for industrial operators related to the monitoring and reporting of environmental data. They may increase for existing operators if new pollutants/parameters and/or lower reporting thresholds are adopted. However, there may also be some benefits with more advanced digital technologies and/or top-down reporting for the livestock / aquaculture sector. In addition, many of the E-PRTR administrative data (e.g. name, location) are already collected under IED reporting.
Operation / conduct of SMEs	- / O	SMEs are not a significant part of the affected sectors.	The impact is not expected to be significant as the E-PRTR activity and reporting thresholds typically exclude smaller operations. This was also confirmed as part of the IED evaluation (recognising that there is significant alignment on activities between the two instruments). However, as some of the measures may consider revising or removing reporting thresholds as well as including new activities (e.g. cattle) this impact has been retained in the assessment where relevant for specific options.
Public authorities: Change in costs to authorities for administrative, compliance and enforcement activities	-	Member State competent authorities (at local, regional and/or national levels depending on PRTR responsibilities).	Changes to the scope and focus of the E-PRTR will have impacts for Member State authorities in terms of data collection, verification, management, reporting and enforcement activities.
Public authorities: Change in costs to the Commission / EEA	-	European Commission / EEA	Changes to the scope and focus of the E-PRTR will have impacts for the EEA primarily in terms of data collection, reviews, management and website activities.
Environmental impacts included			
The climate	+	No specific group is impacted	One of the policy measures assessed considers the refinement of reporting of GHG releases to the E-PRTR. Furthermore, the potential for reporting on resource use (e.g. energy) has also been assessed. Whilst such options will not directly affect emissions of GHG and energy use, indirectly they provide an incentive to improve performance as the data will be publicly available enabling

Impact category	Significance	Impact on key stakeholder groups	Justification for inclusion / exclusion
			benchmarking across sectors / Member States.
Efficient use of resources	+	No specific group is impacted	Some of the policy measures assessed include improvements for reporting on waste data and potential for reporting on resource use. Whilst such options will not directly affect resource use, indirectly they provide an incentive to improve performance as the data will be publicly available enabling benchmarking across sectors / Member States.
Quality of natural resources / fighting pollution (water, soil, air etc.)	++	No specific group is impacted	Whilst the E-PRTR in its current form, as well as with any of the potential revisions to be assessed, does not directly cause industrial facilities to reduce pollution, indirectly it provides an incentive to improve performance as the data is / will be publicly available enabling benchmarking across sectors / Member States.
Reducing and managing waste	+	No specific group is impacted	One of the measures for assessment includes improvements for reporting on waste data. Whilst such options will not directly affect resource use, indirectly they provide an incentive to improve performance as the data will be publicly available enabling benchmarking across sectors / Member States.
Social impacts included			
Reduced health impacts due to lower pollutant emissions	+	Public	Improved public data on plant performance should provide incentive to reduce emissions and improve compliance with existing permitting requirements.
Governance, participation and good administration: Improved public access to information	++	Public	The fundamental objective of the E-PRTR is to make available to the public data on the environmental performance of industrial facilities across the EU. Any potential revisions would only improve the quality and quantity of data available.
Impacts excluded			
International environmental impacts	O	No specific group is impacted	Whilst the E-PRTR and any potential measures for assessment do not require direct reductions in releases, indirectly the data can provide an incentive for facilities to improve performance. This is true within the EU but may also provide an incentive for operators outside of the EU as they can see how European plants perform and what level of environmental protection is possible. However, the impacts on operators outside of the EU are expected to be minimal.
Functioning of the internal market and competition	O	Industrial operators	Whilst the E-PRTR and any potential revisions in scope and focus would have cost implications for industrial operators, these are expected to be minimal relative to overall operating costs and

Impact category	Significance	Impact on key stakeholder groups	Justification for inclusion / exclusion
			would therefore have very limited, if any, impacts on overall competition.
Macroeconomic environment	O	Industrial operators primarily	Whilst the E-PRTR and any potential revisions in scope and focus would have cost implications for industrial operators, these are expected to be minimal relative to overall operating costs and would therefore have very limited, if any, impacts on employment and overall profitability.
Innovation and research	+	Industrial operators, Member State authorities, monitoring equipment suppliers, EEA	Potential improvements in reporting modalities could help drive innovation in the collection, management and reporting of environmental data under the E-PRTR. However, such impacts are unlikely to be significant. Potential efficiency gains have been considered under administrative burdens.
Technological development / digital economy	+	Industrial operators, Member State authorities, monitoring equipment suppliers, EEA	Potential improvements in reporting modalities could help drive innovation in the collection, management and reporting of environmental data under the E-PRTR. However, such impacts are unlikely to be significant. Potential efficiency gains have been considered under administrative burdens.
Operating costs and conduct of business	-	Industrial operators	The E-PRTR Regulation and any potential revisions have cost implications for industrial operators related to the monitoring and reporting of environmental data. These have been shown to be low relative to overall operating costs. They have been assessed under administrative burdens hence why this specific impact is excluded.

Across each of these specific categories, a range of costs and benefits have been considered and, where possible, quantified. For E-PRTR, the most important impacts relate to administrative costs and the benefits associated with access to information (including improvements in the data being reported, greater coverage of activities, pollutants and other parameters). These have been considered relative to the baseline.

The following sections outline the analysis structured by policy option and measures within each problem area. The table below summarises how the E-PRTR policy measures correlate to the E-PRTR problem areas and overall measures.

Table A9-2: Mapping of policy options, E-PRTR problem areas and E-PRTR policy measures

Policy option	E-PRTR problem areas	E-PRTR policy measures [#measure ID]
Baseline	**1a: Current activity thresholds and definitions**	Provide guidance on aggregating 1(c) thermal power stations to align with IED aggregation rules [#12b] = **SWD Baseline**
	4b - Time lag and data flows in reporting	Incrementally improve the EEA reporting system [#51] = **SWD Baseline**
	4c - Inconsistent and incorrect reporting	Promote the use of sector-specific release factors for some activities [#53] = **SWD Baseline**
		Provide guidance on methodology for calculating releases, especially indirect releases to water [#56] = **SWD Baseline**
		Add completeness checks for the reporting of which methodology is used [#59] = **SWD Baseline**
		Add a description field for accidental releases [#60] = **SWD Baseline**
		Develop guidance on how to report M/C/E for multiple release sources [#61] = **SWD Baseline**
		Add an indication of whether the facility is registered under the EMAS Regulation [#62] = **SWD Baseline**
	5 - Access to EPRTR information	Improve promotion of availability of the E-PRTR [#65] = **SWD Baseline**
		Enhance website design and content, better links to national PRTRs [#66] = **SWD Baseline**
		Provide more guidance on how to access and use the data [#67] = **SWD Baseline**
		Case studies/fact sheets on E-PRTR uses [#68] = **SWD Baseline**
	6 - Releases from diffuse sources and releases from products	Deliver Article 8 requirements by cross-referencing to other existing data sources on diffuse releases [#69 & 71] = **SWD Baseline**
PO1 Effectiveness	**1a: Current activity thresholds and definitions**	Clarify that activity 3(b) covers upstream oil and gas facilities [#16] = **SWD E-PRTR#6**
		Reword 5(d) landfills activity description to include flaring of vent gas [#11] = **SWD E-PRTR#8**
	2a: Existing pollutants and thresholds	Reduce reporting thresholds for some existing pollutants to better meet the aim of 90% capture [#33a-x / n=24] = **SWD E-PRTR#1**
		Establish a 'sunset list' to remove pollutants that are no longer of concern [#32] = **SWD E-PRTR#5**
	4a: Reporting modalities	Add an option for top-down reporting for activity 7 (livestock production and aquaculture) [#46] = **SWD E-PRTR#9**
	4c: Inconsistent and incorrect reporting	Introduce sub-facility reporting [#45] = **SWD E-PRTR#2**
		Add active operator confirmation that releases are below the reporting threshold [#52] = **SWD E-PRTR#3**
		Mandate the M/C/E hierarchy [#58] = **SWD E-PRTR#4**
PO2 Innovation	**N/A**	No measures retained
PO3 Circular	**2b: Additional**	Establish a mechanism for dynamic updating to include

Policy option	E-PRTR problem areas	E-PRTR policy measures [#measure ID]
Economy, Resource Efficiency and Safer Chemicals	**pollutants**	additional pollutants of immediate interest [#36] and future interest (sunrise list) [#37] = **SWD E-PRTR#10**
	3: Information to track progress towards the circular economy and decarbonisation of industry	Require the reporting of energy use [#38] = **SWD E-PRTR#11**
		Require the reporting of water use [#39] = **SWD E-PRTR#12**
		Require the reporting of raw material use [#40] = **SWD E-PRTR#13**
		Reporting waste composition of waste transfers [#41] = **SWD E-PRTR#14**
		Improve tracking of waste transfers [#42] = **SWD E-PRTR#15**
		Improve tracking of waste water transfers [#43] = **SWD E-PRTR#16**
	6 - Releases from diffuse sources and releases from products	Reporting releases from products [#70] = **SWD E-PRTR#17**
PO4 Decarbonisation	**3: Information to track progress towards the circular economy and decarbonisation of industry**	Disaggregation of some currently reported GHGs (e.g. HFCs, PFCs) [#44a] = **SWD E-PRTR#18**
		Require GHG releases to be also reported as CO_2 equivalent [#44b] = **SWD E-PRTR#19**
PO5 Industrial scope	**1a: Current activity thresholds and definitions**	Revise capacity thresholds for 7(a) IRPP [#1] = **SWD E-PRTR#21**
		Revise capacity threshold for 5(d) landfills [#3] = **SWD E-PRTR#27**
		Revise capacity threshold for 2(c)(ii) smitheries [#5 – sub-options consider no calorific power threshold or a calorific power threshold of 5 MW] = **SWD E-PRTR#26**
		Revised thresholds for specific sub-sectors of activity 4 chemical industry [#6] = **SWD E-PRTR#28**
		Revise capacity threshold of 5(g) independently operated industrial waste water treatment plants to align with the IED activity description [#8] = **SWD E-PRTR#28**
		Include sub-categories for 1(b) installations for gasification and liquefaction to include coal and "other fuels" to better align with the IED sub-categories [#9] = **SWD E-PRTR#28**
		Include product sub-categories for 3(c) cement production [#10] = **SWD E-PRTR#28**
		Align activity description for 1(c) thermal power stations with IED aggregation rules [#12a] = **SWD E-PRTR#28**
		Reword 8(b) production of food and beverage products activity description to include feed products to align with the IED activity description [#72] = **SWD E-PRTR#28**
		Revise capacity thresholds for 1(c) combustion plants [2 – sub-options consider thresholds of (a) 20-50 MWth and (b) 5-50 MWth] = **SWD E-PRTR#29 and #30**
		Revise capacity thresholds for 5(f) UWWTPs [#13 – sub-options consider thresholds of 2,000, 5,000, 10,000, 20,000 and 50,000 p.e.] = **SWD E-PRTR#29 and #30**

Policy option	E-PRTR problem areas	E-PRTR policy measures [#measure ID]
	1b: Missing activities and sub-activities	Expand activity scope of mining and quarrying activities (3(a) &3(b)) to align with potential IED revision [#14] = **SWD E-PRTR#28**
		Add cattle farming [#15] = **SWD E-PRTR#20**
		Include battery production, disposal and recovery [#18] = **SWD E-PRTR#22**
		Include an additional sub-sector for cold rolling & wire drawing [#20] = **SWD E-PRTR#24**
		Inclusion of an additional 9(a) sub-sector for textile finishing [#21] = **SWD E-PRTR#25**
		Include an additional 9(d) sub-activity for ship yards / dismantling [#23] = **SWD E-PRTR#28**
		Add MgO production in kilns with a threshold of 50 t/day to 3(c) so as to align with IED activity 3.1(c) [#27] = **SWD E-PRTR#28**
		Include capture of CO_2 streams for geological storage with no threshold so as to align with IED activity 6.9 [#28] = **SWD E-PRTR#28**
		Add additional sub-categories and improved descriptions for 5(a) & 5(b) waste treatments to align with the IED activity descriptions and ensure reporters know that disposal includes incineration/co-incineration. Additionally, include recovery in the activity definition [#29] = **SWD E-PRTR#28**
		Add an additional hazardous waste sub-category for temporary storage so as to align with IED activity 5.6 temporary storage of hazardous waste [#30] = **SWD E-PRTR#28**
		Establish a dynamic mechanism to identify and include emerging activities of concern ('sunrise list' for activities) [#31] = **SWD E-PRTR#31**

Common economic impact assumptions

The main economic impacts related to policy measures for the revision of the E-PRTR Regulation relate to administrative burden i.e. data collection, reporting and Quality Assurance (plus EEA data management and website maintenance).

The EU Standard Cost Model applies to administrative costs such as reporting costs. It estimates costs of a given reporting provision as:

Administrative cost = Σ P x Q

where P (for Price) = Tariff x Time;

and where Q (for Quantity) = Number of businesses x Frequency

In relation to the reporting under the E-PRTR, the costs elements are:

- Tariff=hour salary for relevant staff

- Time=hours to perform the reporting activity
- Number of business=number of facilities that have to report
- Frequency: once per year expect for measures/options including more frequent reporting

We have assessed the reporting activities and, at the generic level, they comprise one-off costs. The one-off costs relate to adapting the data collection, calculation and reporting systems, training, instruction and similar activities that are needed to enable the annual reporting. For one-off costs, the frequency is one, otherwise the costs are estimated similar to the recurrent reporting costs.

Below we describe the assumptions and data used for the assessment. These are presented in this section to avoid repetition for each of the individual measures in later sections.

Table A9-3: General assumptions for economic impacts

Element	Value	Reference
Salary rate	40 EUR/hour[2]	Rate for professional, Eurostat data
Discount rate	4%	Better Regulation Guidelines
Lifetime of one-off activities	10 years (unless specified for a particular activity)	Expert assumption – used for annualising one-off costs.

For annualisation of one-off costs, the technical or economic lifetime of the investment typically provides the guiding value. For changes to data collection and reporting requirements, there is no simple lifetime to use as a basis for the annualisation. Changes to reporting systems will last for as long as the system is applied. If a company changes its IT system used for the reporting, it is unlikely that the costs will be significantly affected by the number of pollutants or parameters that are being reported. This would suggest that a long "life time" should be applied. On the other hand, staff turnover could mean that one-off costs should be repeated within a shorter time period. The assumption of ten years is a medium-term lifetime and intended to balance the different factors.

The specific administrative costs include the following elements:

- Business: Reporting by facilities
- Member State CAs: Data checking and QA
- EEA
  Data checking
  Publishing new data or revising webpages by EEA

The data and approach for each stakeholder type is presented below.

[2] 40 EUR/h salary rate is applied in this Annex only. For the sake of aligning the calculations of admin burden with the one-in-one-out calculator and with assumptions behind the IED burden calculations, a 29 EUR/h rate is applied in Annexes 3, 10, the main body of the SWD and its executive summary. Therefore totals provided in this annex are not matching those presented in Annexes 3, 10, the SWD and the summary.

Reporting costs for business

The changes to the reporting costs for facilities depend on the specific measure. There are the following generic types of changes:

- A facility comes under scope of the E-PRTR for the first time and has to start reporting.
- Existing facilities have to report additional pollutants.
- Existing facilities have to report new parameters.

For each of the situations, the unit costs of reporting for a facility has been estimated.

New facilities have to report

The time required for reporting for a facility that is under the E-PRTR is estimated based on the time required for the current scope of the Regulation. Review of the results from the evaluation points to around 22 hours per operator (facility) per year. Findings from the targeted stakeholder survey (TSS) suggests resource use that is slightly higher than this estimate.

There are specific data from the Netherlands that have estimated the total costs for all operators at €12m per year. As the Netherlands have about 3,400 facilities, the average annual costs per facility is in the order of €3,500. This is somewhat higher and corresponds on average to about 70 hours per facility per year.

We assume that the average for an EU facility is somewhere between the 22 and 70 hours referenced above. Hence, we apply 50 hours as representing a medium complexity facility, where complexity for a reporting facility is determined at a sector level considering factors such as likely number of activities and processes per facility, number of plants / installations, number of stacks, number of pollutants to be reported per environmental media and number of waste / waste water transfers. We have assumed that low level of complexity requires half the resources as the medium level, while high complexity is double the hours used for medium complexity reporting. The estimated hours per facility is therefore:

- Low complexity reporting: 0.5*50 hours = 25 hours
- Medium complexity reporting: 50 hours
- High complexity reporting: 2* 50 hours = 100 hours

There is limited evidence on the start-up costs for new facilities/activities. We assume that the start-up costs (one-off costs) are 3 times the annual costs.

Based on these assumptions we estimate the follow unit costs for a new facility being brought into the scope of the E-PRTR. These unit costs are applied to assess changes in activity thresholds and adding new activities, both leading to new facilities having to report.

Table A9-4: Unit costs for new facilities in €

Level of complexity	One-off costs in €	Recurrent costs in € per year	Total annual costs in €
Low	3,000	990	1,360
Medium	5,900	1,980	2,710
High	11,900	3,950	5,420

The unit costs are used to estimate the reporting costs which are administrative costs. Given that the reporting is beyond what is "normal" business operation, the administrative costs can be categorised as an administrative burden. The terms reporting costs, administrative costs and administrative burden are used to express the economic impact on business and all express the same costs.

Existing facilities have to report new pollutant/pollutant threshold changes

The above unit costs are applied to new facilities coming into scope. For additional pollutants, the reporting costs will also increase for the existing facilities that might have to report an additional pollutant. There are two categories:

- Existing activity and existing pollutant where the reporting threshold is changed
- Existing activity where a new pollutant has to be reported

When changing reporting thresholds for existing pollutants, we assume only a very marginal increase in the annual reporting costs. Existing facilities have to check whether they emit above or below the threshold so they should have the data already: the additional cost is in adding one more data point to the annual report. Hence, we assume that there are no one-off costs but only the annual burden of reporting the existing pollutant(s). We assume that this requires one additional hour of work per year.

In case of a new pollutant, the assumptions are different as the facility operator will not already be assessing releases of that pollutant for the E-PRTR. In total, there are about 100,000 data points on individual releases and transfers being reported annually[3] which means that each facility on average reports only two values. Operators will have to consider additional pollutants to those currently reported to verify whether these are below the reporting thresholds. For the majority of pollutants, this verification may be a one-off exercise and may not have to be repeated every year. Only when a facility reports for the first time, the operator may have to consider most or all pollutants. Only if the activity changes significantly (either in nature or volume), the operator may have to reconsider a longer list of pollutants. We assume that, on average, facility operators consider 10 pollutants every year for reporting. This is based on a review of the Spanish PRTR which has no reporting thresholds. Facilities report, on average, on 5 air and 5 water pollutants, so 10 in total.

It means that the annual reporting cost per pollutant is about 5 hours (50 hours in total and 10 pollutants). The pollutants that are being considered for inclusion are typically related to other legislation. It is therefore likely that facilities already monitor or calculate these

[3] Extracts from the E-PRTR database. Sum of pollution releases, pollution transfers and waste transfers.

emissions. However, it is assumed that some changes to existing data collection, calculation and reporting systems may be required initially upfront to enable annual reporting. Evidence on how much time is required for these upfront changes is very limited. It is assumed, based on expert judgement, that these one-off changes equate to 3 times the annual recurrent time and costs for reporting.

Table A9-5: **Costs for new pollutants or new thresholds for existing pollutants**

Type of change	One-off		Recurrent	
	Hours	Costs in €	Hours	Costs in € per year
Existing pollutant with new threshold	0	0	1	40
New pollutant	15	600	5	200

Cost for new parameters – water use, energy, raw materials etc. – and changes to reporting of GHGs and at activity level

The last type of change relevant for industry include the reporting of other parameters. They include use of energy, water and raw materials, as well as a set of minor changes to the reporting of waste releases and transfers and reporting at activity level.

The costs of reporting these parameters have been assessed relative to the costs of reporting pollutants covered by the current scope. Energy and water use are assumed to be similar to the current pollutants and therefore, the additional reporting costs will be equivalent to including a new pollutant. For other raw materials, their reporting is assumed to be more complex. There are multiple raw materials, potentially used across multiple processes and activities so collecting data on their use and reporting it is assumed to be more onerous than the other parameters.

The table below presents the assumptions used for the assessment.

Table A9-6: **Costs for new parameters, changes to reporting of GHGs and reporting at activity level**

Parameter	Scaling factor (relative to new pollutant estimates)	Justification
Energy use	1	Assumed to be equivalent to having to report a new pollutant - all data should already be collated and easy to report
Water use	1	
Other raw materials	5	Will vary in complexity significantly between and within different sectors depending on number of factors e.g. products, processes etc.
Waste composition	0.5	Already reporting on waste transfer - this would just add waste composition information which should be readily available.
Waste transfer tracking improvements	0.5	Already reporting on waste transfer - this would just add where transfer goes.

Parameter	Scaling factor (relative to new pollutant estimates)	Justification
Pollutant transfer (waste water) tracking improvement	0.5	Already reporting on waste transfer - this would just add where transfer goes.
Reporting GHGs like HFCs and PFCs as specific pollutants instead of as a group.	0.25	Already being reported – this would just require some additional time for reporting the data at a more disaggregated level.
Reporting GHGs like HFCs and PFCs in mass of CO_2e.	0.25	Already being reported – this would just require some additional time for reporting the data in different units.
Reporting releases/transfers and other applicable fields on an activity basis instead of aggregation to the facility level.	2	Already likely to be calculated / measured at this level but adding more complexity in terms of reporting.

Data management by Member State CAs:

The cost drivers for changes in the costs for Member State CAs are also:

- Changes in the number of reporting facilities.
- Changes to the number of pollutants being reported.

Costs incurred due to changes in the number of reporting facilities

Data from the TSS covers estimates from 12 Member States. They provide a basis for assessing the average costs. Though not all Member States are represented, the data cover both small and large Member States as well as the regions.

Based on these data, the average number of working days per facility has been calculated as 0.4 working days per installation (equivalent to about 2.8 hours per installation).[4] The resource use for CAs can be estimated using similar assumptions to those used for operators: low level of complexity implies half the number of hours than for the average facility and high level of complexity means twice the resource use. For one-off costs, it is assumed that these are three times the annual costs. These unit costs are applied to estimate the CA burden when new facilities within an existing activity start E-PRTR reporting e.g. if the activity threshold is reduced.

Table A9-7: Unit costs for CAs when new facilities within an existing activity are reporting

Level of complexity	One-off costs in €	Recurrent costs in € per year	Total annual costs in €
Low	170	60	80
Medium	330	110	150
High	660	220	300

Where a new activity is to be added – for example cattle farming – the one-off costs for CAs are expected to be higher than for an existing activity as more changes will be required to

[4] Derived applying the average number of working hours in EU of 36.2 hours per week.

existing data flows and to set up the relevant QA tools etc. Here it is assumed that the one-off costs are two times higher (Table A9-8).

Table A9-8: **Unit costs for CAs for a new activity adding new facilities**

Level of complexity	One-off costs in €	Recurrent costs in € per year	Total annual costs in €
Low	330	60	100
Medium	660	110	190
High	1,320	220	380

The change of reporting thresholds for pollutants implies that more facilities may have to report emissions and therefore additional time would be needed by CAs to check data. The inclusion of new pollutants to Annex II implies that there may be one-off costs for CAs to establish how they will check reported data for new pollutants as well as recurring annual costs for checking new pollutants.

Specific cost estimates are derived in the following way: based on the average costs for CAs per facility and upscaling to the total number of around 50,000 facilities, the total CA costs for the 27 Member States can be estimated at €5.5m per year. Currently 91 pollutants and around 100,000 data points are reported, resulting in annual costs of €60,000 per pollutant and of €55 per data point.

For the inclusion of new pollutants, the costs for CAs will depend how many facilities are likely to report emissions of the added pollutants. Also, if in one revision several new pollutants are added, the costs will not be proportional to the number of new pollutants. It is assumed that the costs of adding new pollutants will be €6,000 per pollutant per year[5]. Furthermore, for adding a new pollutant, it is assumed that there will be a one-off cost which is estimated as three times the annual costs.

Table A9-9: Unit costs for CAs for existing pollutant with new threshold and new pollutant

	One-off costs		Recurrent costs	
	Unit	Costs in €	Unit	Costs in € per year
Existing pollutant with new threshold	No one-off costs	0	Cost per facility reporting	55
New pollutant	Cost per pollutant	18,000	Cost per pollutant	6,000

Data management by EEA

The activities that the EEA performs in relation to the E-PRTR includes:

- Managing the IT systems
- Developing and maintaining the reporting tools
- QA/QC of the data reported by Member States
- Support to Member States

[5] This assumption will be subject to further validation.

- Use of data and publication.

The estimates of resources and costs are presented in the table below.[6]

Table A9-10: Unit costs for CAs for a new activity adding new facilities

Activity	Resource use in FTE	Costs in €
IT	1	100,000
Reporting tools	0.2	18,750
QA/QC	0.9	93,750
Support to MS	0.4	37,500
Use of data and publication	1.0	100,000
Total	**3.5**	**350,000**

While managing the IT systems is not affected by any of the considered measures, the other activities might be affected. The costs are defined for the same type of changes assessed for the industries and Member State CAs.

Given that the EEA does not check data from individual installations, we assume that adding facilities will not increase the EEA costs. Only if new pollutants / activities are added, will there be minor costs for adapting the database, etc. This cost is estimated at around €2,800. It is based on the costs for IT, reporting tools, support to MS and use of data.

It is assumed that the inclusion of new activities, new pollutants and new parameters may require some one-off costs. These are estimated in the following way: the resource used for all the activities are added excluding only the costs of the QA/QC process, as this is automated. The total costs of the other activities are €256,250 per year. There are 91 pollutants being reported and it is assumed that the costs of adding a new activity, pollutant or parameter will require costs in the order of €256,250 divided by 91. The assumptions for the EEA are presented in Table A9-11.

Table A9-11: Unit costs EEA

Type of change	One-off costs in €
More facilities reporting	No additional costs
Changing activity thresholds	No additional costs
Changing thresholds for pollutants	No additional costs
Adding new activity	2,816
Adding new pollutants	2,816
Adding new parameters	2,816

[6] The assessment of the EEA costs will be updated based on detailed information and data recently provided by the EEA. Data presented in the table and for individual measures in this annex are only preliminary estimates.

2 PO1: Effectiveness, information access and simplification

1.1 E-PRTR problem area 1a: Current activity thresholds and definitions

The definitions of some activities require clarification to improve reporting.

Clarify that activity 3b covers upstream oil and gas facilities [#16] = = SWD E-PRTR#6

Description of the measure

This measure would entail the addition of upstream oil and gas industries to the Annex I activity list. Whilst guidance provided by the Commission in 2011 stated that extraction of crude oil and natural gas fell under the activity of '*underground mining and related operations'* this measure would create an explicit activity definition for this activity. It would also align with the potential expansion in scope of the IED.

Economic impacts

Three specific categories of economic impacts were selected for an in-depth assessment of the policy measures for the revision of the E-PRTR Regulation. These include impacts on administrative burdens on businesses, operation / conduct of SMEs and public authorities (broken down into impacts for authorities for administrative, compliance and enforcement activities and for the European Commission / EEA). Overall, this measure is likely to have **weakly negative economic impacts** as it primarily relates to a clarification of the existing scope of the Regulation. No impacts for SMEs are expected as a result of this measure.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative**.

Around 1,300 additional facilities may be captured by this measure and required to report to the E-PRTR. This is expected to be the maximum potential number affected as some of these facilities are likely to fall below the existing reporting thresholds although exactly how many this may affect is unclear. The number of additional facilities was calculated using the number of oil and gas fields within Germany and extrapolating to the EU27 using European production of primary energy statistics[7]. While Member States have previously been advised to report facilities extracting oil under activity 3(a), analysis of the data reported to the E-PRTR shows only 121 facilities have done so (these have been removed from the extrapolated figure).

[7] EU27 production data: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Energy_production,_2008_and_2018.png DE oil/gas exploration fields in 2018:https://www.lbeg.niedersachsen.de/download/144280/Erdoel_und_Erdgas_in_der_Bundesrepublik_Deutschland_2018.pdf

Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the total additional one-off costs are expected to be around €7.8m and recurrent costs of €2.6m per year leading to **total annualised costs of around €3.6m per year** for operators.

Public authorities

Overall impacts on public authorities are expected to be **weakly negative**. This includes additional time for QA for both Member State public authorities and the EEA although this is expected to be limited as some facilities already report.

Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.3, the total additional one-off costs for **public authorities** are expected to be around €0.44m and recurrent costs of €0.15m per year leading to **total annualised costs of around €0.2m per year**.

Impacts for the **EEA** are expected to be **minimal** considering that some facilities already report data so minimal changes would be required to the data and QA flows or website.

Environmental impacts

Four specific categories of environmental impacts were selected for an in-depth assessment of the policy measures for the revision of the E-PRTR Regulation. These include impacts on the climate, efficient use of resources, quality of natural resources / fighting pollution and reducing and managing waste. Overall, this measure is likely to have **weakly positive environmental impacts** as, whilst it primarily relates to a clarification of the existing scope of the Regulation, a large number of additional facilities are expected to report.

Increasing the number of facilities reporting will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). This would primarily impact on emissions of air and water pollutants and potentially GHGs. Limited or no impacts would be expected for resource use or waste. Additional emissions of up to 100kt of NOx and 50kt of NMVOCs could potentially be captured within E-PRTR based on a rough approximation of emissions per facility[8].

Social impacts

Two specific categories of social impacts were selected for an in-depth assessment of the policy measures for the revision of the E-PRTR Regulation. These include reduced health impacts due to lower pollutant emissions and governance, participation and good administration (as a result of improved public access to information). Overall, this measure is likely to have **weakly positive social impacts** as, whilst it primarily relates to a clarification

[8] Emissions per facility based on information provided in the IED Impact Assessment

of the existing scope of the Regulation, a large number of additional facilities are expected to report.

As discussed above, increasing the number of facilities reporting could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making.

Reword 5(d) landfills activity description to include flaring of vent gas [#11] = SWD E-PRTR#8

Description of the measure

Include flaring of vent gas in the description to ensure reporters understand this should be included.

Economic impacts

Overall, this measure is likely to have **no or limited economic impacts**. Although it will lead to a greater number of facilities (estimated to be 742) having to report emissions data for the air pollutants where the reporting thresholds could be reduced, the additional costs are limited. Facilities of this activity should already be reporting to the E-PRTR, therefore only existing facilities would have to report additional releases. The number of facilities affected has been determined to be the current number of facilities reporting releases/transfers and activity 5(d) (either as main or other activity). However, it is uncertain how many may already be reporting flaring of vent gas within their estimates or may be below the relevant reporting thresholds. Therefore, this number is expected to be the maximum likely number affected (and associated impacts discussed below). No impacts for SMEs are foreseen with this measure as all facilities that may be impacted are likely to be already reporting to E-PRTR and the existing reporting and activity thresholds should ensure that SMEs are not captured.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **limited**. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, recurrent costs are estimated at around €0.15m per year and there are no one-off costs (as it existing facilities). Costs are relatively limited as all facilities that would have to report additional data should already be reporting to E-PRTR.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. The additional costs for the CAs are estimated at €56,000 as there may be a very slight increase in QA time for Member State public authorities. No additional costs are expected for the EEA.

Environmental impacts

Overall this measure is likely to have **limited or weakly positive environmental impacts** as it will increase the coverage of reported emissions data for the activity (air pollutants and greenhouse gases). Refining the activity definition should improve the level and overall completeness of data on releases available within the E-PRTR for landfills, potentially helping to improve environmental performance of the sector as it enables better comparison of performance across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). Limited or no impacts would be expected for resource use or waste.

Social impacts

Overall this measure is likely to have **limited or weakly positive social impacts** as emissions coverage for the activity will be expanded. As discussed above, improving data coverage for the activity could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available for the activity improves public access to information potentially enabling greater participation in environmental decision-making.

1.2 E-PRTR problem area 2a: Existing pollutants and thresholds

The Annex II pollutant list is out of date. Reporting thresholds require adjusting for existing pollutants or groups of pollutants to improve the capture of industrial releases as some reporting thresholds do not guarantee capture of 90% of releases from industrial facilities.

Reduce reporting thresholds for some existing pollutants to better meet the aim of 90% capture [#33a-x / n=24] = SWD E-PRTR#1

Description of the measure

11 pollutants to air and 14 to water were identified (presented below in Table A9-12), in the E-PRTR implementation review report[9], as having a threshold too high to capture 90% of releases. The threshold for these pollutants can be lowered to achieve this.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** as it will lead to a greater number of facilities having to report emissions data for the air and water pollutants where the reporting thresholds could be reduced. The pollutants where thresholds could be reduced and the likely number of facilities that could be impacted (i.e. required to report) is presented below in Table A9-12. These estimates are based primarily on the analysis undertaken as part of the E-PRTR implementation review report.

[9] https://circabc.europa.eu/w/browse/b4eacd6d-4425-479a-a225-77306de6b060

Table A9-12: Pollutants where thresholds could be reduced and number of facilities that could be affected

#	Pollutant	Description	# facilities impacted
34a	As and compounds	As and compounds releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 12 kg to achieve this.	63
34b	Cu and compounds	Cu and compounds releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 38 kg to achieve this.	121
34c	F and inorganic compounds	F and inorganic compounds releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 3942 kg to achieve this.	13
34d	NMVOC	NMVOC releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 49590 kg to achieve this.	564
34e	NH_3	NH3 releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 447 kg to achieve this.	11138
34f	Cd and compounds	Cd and compounds releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 7 kg to achieve this.	20
34g	PM_{10}	PM10 releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 17309 kg to achieve this.	330
34h	1,1,2,2-tetrachloroethane	1,1,2,2-tetrachloroethane releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 1 kg to achieve this.	265
34i	Cr and compounds	Cr and compounds releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 57 kg to achieve this.	18
34j	DEHP	DEHP releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 4 kg to achieve this.	31
34k	Vinyl Chloride	Vinyl Chloride releases to air was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 1289 kg to achieve this.	40
34l	Total Phosphorous	Total Phosphorous releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 2042 kg to achieve this.	1566
34m	Pb and compounds	Pb and compounds releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 11 kg to achieve this.	329
34n	TOC	TOC releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 41381 kg to achieve this.	1085
34o	Cu and compounds	Cu and compounds releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 48 kg to achieve this.	50

#	Pollutant	Description	# facilities impacted
34p	Total Nitrogen	Total Nitrogen releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 26233 kg to achieve this.	764
34q	Zn and compounds	Zn and compounds releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 86 kg to achieve this.	818
34r	HCH	HCH releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.7 kg to achieve this.	4
34s	Aldrin	Aldrin releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.9 kg to achieve this.	3
34t	Anthracene	Anthracene releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.4 kg to achieve this.	67
34u	Chlorpyrifos	Chlorpyrifos releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.1 kg to achieve this.	40
34v	Diuron	Diuron releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.004 kg to achieve this.	990
34w	Isoproturon	Isoproturon releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 0.1 kg to achieve this.	87
34x	Trichloroethylene	Trichloroethylene releases to water was identified as having a threshold that did not cover 90% of emissions (using Weibull analysis). The threshold for these pollutants can be lowered to 5 kg to achieve this.	18
34	**ALL**	**Total number of facilities that would have to report an additional pollutant**	**18,424**

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative**. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the total recurrent costs are expected to be around €0.7m per year. Costs are relatively limited as all facilities that would have to report with changes in reporting thresholds should already be measuring or calculating emissions of these pollutants to determine if they are above or below the existing reporting thresholds.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**. A reduction in reporting thresholds for these pollutants could result in some smaller facilities having to report although the existing activity thresholds should ensure that it is minimal.

Public authorities

Overall impacts on public authorities are expected to be between **strongly or weakly negative**. This includes additional time for QA for Member State public authorities.

Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.3, the total recurrent costs are expected to be around €1m per year for Member State public authorities. Costs are moderate as no new activities would be reporting and the pollutants are all already captured within the data flows and tools but the additional data being reported will increase costs.

Impacts for the **EEA** are expected to be **minimal** considering that these pollutants are already captured under E-PRTR so no (or limited) changes would be required to the data and QA flows or website. The only difference would be a larger volume of data to process and QA although the tools for this are automated.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it will increase the coverage of reported emissions data for a number of air and water pollutants. Reducing the reporting thresholds so that more facilities report will improve the level of data on emissions available within the E-PRTR for the specific pollutants described above (90% capture), potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). Limited or no impacts would be expected for climate (GHG emissions), resource use or waste.

Social impacts

Overall this measure is likely to have **weakly positive social impacts** as a large number of additional facilities are expected to report and emissions coverage for a number of air and water pollutants will be expanded. As discussed above, increasing the number of facilities reporting and improving data coverage for some pollutants could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available for specific pollutants improves public access to information potentially enabling greater participation in environmental decision-making.

Establish a 'Sunset list' to remove pollutants that are no longer of concern [#32] = SWD E-PRTR#5

Description of the measure

Creating a more dynamic mechanism to identify a list of pollutants for future removal due to them being longer relevant ("sunset list"). No pollutants were suggested for removal in the E-PRTR implementation review report. However, 24 substances included in the pollutant list are no longer permitted to be used in Europe and therefore could potentially be removed in the future.

Economic impacts

Overall this measure is likely to have **limited or weakly positive economic impacts** as it will remove pollutants that are no longer relevant potentially simplifying to a limited extent the review and reporting processes for operators and Member State authorities. No impacts on SMEs are expected with this measure.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **limited or weakly positive**. If the removal of these pollutants leads to a small time saving (maximum of 0.5 hours per facility) for operators each year (i.e. due to not having to consider if they are relevant for the facility) then savings of around €1m per year could be realised. In practice, it is unlikely to be this high as operators know which pollutants are relevant for their facility and therefore will not need to check each year.

Public authorities

Overall impacts on public authorities are expected to be very **limited**. This includes some potential time savings for Member State public authorities and some costs for the EEA and/or European Commission for reviewing / maintaining the sunset list.

For **Member State public authorities** the savings are likely to be very limited, perhaps a maximum of 1 hour per year per authority through not having to consider these pollutants (equating to a reduction of around €1,000 per year overall).

Impacts for the **EEA and/or European Commission** are expected to be **minimal** related to the time and costs to review, maintain and implement the sunset list with some potential limited savings through not having to include the pollutants in their data flows. Overall net time impacts are estimated to be around 5 additional man-days of effort equating to only around €2,250 per year (assuming one FTE has a cost of €100,000[10]).

Environmental impacts

Overall, this measure is likely to have **no environmental impacts** as it only involves the removal of pollutants and no change to the overall level of data reported.

Social impacts

Overall, this measure is likely to have **no social impacts** as it only involves the removal of pollutants and no change to the overall level of data reported.

[10] Taken from the E-PRTR Evaluation.

1.3 E-PRTR problem area 4a: Reporting modalities

For some categories of activity, in particular farming, reporting releases can be a significant burden on reporters due to the number of facilities and difficulties in quantifying releases accurately. Estimates using a top-down approach for some diffuse industrial sectors (where there is a large number of smaller operators such as in farming) may reduce the reporting burden and improve data quality.

Option for top-down reporting for activity 7 (livestock production and aquaculture) [#46] = SWD E-PRTR#9

Description of the measure

Allowing a top-down calculation approach for activity 7 (livestock production and aquaculture) should help to reduce administrative burdens for operators, some of which may be SMEs. This could be implemented using four methods (some of which could be combined):

- Member States reporting for the sector at a national level (mindful of the overlaps with LRTAP inventories)
- Competent Authorities using a top-down approach and reporting an average release (per head or per LSU) for every facility.
- Operators and Competent Authorities reporting livestock numbers / aquaculture capacity only (via the *productionVolume* field) and emission calculations being done by the EEA. NB - this would require a change to data ownership rules since the legal responsibility to report is with MS competent authorities (and ultimately operators). Any EEA calculations would still require MS verification, thus reducing the scope for savings in administrative burden.
- Operators reporting livestock numbers / aquaculture capacity to Competent Authorities and emission calculations being completed by the Competent Authorities. This is probably the most feasible method as livestock numbers are already reported for other purposes. However, different LRTAP emission factors are used by different countries.

Economic impacts

Overall, this measure is likely to have **strongly positive economic impacts** as it will significantly reduce the reporting burden on facilities in some sectors. There are currently 16,882 facilities captured under activity 7 (i.e. IRPP and aquaculture) based on the latest available E-PRTR data for each MS.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **strongly positive**. In order to estimate the potential impacts of the measure it was necessary to first estimate the current burden associated with reporting to the E-PRTR before then estimating

the costs associated with a top-down approach. Based on the estimated number of facilities impacted (16,882) and the cost assumptions described in Section 1.2, the current annualised costs are estimated to be around €22.8m per year. Assuming that operators would still need to report some limited information each year (e.g. on activity levels to enable a top-down calculation) then these costs would fall to around €3.4m per year, a saving of around €19.5m (overall reduction of 85%). A similar saving (%) would be anticipated if top-down reporting were to be applied to other activities, e.g. if cattle were to be included within E-PRTR. In addition, many of the E-PRTR administrative data (e.g. name, location) are already collected under IED reporting.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **weakly positive**. Whilst the activity and reporting thresholds help to ensure that most SMEs are not captured under the E-PRTR Regulation or required to report, some may still be captured within activity 7 and would benefit from a top-down reporting approach.

Public authorities

Overall impacts on public authorities are expected to be **limited**. There would be some additional burden to undertake the top-down estimation but also savings through not having to QA release data for individual facilities. Overall these would be likely to cancel each other out with no net increase or decrease in burden.

Environmental impacts

Overall, this measure is likely to have **limited or no environmental impacts** as it only impacts on the calculation and reporting mechanism rather than the overall level of data reported.

Social impacts

Overall, this measure is likely to have **no social impacts** as it only impacts on the calculation and reporting mechanism rather than the overall level of data reported.

1.4 E-PRTR problem area 4c: Inconsistent and incorrect reporting

There are inconsistencies and potential issues with the reported E-PRTR data resulting in poor accuracy, incomplete and in-transparent data, including:

- Inconsistent pollutant reporting and quantification methods used by facilities in the same sector.
- A lack of clarity on whether data is absent due to incomplete reporting or non-applicability or below threshold for a particular facility.
- Poor administrative information on location, methodology used and tagging of release or transfer.

Sub-facility reporting [#45] = SWD E-PRTR#2

Description of the measure

This measure would entail reporting releases/transfers on an activity basis instead of aggregating to the facility level. The benefits of reporting at this level would be greater granularity of data enabling better matching to individual activities, e.g. for assessing impacts of different BAT conclusions for specific sectors.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** as the measure would entail some additional effort by operators and Member State competent authorities to report and check data at this granularity. However, these are expected to be limited as it is likely releases are already measured, calculated or estimated at this level. No impacts on operation / conduct of SMEs are anticipated as existing activity and reporting thresholds would still apply.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative.** Only facilities reporting waste transfers, pollutant transfers and pollutant releases (latest year) that also have at least one additional activity to the main activity are likely to be impacted by this measure. Based on the estimated number of facilities impacted (1,025) and the cost assumptions described in Section 1.2, the additional recurrent costs are estimated to be around €81,000 per year.

Public authorities

Overall impacts on public authorities are expected to be **weakly negative** as some additional QA would be required due to an increase in the level of data being reported. Based on the estimated number of facilities impacted (1,025) and the cost assumptions described in Section 1.2, the additional recurrent costs are estimated to be around €114,000 per year.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it will increase the granularity of reported data for a number of facilities. This enables better matching of data to individual activities e.g. for assessing impacts of different BAT conclusions for specific sectors. This could potentially help to improve environmental performance of some activities as it enables better comparison of performance of activities across the EU (including relative to BAT conclusions) as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall this measure is likely to have **weakly positive social impacts.** As discussed above, increasing the granularity of data for some facilities could potentially help to improve environmental performance of some sectors which would have positive impacts for health. Furthermore, increasing the granularity of data available improves public access to information potentially enabling greater participation in environmental decision-making.

Add active operator confirmation that releases are below the reporting threshold [#52] = SWD E-PRTR#3

Description of the measure

Require affirmation that expected pollutants for a sector are below the reporting threshold or not present at all and avoid the ambiguity of missing values. This would improve the overall clarity and quality of the data within the register.

Economic impacts

Overall, this measure is likely to have **limited or weakly negative economic impacts** as the measure would entail some additional effort by operators to report. However, these are expected to be limited as operators should already be checking if their releases of pollutants are above or below the reporting thresholds.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative.** As described above, operators should already be checking if they are above or below reporting thresholds for each pollutant thus the only additional burden would be to specify this within their annual reporting.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **limited**. Some SMEs may be required to confirm that releases are below the reporting threshold although how many this may affect is uncertain (the existing activity thresholds typically exclude the majority of SMEs within individual sectors.

Public authorities

No impacts on public authorities are expected.

Environmental impacts

Overall, this measure is likely to have **limited environmental impacts** as it will increase the overall clarity and quality of data available. This enables better use of the data for e.g. assessment of performance of different facilities and/or sectors. This could potentially help to

improve environmental performance of some activities as it enables better comparison of performance of activities across the EU (including relative to BAT conclusions) as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall, this measure is likely to have **limited social impacts.** As discussed above, increasing the granularity of data for some facilities could potentially help to improve environmental performance of some sectors which would have positive impacts for health. Furthermore, increasing the granularity of data available improves public access to information potentially enabling greater participation in environmental decision-making.

Mandate the M/C/E hierarchy [#58] = SWD E-PRTR#4

Description of the measure

Mandate the MCE hierarchy for reporting releases, e.g. releases should be measured where possible and calculation should take precedent over estimation.

Economic impacts

Overall, this measure is likely to have **limited or weakly negative economic impacts** as the measure would entail some additional effort for those operators that may not already be measuring or calculating their releases for reporting to E-PRTR. However, the overall impacts of the measure are highly uncertain. No impacts on the operation / conduct of SMEs are anticipated.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative.** As described above, it would only impact on those operators that may not already be measuring or calculating their releases. It is uncertain how many facilities this may impact.

Public authorities

No impacts on public authorities are expected.

Environmental impacts

Overall, this measure is likely to have **limited environmental impacts** as it will increase the overall quality of data available. This enables better use of the data for e.g. assessment of performance of different facilities and/or sectors. This could potentially help to improve environmental performance of some activities as it enables better comparison of performance of activities across the EU (including relative to BAT conclusions) as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall, this measure is likely to have **limited social impacts.** As discussed above, increasing the quality of data for some facilities could potentially help to improve environmental performance of some sectors which would have positive impacts for health. Furthermore, increasing the granularity of data available improves public access to information potentially enabling greater participation in environmental decision-making.

3 PO2: Innovation

All measures of relevance to PO2 Innovation were screened out.

4 PO3: Circular Economy, Resource Efficiency and Safer Chemicals

1.1 E-PRTR problem area 2b: Additional pollutants

Recent analysis of science and emerging environmental and health issues (including media specific policies and legislation) have identified new pollutants of concern emitted by industrial activities that are not in the E-PRTR Annex II list. It is important that industry reports on these pollutants and the pollutants are assigned appropriate reporting thresholds.

Establish a mechanism for dynamic updating to include additional pollutants of immediate interest [#36] and future interest (sunrise list [#37]) = SWD E-PRTR#10

Description of the measure

This measure would entail the inclusion of a more dynamic mechanism to identify and include emerging pollutants of concern ("sunrise list") within the Regulation e.g. enabling the Commission to identify and include new pollutants in the future via delegated acts. This could include pollutants that have the potential to become important for environmental issues in Europe. This would be similar to the WFD watch-list process. An additional 48 pollutants of immediate interest have already been identified as part of the E-PRTR analysis report and suggested by the Water Framework Directive as priority (hazardous) substances.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts** as it will lead to a greater number of facilities having to report emissions data for the air and water pollutants that would be added now or in the future. The pollutants which could be added now and the likely number of facilities that could be impacted (i.e. required to report) is presented below in Table A9-13. These estimates are based on a range of sources, as described in the description field for each case.

Table A9-13: Pollutants which could be added to Annex II pollutant list now and number of facilities that could be affected

#	Pollutant	Description	# facilities impacted
36a	2-Ethoxyethanol / ethylene glycol monoethyl ether	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	3
36b	Acetaldehyde	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR	369

#	Pollutant	Description	# facilities impacted
		only sectors within scope of the E-PRTR, were included in the analysis.	
36c	Aclonifen	This pollutant is a herbicide and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36d	Acrolein	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	75
36e	Acrylamide	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	11
36f	Acrylic acid and its water-soluble salts	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	44
36g	Acrylonitrile	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	23
36h	Antimony and compounds (as Sb)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	73
36i	Beryllium and compounds (as Be)	Analysis of the NRW PRTR shows releases of beryllium are mainly from sectors 5(b) and 2(e). The number of facilities that would be reporting releases of beryllium has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	355
36j	Bifenox	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36k	Bisphenol-A	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	69
36l	Carbamazepine	This is a pharmaceutical and therefore the most likely potential source is UWWTP. The number of facilities reporting this pollutant was therefore determined to be UWWTP reporting releases and transfers. Only the UWWTP reporting releases/transfers have been included as it was assumed only those reporting other releases would also reported releases of this.	892

#	Pollutant	Description	# facilities impacted
36m	Black carbon (BC)	The sectors identified as most important to black carbon emissions were determined to be: 1(a)-(f), 2(a)-(e), 3(g), 5(b), 6(a), 9(d). The number of facilities that would be reporting releases of black carbon has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	2,410
36n	Carbon disulphide	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	129
36o	Chromium (VI) compounds (as Cr)	Analysis of the BREFs identified the following sectors as most applicable to emissions of chromium (VI): 2(e), 5(a), 3(e), 3(f), 6(c), 9(c), 5(g), 9(a), 2(c)(i), 2(c)(iii), 2(f), 3(g), 2(f), 4(b). The number of facilities that would be reporting releases of Cr(VI) has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	1,248
36p	Cobalt and compounds (as Co)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	124
36q	Cybutryne	The sectors identified as most applicable to this pollutant were determined to be: 4(d) & 9(e). The number of facilities that would be reporting releases of Cr(VI) has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors. Source: https://chemicalwatch.com/65602/un-agency-considering-international-ban-on-antifouling-cybutryne	28
36r	Cypermethrin	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36s	Dichlorvos	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36t	Dicofol	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36v	Formaldehyde (formalin)	Analysis of the NRW PRTR identified the sectors most applicable to formaldehyde releases as: 1(c), 3(e), 3(f), 4(a)(ii), 6(b). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the	1,652

#	Pollutant	Description	# facilities impacted
		current reporting flow from these sectors.	
36w	Glyphosate	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36x	Hexabromocyclododecane (HBCDD)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	1
36y	Hydrogen sulphide	Analysis of the NRW PRTR shows the sectors most applicable to releases of H2S are: 1(d), 3(f), 2(e). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	239
36z	Macrolide antibiotics (azithromycin, clarithroymycin, erythromycin)	These are pharmaceuticals and therefore the most likely potential source is UWWTP. The number of facilities reporting this pollutant was therefore determined to be UWWTP reporting releases and transfers. Only the UWWTP reporting releases/transfers have been included as it was assumed only those reporting other releases would also reported releases of this.	892
36aa	Manganese and compounds (as Mn)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	892
36ac	n-Hexane	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	480
36ad	Neonicotinoids (Imidacloprid, Thiacloprid, Thiamethoxam, Acetamiprid, Clothianidin)	These pollutants are active substances in plant health products and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36af	Nicosulfuron (herbicide)	This pollutant is an active substance in plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20

#	Pollutant	Description	# facilities impacted
36ag	Per- and Polyfluoroalkyl Substances (PFAS) all PFAS as a group, or	The only sector found to be applicable for this pollutant is activity 9(a) due to its inclusion in the textile (TXT) BREF. The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from this sector.	68
36ah	Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds	The only sector found to be applicable for this pollutant is activity 9(a) due to its inclusion in the textile (TXT) BREF. The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from this sector.	68
36ai	Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)	The only sector found to be applicable for this pollutant is activity 9(a) due to its inclusion in the textile (TXT) BREF. The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from this sector.	68
36aj	Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds	The only sector found to be applicable for this pollutant is activity 9(a) due to its inclusion in the textile (TXT) BREF. The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from this sector.	68
36ak	PM2.5	It was assumed that facilities reporting PM10 would also report PM2.5 and therefore the number of facilities reporting PM10 was used as a proxy for the number of facilities anticipated to report PM2.5.	338
36al	Polychlorinated naphthalenes	The sectors identified as applicable for releases of this pollutant are: 1(c), 5(b), 2(a), 2(b), 2(e), 4(a). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	1,609
36am	Pyrethroids (Bifenthrin, Deltamethrin, Esfenvalerate, Permethrin)	This pollutant is a plant health product and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36an	Quinoxyfen	This pollutant is an active substance in plant health products and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included	20

#	Pollutant	Description	# facilities impacted
		as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	
36ao	Selenium and compounds (as Se)	Analysis of BREFs identified the sectors most relevant for this pollutant as: 3(e), 3(f) and 3(g). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	298
36aq	Silver (biocide)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	62
36ar	Sulfamethoxazole	This is a pharmaceutical and therefore the most likely potential source is UWWTP. The number of facilities reporting this pollutant was therefore determined to be UWWTP reporting releases and transfers. Only the UWWTP reporting releases/transfers have been included as it was assumed only those reporting other releases would also report releases of this.	892
36as	Sulphates	1(c), 3(e), 5(a), 5(b), 5(c), 4(b)(iv), 4(b)(v) identified as the relevant sectors from BREFs. This is the number of facilities reporting emissions to the current reporting flow from these sectors.	2,138
36at	Terbutryn	This pollutant is an active substance in plant health products and therefore it was assumed only facilities under activity 4(d) could potentially release this pollutant. The number of facilities reporting these releases was therefore determined using facilities currently reporting releases/transfers. Only those reporting releases/transfers were included as it was assumed if they weren't reporting any other releases/transfers it was unlikely to be reporting releases/transfers of this pollutant.	20
36au	Thallium and compounds (as Tl)	Numbers of additional facilities and existing facilities reporting additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	12
36av	Tin and tin compounds (as Sn)	Analysis of BREFs identified the sectors most relevant for this pollutant as sectors: 3(e), 3(f), 2(c)(i), 2(c)(iii), 2(f), 3(g). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	599
36ax	Total suspended solids (TSS)	Analysis of BREFs identified the sectors most applicable to this pollutant as: 1(c), 1(a), 3(e), 4(a), 5(a), 5(b), 5(c), 6(a), 6(b), 6(c), 6(a), 6(b), 6(c), 8(a), 9(c), 5(g), 2(c)(i), 2(c)(iii), 2(f), 8(b)(i), 2(c)(ii), 2(d), 2(e)(ii), 4(b)(iv), 4(b)(v). The number of facilities that would be reporting releases of this pollutant has therefore been calculated to be the number of facilities reporting releases to the current reporting flow from these sectors.	3,419
36ay	Triclosan	This is a biocide used in consumer products and therefore the most likely potential source is UWWTP. The number of facilities reporting this pollutant was therefore determined to be UWWTP reporting releases and transfers. Only the UWWTP reporting releases/transfers have been included as it was assumed only those reporting other releases would also reported releases of this.	892
36az	Vanadium	Numbers of additional facilities and existing facilities reporting	285

#	Pollutant	Description	# facilities impacted
	and compounds (as V)	additional releases was determined using TRI data and extrapolated to EU27. While the TRI data includes additional sectors to the E-PRTR only sectors within scope of the E-PRTR, were included in the analysis.	
36aaa	17-beta-Estradiol (E2); 17-alpha-Ethinylestradiol (EE2); Estrone (E1)	These substances are in consumer products and therefore the most likely potential source is UWWTP. The number of facilities reporting this pollutant was therefore determined to be UWWTP reporting releases and transfers. Only the UWWTP reporting releases/transfers have been included as it was assumed only those reporting other releases would also reported releases of this.	892
36	**ALL**	**Total number of facilities that would have to report one or more new pollutant (Note 1)**	**21,937**
Note 1: In reality, the total number of facilities that would be impacted by the inclusion of the pollutants listed in the table would be far less as some facilities and sectors would be impacted more than others i.e. have to report more than one additional pollutant. However, the likely changes in burden would be similar overall as costs have been estimated based on unit costs/burden per additional pollutant that a facility has to report.			

In addition to additional data collection and reporting for operators, there would also be time required for the European Commission and/or EEA to maintain the sunrise list and identify pollutants of emerging concern.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative**. Operators will have to check whether their facilities are likely to release any of the pollutants and, If so, measure, calculate and/or estimate releases to see whether they are above or below the reporting thresholds (to be specified). If they are above the threshold then the data would need to be reported. Some initial time would be required to set up the appropriate data capture, calculation and reporting mechanisms up front. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the one-off costs are estimated to be €13.2m and recurrent costs are expected to be around €4.4m per year. Total annualised costs are €6.0m per year. Additional costs would be incurred by operators in the future if the sunrise list were to lead to the inclusion of additional pollutants.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**. The existing activity thresholds already help to exclude smaller facilities where there may be SMEs. Appropriate reporting thresholds would also need to be established for any new pollutants to ensure that smaller facilities (potentially including SMEs) would not be required to report.

Public authorities

Overall impacts on **public authorities** are expected to be **weakly negative**. This includes additional time for QA for both Member State public authorities and the EEA as well as some

initial upfront time to amend the existing data flow and QA systems to incorporate new pollutants.

Based on the estimated number of facilities impacted by the new pollutants to be included and the cost assumptions described in Section 1.3, the one-off costs are expected to be around €0.9m and total recurrent costs around €0.3m per year for **Member State public authorities**. Total annualised costs are around €04m per year.

Impacts for the **EEA** are expected to be **limited** and primarily relate to some initial upfront time to update the data and QA flows and website to accommodate the new pollutants. These costs are estimated to be around €135,000 (annualised costs of around €17,000 per year). The EEA and/or European Commission would also incur some additional costs for maintaining the sunrise list and identifying and reviewing potential emerging pollutants. This is assumed to cost around €15,000 per year (assuming consultants are used to assess specific pollutants) with a further 30 person days every 5 years to develop and agree a proposal for new pollutant(s) (equating to annualised costs of around €2,600 per year).

Environmental impacts

Overall this measure is likely to have **weakly positive environmental impacts** as it will increase the coverage of air and water pollutants that are reported to the E-PRTR. It will also ensure that the E-PRTR pollutant list can be updated as and when emerging pollutants are identified helping to support the objectives of wider environmental policies such as IED, WFD, UWWTD etc.

Increasing the pollutant coverage will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). Limited or no impacts would be expected for resource use or waste.

Economic costs for operators would partly be offset by synergies and avoided costs related to monitoring efforts for surface water pollutants under EU water legislation and reduced need for reporting the same data under various instruments, as well as promotion of digital solutions. Significant benefits would also accrue via better aligning the E-PRTR with up-to-date information needs, thus better supporting associated policies such as the EU water legislation.

Social impacts

Overall this measure is likely to have **weakly positive social impacts** as a large number of additional facilities are expected to report on these new pollutants and emissions coverage within E-PRTR will be expanded. As discussed above, increasing the number of pollutants reported could potentially help to improve environmental performance of those sectors impacted which would have positive impacts for health. Furthermore, including new

pollutants improves public access to information potentially enabling greater participation in environmental decision-making.

1.2 E-PRTR problem area 3: Information to track progress towards the circular economy and decarbonisation of industry

The European Green Deal commits the Commission to revise EU measures to address industrial pollution to make them more consistent with climate, energy and circular economy policies. This will contribute towards the zero-pollution agenda. The Green Deal commits, inter alia:

- Adopting an action plan towards a zero-pollution ambition.
- Revising EU measures to address pollution from large industrial plants, including both the IED and the E-PRTR.
- The E-PRTR, in combination with related legislation such as the IED, has untapped potential for contributing to the EU's circular economy objectives by providing transparency on industrial performance:

- There is a benefit in the reporting of additional data on resource consumption, e.g. use of energy, water, raw materials. This also has linkages with options under consideration in the IED revision, e.g. mandatory application of BAT-AEPLs related to resource consumption.
- There is also no transparency around the transfer of pollutants in the data reported to the E-PRTR. The E-PRTR needs proper tracking of pollutants in transfers and their storage, export or final release (particularly waste and waste water).

Additionally, the European Union has committed to reach net GHG emissions of 55% of 1990 levels by 2030. The E-PRTR offers a mechanism to efficiently track progress with the reduction of GHG emissions from a range of GHG intensive activities. Coherence between E-PRTR and EU-ETS reporting is needed to provide stakeholders with sufficiently transparent information for decision-making. Although the verified emissions under EU ETS are publicly available, any underlying background information on activity levels is not. Such information forms part of the confidential verification reports and is not available for public scrutiny. With suitable provisions, the E-PRTR could provide relevant background data for benchmarking and assessing industrial environmental performance within and across sectors.

Require the reporting of energy use [#38] = SWD E-PRTR#11

Description of the measure

This measure would require operators to report energy use of their facilities. This would allow the assessment of energy efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR. A reporting threshold could be developed to exclude smaller facilities from having to report.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** The number of facilities that would be required to report this additional data has been assumed to be the number of facilities reporting releases or transfers in the latest year, which is 28,268.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **weakly negative**. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the total one-off costs are expected to be around €17m and the recurrent costs are expected to be around €5.6m per year, giving overall annualised costs of around €7.7m. Costs are relatively limited as all facilities are likely to have this information readily available.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**. All facilities, including SMEs, are likely to have this information readily available and the existing reporting and activity thresholds help to exclude most SMEs from reporting.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. Whilst there may be a very slight increase in QA time for both Member State public authorities and the EEA, it is expected to be very limited and less than €10,000 per year in total (annualised costs).

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable benchmarking of the environmental performance of different industrial activities and facilities, more precisely allowing the assessment of energy efficiency. It may facilitate authorities in assessing progress against Sustainable Development Goals, EU Green Deal and circular economy goals and in identifying activities for further action. It may also improve corporate accountability on environmental management and ultimately result in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

Require the reporting of water use [#39] = SWD E-PRTR#12

Description of the measure

Require the reporting of water use to allow for better assessment of the impacts of industry on the environment beyond pollution. This would allow the assessment of water use efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR. A reporting threshold could be developed to exclude smaller facilities from having to report.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** The number of facilities that would be required to report this additional data has been assumed to be the number of facilities reporting releases or transfers in the latest year, which is 28,268.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **weakly negative**. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the total one-off costs are expected to be around €17m and the recurrent costs are expected to be around €5.6m per year, giving overall annualised costs of around €7.7m. Costs are relatively limited as all facilities are likely to have this information readily available.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**. All facilities, including SMEs, are likely to have this information readily available and the existing activity thresholds help to exclude most SMEs from reporting.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. Whilst there may be a very slight increase in QA time for both Member State public authorities and the EEA, it is expected to be very limited and less than €10,000 per year in total (annualised costs).

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable benchmarking of the environmental performance of different industrial activities and facilities, more precisely allowing the assessment of water consumption. It may facilitate authorities in assessing the progress against Sustainable Development Goals, EU Green Deal and circular economy goals and in identifying activities for further action. It may also improve corporate accountability on environmental management and ultimately result in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

Require the reporting of raw material use [#40] = SWD E-PRTR#13

Description of the measure

Require the reporting of raw material use to be better able to assess energy and carbon efficiencies. This would allow the assessment of resource efficiency and benchmarking of facilities across the EU (within a sector), particularly when combined with production volume data which will soon be required under E-PRTR. A reporting threshold could be developed to exclude smaller facilities from having to report.

Economic impacts

Overall, this measure is likely to have **strongly negative economic impacts.** The number of facilities that would be required to report this additional data has been assumed to be the number of facilities reporting releases or transfers in the latest year, which is 28,268.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **strongly negative**. Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the total one-off costs are expected to be around €84.8m and the recurrent costs are expected to be around €28.3m per year, giving overall annualised costs of around €38.7m. Costs are higher than collecting and reporting for other contextual information as the gathering of data about raw material use will depend on a number of factors such as types of products and processes, presence of multiple installations, etc. The complexity will vary significantly between and within sectors.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **limited**, as the complexity (in terms of types of products and processes, installations, etc.) of the facilities that may have to report is likely to be lower than for large companies. Furthermore, the existing activity thresholds help to exclude most SMEs from reporting.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**[11]. Whilst there may be a slight increase in QA time for both Member State public authorities and the EEA, it is expected to be limited, although higher than for other contextual information. The estimated one-off costs for competent authorities are in the order of €0.09m and the recurrent costs are expected to be around €0.03m, giving overall annualised costs of around €0.04m. Costs for the EEA are expected to be limited.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable benchmarking of the environmental performance of different industrial activities and facilities. It may facilitate authorities in assessing the progress against Sustainable Development Goals, EU Green Deal and circular economy goals and in identifying activities for further action. It may also improve corporate accountability on environmental management and ultimately result in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

Reporting waste composition of waste transfers [#41] = SWD E-PRTR#14

Description of the measure

Require reporting of the composition of waste transfers using the Waste Framework Directive waste codes (EWC waste code).

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** It is expected that around 21,455 facilities will be impacted by this measure, i.e. all facilities in the industrial reporting database currently reporting waste transfers.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **limited.** Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the recurrent costs are expected to be around €0.4m per year.

[11] This assessment is uncertain and will be further validated. It is likely that there could be higher costs for Member State CAs in checking the reported data.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **limited**.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. Whilst there may be a slight increase in QA time for both Member State public authorities and the EEA, it is expected to be limited. The estimated recurrent costs are expected to be around €0.6m. Costs for the EEA are expected to be very limited.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable a better understanding of waste flows. It may facilitate authorities in assessing the progress against Sustainable Development Goals, EU Green Deal and circular economy goals. It may also improve corporate accountability on environmental management and waste management more in general, ultimately resulting in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

Improve tracking of waste transfers [#42] = SWD E-PRTR#15

Description of the measure

Require the reporting of waste receivers for all waste transfers, not just transboundary hazardous waste transfers.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** It is expected that around 21,398 facilities will be impacted by this measure, i.e. all facilities in the industrial reporting database currently reporting non-transboundary transfers.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **weakly negative.** Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the recurrent costs are expected to be around €0.4m per year.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **limited**.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. Whilst there may be a slight increase in QA time for both Member State public authorities and the EEA, it is expected to be limited. The estimated recurrent costs are expected to be around €0.6m. Costs for the EEA are expected to be very limited.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable a better understanding of waste flows. It may facilitate authorities in assessing the progress against Sustainable Development Goals, EU Green Deal and circular economy goals. It may also improve corporate accountability on environmental management and waste management more in general, ultimately resulting in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

Improve tracking of waste water transfers [#43] = SWD E-PRTR#16

Description of the measure

Require the reporting of the receivers of waste water transfers (as currently done for transboundary hazardous waste transfers).

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** It is expected that around 1,496 facilities will be impacted by this measure, i.e. all facilities in the industrial reporting database currently reporting waste water transfers.

Administrative burdens on businesses

Overall impacts on administrative burdens on businesses are expected to be **weakly negative.** Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.2, the recurrent costs are expected to be negligible (around €0.03m per year) as operators should have this information available already.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**.

Public authorities

Overall impacts on **public authorities and the EEA** are expected to be **limited**. Whilst there may be a slight increase in QA time for both Member State public authorities and the EEA, it is expected to be very limited. The estimated recurrent costs for both public authorities and the EEA are expected to be negligible.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may enable a better understanding of waste water flows and reduce potential double-counting. It may facilitate authorities in assessing the progress against Sustainable Development Goals, EU Green Deal and circular economy goals. It may also improve corporate accountability on environmental management and waste management more in general, ultimately resulting in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

1.3 E-PRTR problem area 6: Releases from diffuse sources and releases from products

Many new and emerging products contain pollutants that are released once these products have left the factory and are then used or disposed of. The Aarhus Convention also includes that releases from diffuse sources such as transport and residential combustion should be incorporated.

Reporting releases from products [#70] = SWD E-PRTR#17

Description of the measure

Make use of other reporting streams, such as for the NECD and WISE, and/or carry out a specific Commission study for the calculation of releases from products during consumer use, as advocated in Article 5(9) of the Aarhus Convention. This exercise could be required every few years.

Economic impacts

Overall, this measure is likely to have **no or limited impacts.** The burden falls on the Commission and/or EEA, who would have to calculate releases using available data or outsource the calculations to an external contractor.

Administrative burdens on businesses

The measure would not have any impact on businesses.

Operation / conduct of SMEs

No impacts on SMEs.

Public authorities

Overall impacts on **the Commission** are expected to be **limited**. Costs have not been assessed but would mainly derive from the Commission initiating a dedicated study to quantify product releases.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it may complement environmental footprint information relating to industrial activities' outputs (products). It may facilitate authorities in assessing the progress against EU Green Deal and circular economy goals. It may also improve corporate accountability on environmental management and waste management, ultimately resulting in an improvement in environmental performance.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as it will improve transparency and access to environmental information enabling effective public participation in environmental decision-making. As the measure could lead to an improvement in the environmental performance of facilities and of the industrial activities overall, it may also have positive impacts for health.

5 PO4: Decarbonisation

5.1 E-PRTR problem area 3: Information to track progress towards the circular economy and decarbonisation of industry

Currently, operators have to report releases of HFCs and PFCs as groups but reporting releases of individual compounds of these groups would provide better information, as the global warming potential varies greatly between compounds. The quality and completeness of information could also be improved by requiring GHG releases to be also reported as CO_2 equivalent.

Disaggregation of some currently reported GHGs (e.g. HFCs, PFCs) [#44a] = SWD E-PRTR#18

Description of the measure

This measure would require the reporting of GHGs like HFCs and PFCs as specific, individual pollutants instead of as a group.

Economic impacts

Overall, this measure is likely to have **limited economic impacts** as it would only result in a slight increase in the level of information that would be required to be reported which should be available to operators already. No impacts for SMEs are expected as a result of this measure.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **limited**. This measure has been assumed to only impact facilities currently reporting HFCs and PFCs. Based on the estimated number of facilities impacted (326) and the cost assumptions described in Section 1.2, the additional recurrent costs are expected to be around €3,200 per year for operators. This is based on the assumption that the data is already available to operators so just requires a small amount of additional time to report the data disaggregated.

Public authorities

Overall impacts on public authorities are expected to be **limited**. This includes some very limited additional time for QA for both Member State public authorities and the EEA although this is expected to be minimal as the data is already reported but at an aggregated level.

Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.3, the total additional recurrent costs for **public authorities** are expected to be around €4,500 per year.

Impacts for the **EEA** are expected to be **minimal** considering that the data is already reported but at a more aggregated level so minimal changes would be required to the data and QA flows or website.

Environmental impacts

Overall, this measure is likely to have **limited environmental impacts** as it only provides similar data but in a more disaggregated format. Reporting GHG data disaggregated by pollutant should indirectly support better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). However, such a change would only affect a small number of facilities so the additional data provided would be limited.

Social impacts

Overall this measure is likely to have **limited social impacts** for the same reasons as discussed above under environmental impacts.

Require GHG releases to be also reported as CO_2 equivalent [#44b] = SWD E-PRTR#19

Description of the measure

This measure would require the reporting of GHGs like HFCs and PFCs in mass of CO_2e.

Economic impacts

Overall, this measure is likely to have **limited economic impacts** as it would only result in a slight increase in the steps that operators would have to take to be able to report data to the E-PRTR i.e. after measuring, calculating or estimating GHG releases, operators would have to estimate CO_2e using relevant factors before reporting. No impacts for SMEs are expected as a result of this measure.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **limited**. This measure has been assumed to only impact facilities currently reporting HFCs and PFCs and to a limited extent. Based on the estimated number of facilities impacted (326) and the cost assumptions described in Section 1.2, the additional recurrent costs are expected to be around €3,200 per year for operators. This is based on the assumption that the data is already available to operators so just requires a small amount of additional time to apply CO_2e factors.

Public authorities

Overall impacts on public authorities are expected to be **limited**. This includes some very limited additional time for QA for both Member State public authorities and the EEA

although this is expected to be minimal as the data is already reported but at an aggregated level.

Based on the estimated number of facilities impacted and the cost assumptions described in Section 1.3, the total additional recurrent costs for **public authorities** are expected to be around €4,500 per year.

Impacts for the **EEA** are expected to be **minimal** considering that the data is already reported but in different units so minimal changes would be required to the data and QA flows or website.

Environmental impacts

Overall, this measure is likely to have **limited environmental impacts** as it only provides similar data but in a different, more comparable format. Reporting GHG data in CO_2e should indirectly support better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). However, such a change would only affect a small number of facilities so the additional data provided would be limited.

Social impacts

Overall this measure is likely to have **limited social impacts** for the same reasons as discussed above under environmental impacts.

6 PO5: Industrial scope

1.1 E-PRTR problem area 1a: Current activity thresholds and definitions

There is a lack of completeness in the reporting under identified activities in the E-PRTR. The E-PRTR is not capturing the targeted percentage (90%) of releases from industrial activities currently defined in the reporting requirements. The original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. In addition, the definitions and thresholds of some activities are inconsistent with the IED and other legislation such as the MCPD and UWWTD. Industrial activities operating in Europe have evolved since the E-PRTR came into force and therefore the thresholds for the activity list in Annex I needs to be reviewed and updated to ensure 90% data capture today. The reporting thresholds do not guarantee capture of 90% of releases and transfers from industrial facilities.

Revise capacity thresholds for 7(a) IRPP [#1 – sub-options consider thresholds of 50, 100, 125, 150, 300 and 450 LSU] = SWD E-PRTR#21

Description of the measure

Reduce activity thresholds of poultry and pig farming in order to capture a higher proportion of pollutant releases from this activity. A revision in the activity threshold for this activity under the IED is also under consideration so it will be important to maintain coherence. The thresholds being assessed in detail are 150, 300 and 450 LSU (livestock units). As the current E-PRTR reporting thresholds for individual pollutants mean that there is no reporting under 300 LSU, it can be safely presumed that there would be no E-PRTR reporting for the sub-150 LSU options (i.e. 50, 100 and 125).

It is important to note that thresholds in LSU could result in mixed livestock farms also being within scope of the E-PRTR if the thresholds applied to pig and poultry farms rather than individually.

Economic impacts

Overall, this measure is likely to have **negative economic impacts** as it means that more facilities will have to report. The total economic impacts have been estimated to comprise additional costs of between €11m and €20m per year.

Administrative burdens on businesses

The overall impact on the administrative burdens on businesses is assessed as **negative**.

The administrative costs for business are presented in the table. It is builds on the unit costs presented in Section 1.2. The administrative costs are calculated as the unit costs times the estimated number facilities that will have to report.

It can be seen that for the lowest thresholds – 50 LSU – none of the facilities between 50 and 300 LSU is assessed to have emissions above the pollution thresholds. Hence, they will not have to report any data. If pollution thresholds are lowered so that all facilities above the activity thresholds will have to report, the reporting costs could be significantly higher.

Table A9-14: Administrative costs for business from revised capacity thresholds for IRPP in €m

Alternative capacity thresholds for IRRP	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting *	One off costs*	Recurrent costs *	Total annual costs*
Threshold >450 LSU	8,647	100%	8,647	25.6	8.5	11.7
Threshold >300 LSU	19,007	80%	15,206	45.0	15.0	20.6
Threshold >150 LSU	40,064	38%	15,206	45.0	15.0	20.6

* The values for options below 150 LSU (i.e. 50, 100, and 125 LSU) are considered equivalent to the values for >300 LSU

It should be noted that measure #46 on the use of top-down reporting would reduce the administrative burden significantly (by around 85% or more depending on the mechanism applied).

Operation / conduct of SMEs

The impact on the operation/conduct of SMEs is assessed as **weakly negative**. The majority of facilities in the IRPP sector are SMEs and probably a large share of those that could come within scope under a revised lower activity threshold will be small or micro-companies. With the current thresholds for pollutants, relatively few of the smallest farms would have to report. The reporting costs per facility is moderate so the operation of the farms is unlikely to be significantly affected. However, some negative impacts can still be expected. It should be noted that measure 46 on the use of top-down reporting would reduce the effects on the operation of the SMEs significantly.

Public authorities

Overall, the impacts on public authorities are **weakly negative**. For public authorities the economic impacts include the additional costs related to managing the data reported from the facilities. With lowered activity thresholds for IRRP, there would be more facilities reported as presented above. The additional costs for CAs have been estimated using the unit costs per facility times the number of reporting facilities; see Section 1.2 for details on the approach and assumptions. The administrative costs are estimated to the be in order of €1m to €2m per year.

Table A9-15: Administrative costs for CAs from revised capacity thresholds for IRPP in €m

Alternative capacity thresholds for IRRP	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
Threshold >450 LSU	8,647	100%	8,647	2.9	1.0	1.3
Threshold >300 LSU	19,007	80%	15,206	5.0	1.7	2.3
Threshold >150 LSU	40,064	38%	15,206	5.0	1.7	2.3

No impacts for the **EEA** are expected as the checking of data is fully automated and therefore independent of the number of facilities reporting for an existing activity.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts.** Increasing the number of facilities reporting will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall this measure is likely to have **weakly positive social impacts.** As discussed above, increasing the number of facilities reporting could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making.

Revise capacity threshold for 5(d) landfills [#3] = SWD E-PRTR#27

Description of the measure

Increase the coverage of landfill sites by decreasing the activity threshold to less than 10 tonnes per day. This policy measure is being considered as part of the IED revision and therefore in order to ensure coherence between reporting the threshold(s) to be considered will be consistent.

Economic impacts

Overall, this measure is likely to have **no or limited negative economic impacts** as it is not expected to increase the number of reporting facilities with any significant number. No impacts for SMEs are expected as a result of this measure.

Administrative burdens on businesses

The number of additional facilities that might have to report has not been possible to quantify at this stage. It is expected to be very limited and therefore leading to limited additional administrative costs.

The impact on the administrative burden is assessed as **no or limited** impact.

Operation / conduct of SMEs

The affected number of SMEs have not been assessed. Given that impact on the administrative cost is estimated to be very limited, we assess that there will be **no or limited impacts** on the conduct of SMEs.

Public authorities

The impact on public authorities is assessed to be **no or limited impact**. Given that only a few additional facilities could be reporting, the additional costs of checking data and preparing the data submission will be very low.

Environmental impacts

The environmental impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis.

Social impacts

The social impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis.

Revise capacity threshold for 2(c)(ii) smitheries [#5 – sub-options consider no calorific power threshold or a calorific power threshold of 5 MW] = SWD E-PRTR#26

Description of the measure

Reduce the activity threshold for activity 2(c)(ii) to 20 kj and with either no calorific power threshold or where the calorific power exceeds 5MW. The current threshold is 50 kj per hammer, where the calorific power exceeds 20 MW. This measure will help to cover a larger proportion of the sector's emissions, especially to air. This measure is being considered by the IED Impact Assessment and is therefore considered under for consistency.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** It is expected to increase the number of reporting facilities with around 700 facilities (assuming no capacity threshold) although it is unclear how many would be required to report with current pollutant reporting thresholds. This is potentially a large increase compared to the current number of

smitheries reporting. Some of the additional facilities might be SMEs and therefore, there is a risk of negative impacts on the SMEs.

Administrative burdens on businesses

Overall, the impact on administrative costs is **weakly negative**. The impact on administrative burden is estimated using the approach and assumptions presented in Section 1.2 and summarised in the table below.

Table A9-16: Administrative costs for business from revised capacity thresholds for smitheries in €M

	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
Revise capacity threshold for 2(c)(ii) smitheries	733	100%	733	4.3	1.4	2.0

Operation / conduct of SMEs

Overall, the impacts on the operation/conduct of SMEs are assessed as **weakly negative**. Some of the facilities that could come under scope with the changed activity threshold would be SMEs. They will face additional administrative costs although a number of these may be operating below the pollutant reporting thresholds so may not be required to report. The level of the administrative burden from reporting is moderate. Though the facilities will experience additional costs of the order estimated above, these costs are not expected to affect the operation or conduct of the SMEs in the industry.

Public authorities

Overall, this measure is assessed to have **no or limited impacts** on public authorities. The additional costs for CAs have been estimated using the unit costs per facility times the number of reporting facilities; see Section 1.2 for details on the approach and assumptions. The administrative costs are estimated at only €0.1m per year.

Table A9-17: Administrative costs for CAs from revised capacity thresholds for smitheries in €M

	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
Revise capacity threshold for 2(c)(ii) smitheries	733	100%	733	0.2	0.1	0.1

No impacts for the **EEA** are expected as the checking of data is fully automated and therefore independent of the number of facilities reporting for an existing activity.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts.** Increasing the number of facilities reporting will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). Given that, currently, only few smitheries are above the activity threshold, the change will significantly improve the coverage of the reporting from the sector.

Social impacts

Overall this measure is likely to have **weakly positive social impacts.** As discussed above, increasing the number of facilities reporting could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making.

Various other capacity threshold/definitions changes with limited impacts

Description of the measure

There are a number of additional measures which are about changing various activity definitions and/or thresholds but which are not expected to have any significant impacts; they are listed below. The overall purpose of these changes is to increase the alignment with the IED.

Table A9-18: List of measures with revised capacity thresholds and definitions

	#	Name	Description	# of facilities impacted
Align with potential revised IED scope	6	Revise thresholds for specific sub-sectors of activity 4 chemical industry	Addition of thresholds for some sub-sectors of the chemical industry. For example, pharmaceutical production to exclude the very small-scale facilities.	0
Align with current potent IED scope	8	Revise capacity threshold for activity 5(g)	Remove the 10,000 m3/day capacity threshold for activity 5(g) independently operated industrial waste water treatment plants to align with the IED activity description	421[12]
	9	Include sub-categories for 1(b) installations for gasification and liquefaction	Add sub-categories to include coal and "other fuels" to better align with the IED subcategories.	0

[12] Of the 421 impacted facilities, it is estimated that 90 are new facilities, while the 331 are existing facilities that may have to report water pollutants.

	#	Name	Description	# of facilities impacted
	10	Include product sub-categories for 3(c) cement production	Re assign the sub categories for cement production to be product categorised as done in the IED, e.g. production of cement in rotary kilns and other kilns, production of lime in kilns etc. This may cause some time-series consistency issues for historical data.	0
	12a	Align activity description for 1(c) with aggregation rules of IED (legislative option)	The IED contains aggregation rules for the definition of LCPs (E-PRTR activity 1(c)). The E-PRTR activity description would be updated to explicitly include the same rules for aggregation.	0
	72	Reword 8(b) production of food and beverage products activity description to include feed products [#72]	Update the 8(b) activity description to include feed production in order to align with the activity description under the IED	0
	Total			**421**

Economic impacts

Overall, these measures are likely to have **no or limited economic impacts.** They are only expected to increase the number of reporting facilities marginally.

Administrative burdens on businesses

The impact on the administrative burdens is assessed as **weakly negative**. Given that in most cases, the measures do not lead to any new facilities having to report, the administrative costs are limited. Only of the measures will potentially lead to an additional 90 new facilities having to report. This measure also impacts about 331 existing facilities that will have to report a few more pollutants. The total administrative costs are estimated at around €0.3m per year.

Operation / conduct of SMEs

Overall, the measures are assessed to have **no or limited impacts** on the operation of SMEs. Given the very limited additional administrative costs, the measures will not impact SMEs. Firstly, few SMEs are expected to be affected by the measures and secondly, where there could be SMEs affected, the additional costs are very limited.

Public authorities

Overall, the measures will have **no or limited** impacts on public authorities. The additional costs for public authorities will be very limited. As there are only few additional facilities that may have to report and that the checking of the data in relation to the revised definitions is also only requiring few additional resources. The additional costs for CAs are estimated at around €13,000 per year.

Environmental impacts

The environmental impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis. The changes to definitions etc. will also only very marginally change the quality of the reported data but will ensure coherence with the IED.

Social impacts

The social impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis.

Revise capacity thresholds for 1(c) combustion plants [#2 – sub-options consider thresholds of (a) 20-50MWth and (b) 5-50MWth] = SWD E-PRTR#29 and #30

Description of the measure

This measure considers a revision of the capacity thresholds for combustion plants:

- Measure 2a: Include combustion plants between 20 MW and 50 MW
- Measure 2b: Include combustion plants between 5 MW and 50 MW

This should include the aggregation rules of the MCPD (aggregate if waste gases go through a common stack or the competent authority judges them to). A further measure to include full alignment with the MCPD (i.e. 1-50MWth plants) was screened out due to the significant number of plants in the 1-5MWth category and potential impacts on SMEs.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts.** Changes to the capacity threshold for combustion plants could potentially increase the number of reporting facilities quite significantly. However, with the current reporting thresholds for pollutants, not all facilities passing the capacity threshold will actually have to report. The number of MCPs that will have to report is uncertain as the plants often have low emissions. There are a large number of back-up plants and/or plants which only run for a small number of hours each year.

The total economic impacts covering the costs for business and public authorities comprise between €1,8m and €3m as total annual costs.

<u>Administrative burdens on businesses</u>

This measure is assessed to have a **weakly negative impact** on the administrative burden for business. The administrative costs for business are presented in the table below. It builds on

the unit costs presented in the Section 1.2 and is calculated as the unit costs multiplied by the estimated number of facilities that will have to report[13].

Table A9-19: Administrative costs for business from revised capacity thresholds for combustion in €M

Alternative capacity thresholds for combustion	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
20-50MWth	4,946	25%	1,236	3.7	1.2	1.7
5-50MWth	21,590	10%	2,159	6.4	2.1	2.9

The administrative costs depend on the number of facilities that will have to report. Assessing the emissions from different sized plants has shown that only a small percentage of the MCPs above the revised thresholds will have to report. The estimated administrative costs are therefore only in the order of €2m to €3m per year. Should some of the relevant pollutant thresholds be lowered then the number of facilities would increase, and the administrative costs would increase proportionally.

Operation / conduct of SMEs

Though some of the MCPs considered for inclusion could be small, they are typically owned and managed by larger entities. Therefore, few of the operators will be SMEs and the impact on the operation of SMEs can be assessed as **limited**.

Public authorities

The impacts on public authorities can therefore be assessed as **weakly negative.** The additional costs for CAs have been estimated using the unit costs per facility multiplied by the number of reporting facilities; see Section 1.2 for details on the approach and assumptions. The administrative costs for CAs are estimated at €0.1m and €0.16m.

Table A9-20: Administrative costs for CAs from revised capacity thresholds for combustion in €M

Alternative capacity thresholds for combustion	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
20-50MWth	4,946	25%	1,236	0.2	0.07	0.09
5-50MWth	21,590	10%	2,159	0.4	0.1	0.16

No impacts for the **EEA** are expected as the checking of data is fully automated and therefore independent of the number of facilities reporting for an existing activity.

[13] https://ec.europa.eu/environment/air/clean_air/index.htm

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts.** Increasing the number of facilities reporting will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall, this measure is likely to have **weakly positive social impacts.** As discussed above, increasing the number of facilities reporting could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making.

Revise capacity thresholds for 5(f) UWWTPs [#13 – sub-options consider thresholds of 2,000, 5,000, 10,000, 20,000 and 50,000 p.e.] = SWD E-PRTR#29 and #30

Description of the measure

The measure includes a change of the capacity thresholds for urban wastewater treatment plants. Currently, the threshold is set at 100,000 p.e. and the measure includes five alternative thresholds:

- Change capacity thresholds for UWWTP from 100,000 p.e. to 50,000 p.e.
- Change capacity thresholds for UWWTP from 100,000 p.e. to 20,000 p.e.
- Change capacity thresholds for UWWTP from 100,000 p.e. to 10,000 p.e.
- Change capacity thresholds for UWWTP from 100,000 p.e. to 5,000 p.e.
- Change capacity thresholds for UWWTP from 100,000 p.e. to 2,000 p.e.

Changing the threshold will increase the coverage of emissions from UWWTPs and bring the E-PRTR closer to the definitions of the UWWTD. The UWWTD currently defines treatment standards and emission limit values for UWWTPs above 2,000 p.e.

Economic impacts

Overall, this measure is likely to have **weakly negative economic impacts,** the scale of these would depend on the threshold selected**.** Changes to the capacity threshold for UWWTPs would increase the number of reporting facilities. However, with the current reporting thresholds for pollutants, not all facilities passing the capacity threshold will have to report.

The total economic impacts covering the costs for business and public authorities comprise between €1.8 m and €5.8m as total annual costs.

<u>Administrative burdens on businesses</u>

Overall, this measure is likely to have **weakly negative impacts** on the administrative burdens. The administrative costs for business are presented in the table. It is builds on the unit costs presented in the Section 1.2. The administrative costs are calculated as the unit costs multiplied by the estimated number facilities that will have to report[14].

With the current reporting thresholds for pollutants, it is unlikely that all facilities will have to report. A rough assessment has been done focused on the reporting of nitrogen and phosphorus. The share that is likely to have to report has been assessed for the different size ranges.

Table A9-21: Estimated share of facilities having to report

Size band for UWWTPs	# of facilities	Share that is estimated to have to report	Resulting number of facilities
2000-5000	10,210	0%	0
5000-10000	5,543	10%	554
10000-20000	3,591	20%	718
20,000-50,000	3,043	50%	1,522
50,000-100,000	1,234	100%	1,234

Based on the estimated number of facilities reporting the number of facilities for each alternative threshold definition can be estimated. Results and the costs assessment are presented in the table below.

Table A9-22: Administrative costs for business from revised capacity thresholds for UWWTPs in €M

Alternative capacity thresholds for UWWTP	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
Change capacity thresholds for UWWTP from 100,000 p.e. to 50,000 p.e.	1,234	100%	1,234	3.7	1.2	1.7
Change capacity thresholds for UWWTP from 100,000 p.e. to 20,000 p.e.	4,277	64%	2,756	8.2	2.7	3.7
Change capacity thresholds for UWWTP from 100,000 p.e. to 10,000 p.e.	7,868	44%	3,474	10.3	3.4	4.7
Change capacity thresholds for UWWTP from 100,000 p.e. to 5,000 p.e.	13,411	30%	4,028	11.9	4.0	5.4
Change capacity thresholds for UWWTP from 100,000	23,621	17%	4,028	11.9	4.0	5.4

[14] Number of facilities estimated based on the Waterbase-UWWTD https://www.eea.europa.eu/data-and-maps/data/waterbase-uwwtd-urban-waste-water-treatment-directive-7

Alternative capacity thresholds for UWWTP	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
p.e. to 2,000 p.e.						

Operation / conduct of SMEs

Though some of the UWWTPs considered for inclusion could be small, they are typically owned and managed by larger entities. Most UWWTPs are municipal so they are publicly owned and if there are private operations, it is typically large companies. Therefore, it is assessed that there will be **no or limited impact** on the operation of SMEs.

Public authorities

Overall, the impacts on public authorities can therefore be assessed as **weakly negative**. The additional costs for CAs have been estimated using the unit costs per facility multiplied by the number of reporting facilities; see Section 1.2 for details on the approach and assumptions.

The measure will potentially add a large number of additional facilities although not all are likely to have to report based on the current pollutant reporting thresholds. The administrative costs for CAs are estimated at between €0.1m and €0.3m.

Table A9-23: Administrative costs for CAs from revised capacity thresholds for UWWTPs in €m

Alternative capacity thresholds for UWWTP	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting	One off costs	Recurrent costs	Total annual costs
Change capacity thresholds for UWWTP from 100,000 p.e. to 50,000 p.e.	1,234	100%	1,234	0.2	0.1	0.1
Change capacity thresholds for UWWTP from 100,000 p.e. to 20,000 p.e.	4,277	64%	2,756	0.5	0.2	0.2
Change capacity thresholds for UWWTP from 100,000 p.e. to 10,000 p.e.	7,868	44%	3,474	0.6	0.2	0.3
Change capacity thresholds for UWWTP from 100,000 p.e. to 5,000 p.e.	13,411	30%	4,028	0.7	0.2	0.3
Change capacity thresholds for UWWTP from 100,000 p.e. to 2,000 p.e.	23,621	17%	4,028	0.7	0.2	0.3

No impacts for the **EEA** are expected as the checking of data is fully automated and therefore independent of the number of facilities reporting.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts.** Increasing the number of facilities reporting will improve the level of data on water releases available within the E-PRTR, potentially helping to improve environmental performance of the sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information). It would also improve alignment with the UWWTD.

Social impacts

Overall, this measure is likely to have **positive social impacts.** As discussed above, increasing the number of facilities reporting could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making.

1.2 E-PRTR problem area 1b: Missing activities and sub-activities

The original aim of the E-PRTR was to capture 90% of industrial releases for each pollutant. Industry in Europe has changed since the E-PRTR came into force in 2006 with new activities becoming more widespread. Therefore, the activity list in Annex I needs to be updated. Missing activities mean that the E-PRTR does not provide a complete picture of releases and transfers and cannot be used as a tool to fully understand impacts and ensure coherent environmental policy. Furthermore, the IED is being revised so it will be important to maintain coherence with any future scope.

Include cattle rearing farms [#15 – sub-options consider thresholds of 50, 100, 125, 150, 300 and 450 LSU] = SWD E-PRTR#20

Description of the measure

There is no activity covering cattle and it is proposed to include an additional activity in Annex I of the E-PRTR covering these farms. This measure has been proposed for inclusion within the IED and therefore in order to ensure coherence between reporting the exact threshold(s) and activity definition to be considered will be informed by that process. There are alternative activity thresholds being considered. They all relate to the number of livestock units (LSU).

In line with the IED revision, the following thresholds were assessed: 50, 100, 125, 150 LSU, 300 LSU and 450 LSU. As the current E-PRTR reporting thresholds for individual pollutants mean that there would be no reporting under 300 LSU, it can be safely presumed that there would be no E-PRTR reporting for the sub-150 LSU options (i.e. 50, 100 and 125).

Economic impacts

Overall, the economic impacts are **negative**. The measure will increase the number of reporting facilities and potentially with a large number. The annual costs have been estimated to be in the order of €11 – 23m, primarily for operators but also MS CAs. This based on the estimated number of additional facilities would be required to report which is estimated to vary between around 9,000 up to 18,000 facilities.

Administrative burdens on businesses

Overall, the impacts on the administrative burden for business are **negative**. The administrative costs for business are presented in the table below. It builds on the unit costs presented in Section 1.2. The administrative costs are calculated as the unit costs multiplied by the estimated number of facilities that will have to report[15].

Table A9-24: Administrative costs for business from alternative capacity thresholds for cattle in €m

Alternative capacity thresholds for cattle	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting*	One off costs*	Recurrent costs*	Total annual costs*
Threshold >450 LSU	8,523	100%	8,523	25.2	8.4	11.5
Threshold >300 LSU	26,624	66%	17,574	52.1	17.4	23.8
Threshold >150 LSU	120,727	15%	17,574	52.1	17.4	23.8

* The values for options below 150 LSU (i.e. 50, 100, and 125 LSU) are considered equivalent to the values for >300 LSU

The alternative thresholds could potentially lead to a significant number of additional facilities being captured. However, an assessment of likely emissions from farms of different sizes has shown that no or few facilities below 300 LSU are expected to have to report under current NH_3 and CH_4 reporting thresholds, and only around 66% above 300 LSU (based on a worst case assessment of likely emissions i.e. using the highest emission factors to estimate farm level emissions).

It should be noted that if NH_3 and/or CH_4 reporting thresholds are reduced, then the total number of facilities could increase. As a result the administrative costs would increase proportionally with the number of facilities.

In contrast, if measure #46 on the use of top-down reporting were to be applied to cattle then this would reduce the administrative burden significantly (by around 85% or more depending on the mechanism applied).

[15] Data on number of facilities are based on Ricardo (2021) *Updating of available information for undertaking the assessment of impacts for a possible modification of the IED with regard to aspects of intensive agriculture*

Operation / conduct of SMEs

Overall, the impact on the operation/conduct of SMEs is assessed as **weakly negative**. The majority of facilities in the cattle sector are SMEs and probably a large share of those that could come within scope would be small or micro-companies. With the current thresholds for pollutants, relative few of the smallest farms would have to report. The reporting costs per facility is moderate so the operation of the farms is unlikely to be significantly affected. Still some negative impacts can be expected.

It should be noted that measure 46 on the use of top-down reporting would reduce the effects on the operation of the SMEs significantly.

Public authorities

The impacts on public authorities are assessed as **strongly negative**. For public authorities the economic impacts include the additional costs related to managing the data reported from the facilities. With adding cattle farms to the scope of the E-PRTR, there would be significantly more facilities reported as presented above. The additional costs for CAs have been estimated using the unit costs per facility multiplied by the number of reporting facilities; see Section 1.2 for details on the approach and assumptions.

The administrative costs are estimated to be in order of €1m to €2m per year.

Table A9-25: Administrative costs for CAs from alternative capacity thresholds for cattle in €m

Alternative capacity thresholds for cattle	No of additional facilities above activity threshold	Share that will report	Additional number of facilities reporting*	One off costs *	Recurrent costs *	Total annual costs*
Threshold >450 LSU	8,523	100%	8,523	2.8	0.5	0.8
Threshold >300 LSU	26,624	66%	17,574	5.8	1.0	1.7
Threshold >150 LSU	120,727	15%	17,574	5.8	1.0	1.7

* The values for options below 150 LSU (i.e. 50, 100, and 125 LSU) are considered equivalent to the values for >300 LSU

The impact on the **EEA** is estimated to be relatively **limited**[16]. The additional annual costs are estimated at less than 1,000 EUR. This includes costs associated with adding a new activity to the database and reporting tools. As QA/QC of data is automated, the additional facilities and additional data being reported should not add to the costs.

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts.** Including cattle and increasing the number of facilities reporting will improve the level of data on

[16] EEA costs associated with some measures are under revision in collaboration with the EEA and may be revised.

emissions available within the E-PRTR, potentially helping to improve environmental performance of the cattle sector as it enables better comparison of performance of the sector across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

It should be noted that with the current pollutant thresholds, only a proportion of emissions from the cattle sector will be reported.

Social impacts

Overall, this measure is likely to have **weakly positive social impacts.** As discussed above, the inclusion of the cattle sector in E-PRTR could potentially help to improve environmental performance of the sector which would have positive impacts for health. Furthermore, increasing the level of data available on performance of the sector improves public access to information potentially enabling greater participation in environmental decision-making. Similar to the case for the environmental impacts, adding reporting from only the largest cattle farms means that not all the emissions are covered by the reporting.

Various other measures with limited impacts

Description of the measures

There are several additional measures to change various definitions and adding activities in order to achieve better alignment and coherence with the IED – both in its current version and the changes proposed for a revised IED. They are listed below and they are not expected to have any significant impacts on costs and benefits.

Table A9-26: List of measures with revised capacity thresholds and definitions

Category	#	Measure	Description	# of facilities impacted
Align with potential revised IED scope	14	Expand activity scope of mining and quarrying activities (3(a) &3(b))	The IED revision is looking to include these activities and considering how to also bring into line with matching the scope of Directive 2006/21/EC and/or the MWEI BREF. This measure will ensure the E-PRTR activities are in line with any adjustments made.	0
	18	Include battery production, disposal and recovery	Include battery production, disposal and recovery in activity list. This measure is being considered as part of the IED revision and therefore in order to ensure coherence between reporting the exact threshold(s) and activity definition to be considered will be informed by that process.	70
	20	Include an additional sub-sector for cold rolling & wire drawing	Include an additional sub-sector for cold rolling, with a capacity threshold of 10 t/h, and wire drawing, with a capacity threshold of 2 t/h, under activity 2. This measure is being considered as part of the IED revision.	53

Category	#	Measure	Description	# of facilities impacted
	21	Inclusion of an additional sub-sector for textile finishing	Inclusion of textile finishing in the activity list under activity 9 (Other activities). Rename the current activity 9(a) to activity 9(a)(i) - Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles (a current activity) and include an additional sub activity of 9(a)(ii) Textile finishing with the same threshold as the current 9(a) activity. This measure is being considered as part of the IED revision.	76
	23	Include an additional sub-activity for ship yards / dismantling	Include an additional sub-activity under 9 - Other activities for ship yards / dismantling. Currently only building of and painting or removal of paint from ships is included in the activity list (9(e)). This measure is being considered as part of the IED revision.	6
Align with current IED scope	27	Include MgO production	Include MgO production in kilns with a threshold of 50 t/day to align with IED activity 3.1(c).	25
	28	Include CO_2 capture	Include capture of CO_2 streams for geological storage with no threshold to align with IED activity 6.9.	9
	29	Additional sub-categories and improved descriptions for 5(a) & 5(b)	Align these categories with the IED activity descriptions to ensure reporters know that disposal includes incineration/co-incineration (sub categories to match IED activities 5.1 and 5.2(b). Additionally, include recovery in the activity definition.	0
	30	Additional hazardous waste sub-category for temporary storage	IED activity 5.6 - temporary storage of hazardous waste is not included in the E-PRTR activities list and should be considered for inclusion.	9
	All			**248**

Economic impacts

Overall, these measures are likely to have **no or limited economic impacts.** They are only expected to increase the number of reporting facilities marginally.

Administrative burdens on businesses

Overall, the measures are assessed to have **no or limited** impacts on administrative burdens. Given that in most cases, the measures only lead to a small number of new facilities having to report, the administrative costs are limited. Only the measures which potentially could lead to an additional 70-80 new facilities having to report would increase reporting costs. Still the reporting costs are very limited. The total administrative costs for **all** the measures are estimated at around €0.7m per year.

Operation / conduct of SMEs

Overall, the measures are assessed to have **no or limited impacts** on the operation of SMEs. Given the very limited additional administrative costs, the measures will not impact the operation of SMEs. Firstly, few SMEs are expected to be affected by the measures and secondly, where there could be SMEs affected, the additional costs are very limited.

Public authorities

Overall, the measures will have **no or limited impacts** on public authorities. The additional costs for public authorities will be very limited and they are estimated at €37,000 per year. As there are only a limited number of additional facilities that may have to report and the checking of the data in relation to the revised definitions is also only requiring few additional resources.

Environmental impacts

The environmental impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis. The changes to definitions of included activities will also only very marginally change the quality of the reported data but will ensure coherence with the IED.

Social impacts

The social impacts are assessed to be **no or limited impacts**. Given that only a few additional facilities could be reporting, the additional data will not change the coverage of the emissions and therefore not improve the decisions basis.

Establish a dynamic mechanism to identify and include emerging activities of concern ('sunrise list' for activities) [#31] = SWD E-PRTR#31

Description of the measure

This measure would entail the inclusion of a more dynamic mechanism to identify and include emerging activities of concern ("sunrise list") within the Regulation e.g. enabling the Commission to identify and include new activities in the future via delegated acts.

Economic impacts

Overall this measure is likely to have **weakly negative economic impacts** as it will lead to a greater number of activities being captured under E-PRTR in the future and more facilities having to report release and transfer data. Some additional activities for inclusion and existing activities with revised thresholds and/or definitions have already been identified and included under other measures (with associated assessment of impacts). It is unknown what further activities may be included in the future and thus it is not possible to assess the impacts that may be incurred.

In addition to additional data collection and reporting for operators, there would also be time required for the European Commission and/or EEA to maintain the sunrise list and identify activities of emerging concern.

Administrative burdens on businesses

Overall impacts on administrative burdens for businesses are expected to be **weakly negative** for any new activities included in the future although the scale of such impacts are unclear at this stage. Operators in any new activities will have to measure, calculate and/or estimate releases to see whether they are above or below the reporting thresholds. If they are above the threshold then the data would need to be reported. Some initial time would also be required to set up the appropriate data capture, calculation and reporting mechanisms up front.

Operation / conduct of SMEs

Overall impacts on SMEs are expected to be **very limited**. Appropriate activity thresholds would need to be established for any new activities to ensure that smaller facilities (potentially including SMEs) would not be required to report.

Public authorities

Overall impacts on **public authorities** are expected to be **weakly negative**. This includes additional time for QA of data for any new activities for both Member State public authorities and the EEA as well as some initial upfront time to amend the existing data flow and QA systems to incorporate new activities.

The EEA and/or European Commission would incur some additional costs for maintaining the sunrise list and identifying and reviewing potential emerging activities. This is assumed to cost around €15,000 per year (assuming consultants are used to assess specific activities) with a further 30 person days every 5 years to develop and agree a proposal for new activity(ies) (equating to annualised costs of around €2,600 per year).

Environmental impacts

Overall, this measure is likely to have **weakly positive environmental impacts** as it will increase the coverage of activities that are reporting to the E-PRTR. It will ensure that the E-PRTR activity list can be updated as and when emerging activities are identified helping to support the objectives of wider environmental policies such as IED, WFD, UWWTD etc.

Increasing the activity coverage will improve the level of data on emissions available within the E-PRTR, potentially helping to improve environmental performance of those activities being included as it enables better comparison of performance across the EU as well as greater engagement of citizens in environmental decision-making (as a result of access to information).

Social impacts

Overall, this measure is likely to have **weakly positive social impacts** as the emissions coverage within E-PRTR will be expanded. As discussed above, increasing the number of activities and facilities reporting could potentially help to improve environmental performance of those activities included which would have positive impacts for health. Furthermore, including new activities improves public access to information potentially enabling greater participation in environmental decision-making.

Annex 10: Supporting information to Section 6 of the SWD

Table of Contents

INTRODUCTION

Through a series of boxes and tables, this annex summarises key information underpinning section 6 of the SWD i.e. assessment of the impacts of the options. It brings together the information presented in fuller detail in Annexes 8 and 9 i.e. the detailed impact assessment of each individual measure included in the policy options assessment.

The boxes and tables in this annex cover the following:

1. Impacts of individual measures that dominate in the impact assessment of options
2. Comparison of impacts of alternative measures contained in certain sub-options
3. Summary information on impacts of options PO5-a to PO5-i
4. Administrative costs breakdown per measure, for each option.

1. Information supporting the assessment of Option PO1

Boxes 1 and 2 provide a summary of the impacts of measures IED#5 and E-PRTR#2 that dominate the assessment of policy option PO1.

Box 1: Summary of the impacts of measure IED#5

Although all policy measures will have relevant contributions as noted, measure IED#5 presents a particularly significant opportunity to enhance the environmental benefits from the IED's implementation, and overall makes a significant contribution to the policy option total impacts. This measure would specify that when setting ELVs, the starting point is the lower end of the BAT-AEL range, unless the operator demonstrates to the satisfaction of the competent authority that applying BAT as described in BAT Conclusions only allows meeting a higher level within the BAT-AEL range.

The measure would seek to encourage a tightening of the ELVs in permit conditions for installations across the EU employing a relatively harmonised approach. It is not foreseen as a means to make lower BAT-AELs mandatory. Competent Authorities will be able to make decisions on a case-by-case basis, continuing to account for local environmental conditions and the technical characteristics of the installation, i.e., allowing for the possibility to set ELVs higher in the BAT-AEL range. The emphasis however is to begin the considerations at the lower end of the BAT-AEL range. For the assessment of this measure, an assumption has been needed as to the proportion of installations that would be affected by this measure. Considering its non-mandatory nature, it is not appropriate to assume that all installations currently with ELVs set at upper BAT-AELs would be affected by the measure. We assumed that around 5% of 'new permits' (of 500 per annum) and 10% of existing permits (of 52 000) could be 'affected' by this measure in the process of setting up a permit and or reconsidering/updating a permit. This has been informed from the evidence below.

For example, a 2019 study by Eunomia, *An Assessment of IED Permitting Stringency*, examines the emission limit values for 117 permits for European cement installations and 24 electric arc furnaces (Eunomia, 2019). The results from both these sectors in aggregate indicate that most ELVs are set in line with the upper BAT-AEL (80%), while a minority are above the upper BAT-AEL (12%, e.g. have derogations) or were set at the lower BAT-AEL (9%). This indicates that most cement works and electric arc furnaces (82%) would need to change or upgrade their practices to comply with the lower BAT-AEL. Overall, this report would suggest that there is a significant opportunity to further environmental protection by setting ELVs closer to the lower end of the BAT-AEL ranges.

Pre-final information from an ongoing contract on "Assessment of BAT conclusions implementation in IED Permits"[17], which builds on the experience of previous pilot projects and focusses on four IED sectors (glass, pulp and paper, non-ferrous metals and wood based panels) ,confirms that **75-85%** of ELVs in permits are based on the upper level of BAT-AEL range (or above). The distribution differs in case of sectors and pollutants.

The extent to which this may happen and, therefore, result in the reduction of pollutant emissions is highly uncertain. It is expected that this measure may lead to significant and additional substantive compliance costs for businesses that would reduce pollutant emissions to air especially, as well as water and soil in a significant way, when compared to the baseline.

For example, a detailed study of the possible impacts of BAT conclusions was carried out for selected

[17] Terms of reference available at: Circabc (europa.eu)

plants under scope of the LCP BAT Conclusions (Ricardo, 2018). This found that, for the largest plants (>300 MW_{th}) firing solid fuels, there was an appreciable increase in the expected compliance costs to comply with lower BAT-AELs for SO_2, NO_X, dust and Hg compared to when the upper BAT-AEL was met (Ricardo, 2017). The estimates from that study suggested total annualised substantive compliance costs of €0.6bn/year for meeting upper BAT-AELs, rising 10 times to €5.7bn/year for meeting lower BAT-AELs (two thirds of this higher cost was estimated to be due to fitting high efficiency SO_2 reduction measures). The monetised benefits in that study were estimated to outweigh the costs – and that this conclusion held true at the lower BAT-AEL level as well as upper BAT-AEL: €3.4bn/year for upper BAT-AELs, rising to €14.2bn/year for lower BAT-AELs.

These estimates are not representative of the likely impact across all sectors. Nevertheless, they highlight the potential order of magnitude of the potential requirements associated with tightening of ELVs towards the lower end of BAT-AEL ranges. To clarify, in this example, existing LCPs would have needed to comply with lower BAT-AELs, as well as the fact that for this sector (LCPs) minimum standards already had to have been met (IED Annex V ELVs) prior to achieving BATC compliance (and this existing compliance was accounted for in the estimation of costs), which leads to increases in estimated compliance costs.

To inform the potential scale of emission reductions that could occur when applying this measure, analysis of the Commission's BAT-AEL tool (European Commission, 2020) listing all BAT-AELs from BATC was carried out. This used, for an illustrative pollutant of NOx emissions, the average % of potential reduction from the upper to the lower end of BAT-AEL ranges across CLM, GLS, LCP, PP and REF BATC, together with the assumed proportion of installations that would be affected by the measure (assumed to be 10%), the NOx emissions by sector, and the average EU NOx damage cost to generate, at a high level, the possible illustrative NOx benefit for these five sectors from this measure. These illustrative NOx benefits were estimated to be between €0.9bn and €2.8bn per year. The total benefits of this measure would sum the impacts across all environmental issues, which would be expected to be tens of €billions per year overall.

The economic impacts can also be illustrated using a similar example. Let there be around 10% of the installations affected by this measure IED#5 so that each of these installations may require to invest at least €0.5 million additional or earlier than in the baseline. This would mean that capital costs could be around €2 850 million over the 20-year period or an equivalent annual cost of around €210 million per year. When summed with the administrative burden on operators and public authorities, the costs would be at least €225 million per year (central estimate), which are significantly lower than the potential benefits for this one pollutant (NOx) illustration.

Box 2: Summary of the impacts of measure E-PRTR#2

Whilst E-PRTR reporting is at the level of 'facility', the IED sets regulatory controls at sub-facility level i.e. for 'installations'. Since there may be several IED installations in an E-PRTR facility, this restricts the extent to which E-PRTR data can support the IED. This measure would entail reporting releases/transfers on an installation basis rather than aggregating to the facility level. The benefits of reporting at this level would be greater data granularity thus enabling better matching to individual activities.

A major implication of this measure would be a significant increase in the number of reports that will need to be submitted – increasing from circa 34,000 facilities at present, to circa 210 000 installations when considering the current, and proposed, IED scope. However, this translates in little increase of burden for operators as currently that data is already collected by the operator and has to be

aggregated per facility for reporting under to the E-PRTR.

Changes in administrative burden on businesses and public authorities have been estimated to the extent that is possible and are summarised in the Table A10-1. Positive estimates refer to additional costs and negative estimates refer to potential savings.

Table A10-1: Administrative burden from PO1

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
PO1-a – More effective legislation		
IED#1	0.6	0.4
IED#2	0.2	0.09
IED#3	0.6	0.4
IED#4	None/Limited	None/Limited
IED#5 – ("out" in Alternative 1, "in" in Alternative 2)	8	7
PO1-b Implementation and enforcement		
IED#6	None/Limited	0.2
IED#7 [18]	4	5
IED#8	None/Limited	0.05
IED#9	0.6	0.4
PO1-c Rights of the public		
IED#10	None/Limited	None/Limited
IED#11	None/Limited	Baseline obligations
IED#12	None/Limited	2
IED#13	None/Limited	0.2
E-PRTR#1	0.5	0.7
E-PRTR#2 – ("out" in Alternative 1, "in" in Alternative 2)	0.06	0.08
E-PRTR#3	-	-
E-PRTR#4	-	-
PO1-d Simplification		
IED#14	None/Limited	None/Limited
IED#15	-0.6	-0.5
IED#16	-0.1	-0.3
E-PRTR#5	-0.7	-
E-PRTR#6	1.9	0.13
E-PRTR#8	0 M€	-
E-PRTR#9	-12.5	-
Sub-total IED measures (alternative 1, without IED#5)	4.3	7.94
Sub-total IED measures (alternative 2, incl. IED#5))	12.3	14.94
Sub-total E-PRTR measures (Alternative 1, without #2)	(-10.314)	0.882
Sub-total E-PRTR measures (Alternative 1, incl. E-PRTR#2)	(-10.255)	0.962

[18] A report for the European Commission into common rules for assessing compliance is underway and may feed into this assessment.

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
Total - all PO1 measures (Alternatives 1)	**-6.014**	**8.372**
Total - all PO1 measures (Alternatives 2)	**2.045**	**15.902**

2. Information supporting the assessment of Option PO2

Box 3 compares the two measures contained in PO2-b.

Box 3: Comparison of the two measures contained in PO2-b

PO2-b puts forward alternative measures for improving the flexibility of the BREF process in an attempt to keep up with the latest technological advances, whilst maintaining the robustness and standards of the existing processes.

These alternatives include (IED#19) establishing shorter, up to 5-year BREF cycles focussed on defining stricter BAT-AELs based on recent innovations or (IED#20) establishing the INnovation Centre for Industrial Transformation & Emissions (INCITE) to monitor the Technology Readiness Level (TRL) and environmental performance (BAT-AEPLs) of emerging and breakthrough techniques, which would also recommend a BREF review and/or update of the BAT conclusions when identified as pertinent (IED#20).

At this stage, it is envisaged that measures would target new installations and/or major refurbishments or retrofits but would not trigger a permit reconsideration and update for all existing installations, unless recent transformative techniques have been made available that would be applicable to all existing installations. More frequent BREF reviews and/or BAT conclusion updates would likely affect a minority of installations at least in the shorter term, until innovation leads to the availability of transformative techniques.

The ambition of these measures is similar, and both would address issues surrounding the lack of frequency of the BREF review process and/or updates of BAT conclusions, which affect the ability to keep up with exogenous technological progress. That said, the key advantages and disadvantages of these measures vary, as shown below.

Policy measure	Advantages	Disadvantages
IED#19 Shorter BREF cycles	-Certainty within the adjusted framework could help businesses adapt and plan their investments accordingly (for new plants or major retrofits only). -More frequent updates of best environmental performance standards (BAT-AEPLs) are	-Managing a strictly more frequent BREF process complementary to the baseline, without a strategic understanding or identification of opportunities driven by technological progress, could increase inefficiencies. -The rigidity of the process would be retained, also

	performed systematically.	contributing to inefficiencies (e.g., spending resources on a BREF review of there were not many novel techniques nor lower performance levels available) and/or missed opportunities.
IED#20 INCITE	-Potential to be an efficient tool to identify opportunities linked to technological progress across sectors and respond flexibly, e.g., the triggering of a BREF review and/or proposing updates to BAT conclusions only happens once opportunities are identified.	-Could introduce some regulatory uncertainty (i.e., unclear timing of reviews and updates of BAT conclusions, etc.), which could affect business investment negatively. -Efficiency might depends upon the ability of INCITE (resources will be limited requiring priorities) to monitor a wide range of complex sectors and their technologies.

Experts from Ricardo and other stakeholders were also consulted. Their expert opinion is that could be a more effective and efficient approach to address some of the shortcomings identified in the IED evaluation in relation to the BREF process, especially when compared to introducing new and systematic (rigid) homogenous shorter BREF cycles.

Stakeholders attending focus groups indicated that INCITE (IED#20) could become an effective and efficient platform for triggering BREF reviews, once novel techniques or better performance levels have been identified for key environmental issues. Stakeholders attending a workshop stated that measure IED#19 (shorter BREF cycles) is likely to be technically challenging and difficult to implement in practice, if the principles and rigour of current BREF process are maintained.

Box 4 compares the two measures contained in PO2-c.

Box 4: Comparison of the two measures contained in PO2-c

PO2-c includes alternative measures that would seek to facilitate sectoral transformation in line with longer term EU objectives, by allowing operators to retain focus on contributing to the EU's long-term objectives even if these may mean that they cannot keep up with the implementation of BAT conclusions in the shorter term.

These alternatives include amending requirements to allow operators to have more time to implement BAT conclusions where deep transformation of industrial sectors is required (IED#21) *versus* establishing a Transformation Plan and either a permit review obligation by 2030 that focusses on the capacity of the installations to operate in accordance with the EU's general zero-pollution, circular economy and climate objectives; including a requirement for installations to

produce Transformation Plans or integrating the Transformation Plan in the EMS (IED#22).

All measures would encourage IED operators to align their investments with longer term, transformation needs. However, their approach and, thus, their key advantages and disadvantages are likely to vary.

Policy measure	Advantages	Disadvantages
IED#21 'Derogation' from implementing BAT conclusions due to a requirement for deep transformation	-Focussed on sectors that require 'deep transformation' -Could have limited administrative burden since similar to existing (familiar) derogation process. - Tool to promote deeper transformation with benefits for operator (and no significant additional costs/ investments).	-Lack of ability to build a holistic understanding and monitoring of transformation efforts by IED operators. -Some of the transformation and decarbonisation pathways may not be win/win options for every environmental aspect.
IED#22 Permit review obligation & preparation of Transformation Plan Alternative: Transformation Plans integrated in the EMS	-All IED operators would be encouraged to reflect on their transformation needs and demonstrate how their plans may or may not align with BAT conclusions and general EU objectives -Integrated into the permitting process and degree of sophistication could be adjusted to the sector and/or plant size (same as EMS do now in BREFs). The alternative solution offers the same advantages as above at lower costs.	-Could be inefficient, especially where there are sectors that may require limited transformation or have already undergone significant transformation. -Could be burdensome for public authorities to manage rapidly; therefore causing delays. This can be mitigated by ntegratong Plans in EMS.

Experts from Ricardo and other stakeholders were also consulted. Their expert opinion is that the permit review obligation requiring Transformation Plans (IED#22) is likely to gain more traction, and improve the collective understanding of industry's transformation needs and overall preparedness for industry sectors to accelerate implementation, to increase transparency and provide confidence that specific actions will be taken forward. The alternative (EMS integration) which offers the same advantages looks even more promising given that it's delivered at much lower costs.

During the focus groups held, some industry stakeholders were supportive of measure IED#21, while Member State representatives noted that a clearer EU process and/or guidelines would be needed to implement these derogations. Stakeholders attending a second workshop, especially Member States' representatives, were supportive of measure IED#22, whilst some (e.g., DE)

raised concerns on the timings of the permit review obligation, considering that the Transformation Plans should ideally be required for implementation before 2030.

Additional administrative have been estimated to the extent that is possible and are summarised in Table A10-2 below.

Table A10-2: Administrative burden from PO2-a, PO2-b, and PO2-c

Policy options	Additional administrative burden on businesses, annual average over 20 years (M€2020 p.a.)	Additional administrative burden on public authorities, annual average over 20 years (M€2020 p.a.)
PO2-a		
IED#17	0.4	0.2
IED#18	0.6	0.3
PO2-b		
IED#19	**3**	**5**
IED#20	**3**	**4**
PO2-c		
IED#21	**0.6**	**0.3**
IED#22	**50**	**50**
IED#22 (alternative)	**20**	**0**
Total IED measures[19] #21	**7.6**	**9.8**
Total IED measures[20] #22	**57**	**59.5**
Total IED measures[21] #22 (alternative)	**27**	**9.5**

3. Information supporting the assessment of Option PO3

Box 5 compares the two measures contained in PO3-a.

Box 5: Comparison of the two measures contained in PO3-a

PO3-a (Better setting of BAT-AEPLs) includes alternative measures that would improve the determination of BAT-AEPLs and their implementation, by updating their status through legislation.

These alternatives include introducing explicit options for Technical Working Groups (TWG) to set: i) either binding resource efficiency and circular economy BAT-AEPLs or indicative performance levels (IED#23), ***or*** *ii)* also include an explicit option to set benchmark levels associated with BAT, for which the inclusion in the Environmental Management System is

[19] option IED#21 and #22 are exclusive
[20] option IED#21 and #22 are exclusive
[21] option IED#21 and #22 are exclusive

obligatory (IED#24).

Both measures would bring the status of BAT-AEPLs in line with that of BAT-AELs. Similar to emission KEIs covered by BREFs, there would be a possibility to set indicative resource efficiency and circular economy levels, e.g., when there is large variability in the data due to important differences in products manufactured, or when one KEI is much more important than another (like in the case for NO_x and CO emissions in many processes). This would be a decision of the TWG on an individual KEI basis. Under measure IED#23, existing BAT-AEPLs would not become binding in the same manner as BAT-AELs. Under measure IED#24, existing BAT-AEPLs would become benchmarks for inclusion in the EMS. Only a new or review of a BREF and its BAT conclusions would render the BAT-AEPL binding in line with BAT-AELs, where applicable.

The introduction of benchmark levels (IED #24) would create an opportunity to improve implementation of past BAT-AEPLs derived under the IED, or possibly even under the IPPCD. They can, retroactively, be assigned the status of benchmark levels, meaning that operators would be obliged to address them in the EMS. Any review of a BREF and its BAT conclusions would consider and update the benchmark levels or convert them into binding BAT-AEPLs if this is deemed preferable by the TWG.

Experts from Ricardo and other stakeholders were also consulted. Their expert opinion is that **benchmark levels would provide a more ambitious yet practical option for TWG** (measure IED#24), which could likely result in a more efficient and practical approach when compared to the "all or nothing", that is, "binding", option put forward by measure IED#23.

The scale of the benefits, however, would depend on the uptake of the binding BAT-AEPL and/or the benchmark-setting options when compared to the baseline. Evidence suggests that having a more pragmatic option for TWG (IED#24) is likely to have more impact in practice, since it is not expected that binding BAT-AEPLs would be preferred or possible in most cases.

Additional administrative costs are summarised in Table A10-3 below.

Table A10-3: Administrative burdens for PO3-a to PO3-g

Policy options	Additional administrative burden on businesses, annual average over 20 years (M€2020 p.a.)	Additional administrative burden on public authorities, annual average over 20 years (M€2020 p.a.)
PO3-a		
IED#23	7	6
IED#24	16	12
PO3-b		
IED#25	46	23
PO3-c		
IED#26	None/ Limited	None/Limited

Policy options	Additional administrative burden on businesses, annual average over 20 years (M€2020 p.a.)	Additional administrative burden on public authorities, annual average over 20 years (M€2020 p.a.)
PO3-d		
E-PRTR#10	3.9	0.3
PO3-e		
E-PRTR#11	5.0	-
E-PRTR#12	5.0	-
E-PRTR#13	25.0	0.03
PO3-f		
E-PRTR#14	0.3	0.4
E-PRTR#15	0.3	0.4
E-PRTR#16	0.02	0.03
PO3-g		
E-PRTR#17	-	-
Sub-total IED measures #23	53	29
Sub-total IED measures #24	62	35
Sub-total E-PRTR measures	39.55	1.201
Total - all PO3 measures	**92.50** **101.5**	**30.2** **36.2**

4. Information supporting the assessment of Option PO4

Box 6 compares the three measures contained in PO4-b.

Box 6: Comparison of the three measures contained in PO4-b

PO4-b includes alternative measures that would review or allow the BREF and IED permitting processes to consider and set emission limit values for GHG for IED installations, even where these emissions are addressed under the EU ETS framework.

The legislation that transposes the IED in the majority of Member States (21 out of 27) does not include emission or concentration limits for GHG. This option would, therefore, review and/or change this. The alternatives considered have similar ambitions, albeit the proposed timing and approach is very different. Whereas one alternative (IED#28) suggests that a formal review of the IED and ETS interface is carried out, another (IED#29) would introduce a 'sunset date' beyond which this exemption is no longer applicable or delete this exemption (Article 9(1)) immediately (IED#30).

Available evidence regarding the **PO4-b-IED/ETS interface** measures that delete Article 9(1) later (IED#29) or immediately (IED#30) suggest that these measures will also lead to an increase in CAPEX and OPEX for IED operators, who would be required to increase decarbonisation and energy efficiency efforts. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon

price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether are measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Subsequent to the initial investment, operators' life cycle costs would diminish. Given the evidence available and significant uncertainties, it has not been possible to quantify these impacts.

Introducing a review of the interface between the IED and the ETS (IED#28) or a sunset (IED#29) clause into Article 9(1), or deleting Article 9(1) (IED#30) could have a wide range of impacts, depending on the selected alternative. Immediate deletion would likely result in GHG emission reductions at the specific installations, depending on the stringency of GHG emission limits derived under IED. This may also have other positive environmental impacts, such as on air quality and resource use, as decarbonisation techniques may have also positive impacts on overall depollution, and hence environmental protection. This, however, could lead to more carbon allowances becoming available for trading in the ETS, which could impact the carbon price and affect incentives for emissions reductions in other ETS sectors. The scale of impact will depend on whether measures are taken to address potential impacts on the carbon price, e.g. through the Market Stability Reserve, the timing of measures, derogations allowed, speed of technological advancement, technology cost curves, and energy efficiency gains achieved. Introducing a review (IED#28) or sunset (IED#29) clause into Article 9(1) may delay potential impacts.

Additional administrative costs are summarised in Table A10-4 below.

Table A10-4: Administrative burden from PO4-a and PO4-b

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
PO4-a		
IED#27	**29**	**21**
PO4-b		
IED#28	None/Limited	None/Limited
IED#29	15	11
IED#30	56	40
PO4-c		
E-PRTR#18	0.002	0.003
PO4-d		
E-PRTR#19	0.002	0.003
sub-total IED measures	100	76
sub-total E-PRTR measures	0.004	0.006

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
Total - all PO4 measures	**100**	**76**

5. Information supporting the assessment of Option PO5

Box 7 provides a detailed summary of the impacts of measures included in PO5-a, that dominate the assessment of policy option PO5. An overview of the main parameters, such as number of farms, animals, emissions, costs and benefits, for the various LSU thresholds considered for cattle, pigs and poultry farms (50-150 LSU) is provided in Box 8.

Box 7: Summary of the impacts of the three measures included in PO5-a

PO5-a includes three policy measures on cattle-farming and IRPP: expanding the current IRPP scope, bringing cattle farms within the scope and applying a tailored permitting/registration system.

Analysis carried out suggests that including cattle-farming at a threshold between 50-150 LSU or more and expanding the capacity thresholds for IRPP to a threshold level between 50-150 LSU or more could introduce **~161 000-517 000 farms across the EU under the IED's regulatory framework (84 000-330 000 cattle farms and 77 000-187 000 additional IRPP farms).** This would mean a significant increase in the number of sites regulated by the IED, covering in total as a result of the scope increase (i.e. including the farms already covered) however only less than the 10-40% larger farms, out of the c.1.5 million of cattle, pigs and poultry farms with more than 10 LSU existing in the EU.

	Pigs farms	Poultry farms	Cattle farms	Total
Total farms in EU incl. subsistence (< 10 LSU)	1 955 640	3 972 880	1 927 650	7 856 170
Total farms in EU > 10 LSU	275 210	318 610	869 400	1 463 220
Farms currently covered by IED	11 100	12 000	0	23 100
Farms newly brought into IED scope	77 000-187 000		84 000-330 000	161 000-517 000

Administrative burden on businesses and public authorities

As a result of these measures, farm operators would need to further engage with applying for permits and implementing BAT based requirement, as defined in a Commission implementing act and, if already regulated, addressing permit reconsideration and updates.

Under full IED permitting, **additional administrative costs for businesses is estimated at €182 million per year** for cattle, pigs and poultry **farms of 50 LSU** or more, and at **€596 million per year** for **farms at 150 LSU** or more over 20 years from adoption of these policies. **Public authorities would face a similar annual burden**.

Sectoral expansion	Administrative burden on businesses (per year on average)	Administrative burden on public authorities (per year on average)
Cattle farming (50-150 LSU or more)	€102-401 million	€102-401 million

Rearing of pigs (50-150 LSU or more)	€39-95 million	€39-95 million
Rearing of poultry (50-150 LSU or more)	€41-100 million	€41-100 million
Total	**€182-596 million**	**€18222-596 million**

Source: Ricardo analysis

The introduction of a more **tailored regulatory framework** seeks to minimise the impact on the already established Member State permitting systems. This framework would define the minimum BAT-based requirements that Member States could implement within their national permitting systems and, therefore, mitigate the additional administrative and compliance burden. The tailored framework could also be employed for the existing IED IRPP installations at the discretion of Member States.

The possible reduction of impacts on administrative burden could be achieved by:

1. Reducing IED requirements specific to the livestock sector.
2. Aligning with existing permitting systems.

Firstly, reducing overall requirements (pillar 1) may include:

- Removal of the need for baseline reports under Article 22.
- Reduction in the frequency of inspections to, e.g., every 5 years as a default, or being triggered by complaints or compliance.
- Stepwise BAT requirements that are dependent on farm-size (rather than one farm size threshold), thereby reducing BAT requirements for smaller farms.
- Inclusion of minimum ELVs in a Commission implementing decision.

This is expected to yield a reduction in administrative burden by up to **20%,** while still achieving a significant environmental gain.

Secondly, aligning with the existing permitting systems (pillar 2) could achieve between **5% – 40% additional** reductions in burden when compared to a full permitting scenario. This can be achieved by the Member States that already deploy environmental permits or apply general binding rules that mean that non-IRPP farms have to apply BAT or comply with certain ELVs, in practice.

The table below explores the possible cumulative reduction in administrative burden associated with tailored approach when compared to the full-permitting baseline scenario.

Base reduction in tailored approach from Pillar 1: Reduction in requirements	**First additional reduction based on existing permitting system**	**Second additional reduction based on existing permitting system with full implementation of BAT**	**Cumulative level of reduction in administrative burdens achieved for different baseline situations.**
20% for all operators and permitting	0% (no evidence of a permitting system. Registration systems are not considered	N/A	**20%**

authorities	valid)		
	5% (evidence of a permitting system but no evidence of BAT)	N/A	**25%**
	20% (evidence of a permitting system with some level of BAT, but with confirmation from the MS that BAT requirements are more limited than likely required under the IL BREF)	20% (evidence of a permitting system with full implementation of BAT)	**40% - 60%**

Source: Ricardo analysis based on engagement with stakeholders

Therefore, the cumulative **reduction in administrative burden associated with the tailored approach could range from 20% - 60%,** when compared to a full permitting baseline and depending on the Member States' status quo.

A consultation was carried out to gather additional evidence and confirm which of these possibilities would be most appropriate for each Member State. From this, we estimate that the measure could reduce the **overall administrative burden for these sectors by 30%-40% across the EU**. The largest efficiencies would appear for Member States with strict existing environmental requirements.

PO5-a would, therefore, have a **resulting administrative burden on businesses between €110-394 million per year**, depending on the specific threshold between 50-150 LSU, if the tailored approach to regulating farms was taken forward. **Public authorities would likely face a similar annual burden.**

Sectoral expansion	Administrative burden on businesses (per year on average)	Administrative burden on public authorities (per year on average)
Cattle farming (50-150 LSU or more)	€63-281 million	€63-281 million
Rearing of pigs (50-150 LSU or more)	€23-55 million	€23-55 million
Rearing of poultry (50-150 LSU or more)	€24-58 million	€24-58 million
Total (50-150 LSU or more)	**€110-394 million**	**€110-394 million**

Source: Ricardo analysis

In addition, further administrative savings could be introduced if the tailored framework were adopted by Member States for the existing IRPP installations (~20 500).

Operating costs and conduct of business (substantive compliance costs)

PO5-a would also require farm operators to adjust and/or implement new techniques to target the reduction of their environmental impacts as identified through a Commission implementing act based

on BAT. The stringency of the BAT requirements cannot be defined with precision at this stage. These would target in particular two key environmental issues for the sector: emissions to air of ammonia, NH3, and methane, CH4. **Substantial compliance costs to introduce abatement techniques for these pollutants only could reach an annual €265-813 million across the EU, depending on the specific threshold between 50-150 LSU**. This is a central estimate based on existing practices of emission reduction in Member States who already apply reduction technologies. The BAT based Commission implementing act may however require a higher share of highly effective technologies to achieve stricter ELVs.

Sectoral expansion	**Substantive Compliance Costs for Abatement of NH_3 and CH_4 emissions (per year on average)**
Cattle farming (50-150 LSU or more)	Around €112-441 million
Rearing of pigs (50-150 LSU or more)	Around €91-222 million
Rearing of poultry (50-150 LSU or more)	Around €62-150 million
Total (50-150 LSU or more)	**Around €265-813 million**

Source: Ricardo analysis based on the GAINS model

Environmental benefits

The environmental benefits associated with these measures could be significant. For example, the introduction of cattle and the expansion of IRPP coverage within the IED could result in significant reductions in the emissions to air of NH_3 and CH_4. As illustration of the relevance of the widened scope, a large part of emissions of ammonia from livestock farms under the IED legal framework:

Proportion (%) of ammonia emissions of the sector regulated under the existing and the widened IED scope					
	Pigs farms	**Poultry farms**	**IRPP total**	**Cattle farms**	**IRPP and cattle total**
Existing IED scope	39.4%	42.0%	40.4%	0.0%	17.6%
Widened IED scope (50-150 LSU)	82-86%	86-97%	84-97%	41-81%	70-92%

Furthermore, by expanding the scope to include cattle farms as well as smaller pigs and poultry farms, the fraction of methane emissions from livestock that is regulated by the IED as such increases from around 3% to 43-80% (c. 2,650-4,900 kt CH_4 per year) . This includes emissions from enteric fermentation and manure management, representing c. 82% and 18% of the EU livestock methane emissions in 2018, respectively. There is therefore a high potential for the IED to contribute to methane emission reductions, as technologically feasible mitigation practices do exist.

NH3 and CH4 emission reductions benefits are valued at around €5 450-9 240 million per year, depending on the specific threshold between 50-150 LSU. This is a central estimate based on existing practices of emission reduction in Member States who already apply reduction technologies. The BAT based Commission implementing act may however require stricter ELVs and hence result larger emission reductions.

Sectoral expansion	Monetised benefits of NH_3 abatement (per year on average)	Monetised benefits of CH_4 abatement (per year on average)
Cattle farming (50-150 LSU or more)	Around €2 100-3 980 million	Around €1 299-2 653 million
Rearing of pigs (50-150 LSU or more)	Around €524-690 million	Around €551-719 million
Rearing of poultry (50-150 LSU or more)	Around €974-1 195 million	-
Total (50-150 LSU or more)	**Around €3 598-5 865 million**	**Around €1 850-3 372 million**

Source: Ricardo analysis based on the GAINS model

Reductions in other air pollutants, as well as emissions to soil and water, both directly (e.g., PM) and indirectly (e.g., PM, ozone) would lead to further benefits which have not been quantified for this report.

Box 8: Main parameters for each LSU threshold (50-150 LSU) considered in PO5-a

The values below present the number of farms, animals as well as the reduction of CH_4 and NH_3 emissions corresponding to a specific threshold in the range of 50-150 LSU. The percentage of farms and animals per LSU threshold are relative to the total number of non-subsistence farms in the EU-27 per livestock category. Furthermore, costs (administrative and compliance), monetised benefits and the resulting benefit-cost ratio is presented for each LSU threshold considered.

The emissions of CH_4 and NH_3 covered by each LSU threshold are directly in proportion of the number of animals covered by that LSU threshold. In the case of CH_4 emission reduction from cattle farms, the assessment has assumed a technique (nutrition based) can be applied that reduces emissions from enteric fermentation by up to 10%, which is currently an accepted value and which is in line with academic research on various feed modifications. However, it is acknowledged that this is a conservative estimate as some scientific publications report significantly higher emission reduction potential (c. 36-50%). Detailed assessment of specific feeding techniques is required to validate such potential. This would take place as part of the preparation of the BAT requirements for these activities.

	Farms		Animal heads		CH_4 reduction	NH_3 reduction
	Number	%	Number (x1000)	%	kt	kt
CATTLE						
> 50 LSU	330,346	39%	64,008	81%	359	115
> 100 LSU	162,736	19%	48,986	62%	275	88
> 125 LSU	123,437	14%	40,899	52%	229	74
> 150 LSU	84,000	10%	32,811	41%	184	59
PIGS*						
> 50 LSU	102,120	37%	98,947	94%	159	39
> 100 LSU	69,660	25%	93,288	89%	150	37
> 125 LSU	59,080	21%	88,681	85%	143	35
> 150 LSU	48,500	18%	84,073	80%	135	33
POULTRY*						
> 50 LSU	107,770	32%	1,198,810	98%		71
> 100 LSU	71,700	21%	1,153,920	95%		68
> 125 LSU	61,700	18%	1,105,910	91%		65
> 150 LSU	51,700	15%	1,057,900	87%		63

* total values for pigs and poultry, i.e. including the values for the existing IRPP farms under the IED.

	Admin costs for business €m/year	Admin costs for business - TA €m/year	Admin costs for public authorities €m/year	Admin costs for public authorities - TA €m/year	Compliance costs for business €m/year	Benefits €m/year	BCR
CATTLE							
> 50 LSU	401	249 - 281	401	249 - 281	441	6,633	6.9
> 100 LSU	198	123 - 139	198	123 - 139	217	5,076	10.8
> 125 LSU	150	93 - 105	150	93 - 105	165	4,238	11.9
> 150 LSU	102	63 - 70	102	63 - 70	112	3,399	14.0
PIGS							
> 50 LSU	94.6	55.1	94.6	55.1	222	1,409	4.3
> 100 LSU	60.9	35.4	60.9	35.4	143	1,282	6.0
> 125 LSU	49.9	29	49.9	29	117	1,179	6.7
> 150 LSU	38.9	22.6	38.9	22.6	91	1,075	7.9
POULTRY							
> 50 LSU	99.6	57.9	99.6	57.9	150	1,195	4.5
> 100 LSU	62.1	36.1	62.1	36.1	93	1,125	6.8
> 125 LSU	51.6	30.1	51.6	30.1	78	1,050	7.6
> 150 LSU	41.3	24	41.3	24	62	974	8.9

TA: Tailored Approach; BCR: benefit-cost ratio

Table A10-5 provides a detailed summary of the assessment of impacts of the measures that dominate the impact assessment of options PO5 a to f. These are the measures that concern IED scope expansion for which full detail is available in Annex 8. Measures concerning E-PRTR scope expansion have limited impacts in the form of administrative burden, which are provided in Table A10-6.

Table A10-5: Synthesis of impacts of IED scope expansion measures included in PO5 a to f

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
PO5-a	Expand the current sectoral coverage of the **rearing of animals:** cattle farming (**IED#31**), expand IRPP (**IED#32**) AND a tailored permitting process for the rearing of animals (**IED#33**)	▪ Agriculture emissions of 463Mt CO2e represent 13% of the total EU-27 GHG emissions. **The activities regulated under this option currently represent about 21% of the 463Mt CO2eq of GHG (mainly methane) emitted each year by the agricultural sector.** ▪ Livestock farming contributes to the presence of surplus nitrogen in European aquatic environments while also being a principal emitter of ammonia, leading to considerable environmental damage, such as eutrophication. ▪ EU27 total NH_3 emissions were 3.6 Mt in 2018, of which 2.4 Mt/year were from livestock. **The NH_3 emissions from pigs represent approximately 45% of NH_3 emissions relative to the scope of the IED, and the corresponding value for poultry is 28%.** ▪ **The activities regulated under this option currently represent about 37% of total EU ammonia emissions to air.** ▪ The processes and emissions patterns from the cattle sector (and widened scope for IRPP) are relatively simple in comparison with other IED activities. Agro-industrial activities may not require the full extent of the IED regime as laid out in 2010/75/EU. Therefore, for such activities a specific tailored approach (TA) is considered.	<u>Include cattle farming (IED#31 and #33)</u> ▪ This covers approximately 84 000-330 000 cattle farms (>50-150 LSU). ▪ The total EU27 compliance costs for bringing cattle farms larger than 50-150 LSU (equivalent to 69-207 animal places or heads) into the IED are estimated to be € 112-441 m/ year for applying abatement measures tackling NH_3 and CH_4 emissions. ▪ The associated administrative costs are estimated to be € 102-401 m/year leading to a total cost of € 214-842 m/year. The adoption of a TA for implementing cattle farming in the IED could represent a cost reduction of c. 30%. ▪ The costs are smaller than the monetised benefits of **NH_3 and CH_4** emissions reductions which are estimated to be c. € 3 400-6 600m/year. **The benefit-cost ratio is approximately between 7-14.** ▪ It is assumed that the majority of the cattle farms will be SMEs, particularly sizes 50 to 300 LSU. ▪ With a threshold within the range of 50-150 LSU, approximately 185-360 kt of CH_4 and 60-115 kt of NH_3 could be mitigated per year. These reductions in CH_4 emissions would contribute to the EU Methane Strategy. ▪ The fraction of methane emissions from cattle that is regulated by the IED as such would increase from

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
			0% to around 80%. <u>Amend the capacity thresholds of IRPP (IED#32 and #33)</u> ▪ This covers an additional 77 000-187 000 pigs and poultry farms under the IED (c. 37 400-91 000 pigs and 39 700-95 800 poultry farms). ▪ The total EU27 compliance costs for reducing the IED thresholds to a threshold within the range of 50-150 LSU for pigs (170-500 production pigs, 65-195 sows) and poultry (~2 400-7 200 animals) are estimated to be € 91-222 m/year and € 62-150 m/year, respectively, for applying abatement techniques tackling NH_3 and CH_4 emissions. ▪ The associated administrative costs are estimated to be € 39-95 m/year for pigs and € 41-100 m/year for poultry, leading to a total cost of € 130-317 m/year for pigs and € 103-250 m/year for poultry. ▪ The costs are smaller than the monetised benefits of NH_3 and CH_4 emissions reductions which are estimated to be € 1 075-1 409 m/year for pigs and € 974-1 195 m/year for poultry. **The adoption of a TA for IRPP in the IED could see the permitting costs drop by c. 30%, per year.** ▪ **The benefit-cost ratio is approximately 4-8 for pigs and 5-9 for poultry** (depending on the specific threshold within 50-150 LSU)**.** ▪ With a threshold within the range of 50-150 LSU, approx. 77-101 kt of CH_4 could be mitigated per year (pigs), as well as approx. 19-25 kt and 37-45 kt of NH_3 emissions per year for pigs and poultry respectively. <u>Introduce a tailored regulatory framework (TA)</u> ▪ The TA, even when not combined with the scope extensions, could be beneficial and lead to similar

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
			environmental performance with lower administrative burden. A TA would lead to a reduced administrative cost for businesses (farms) as compared to implementing full IED chapter II requirements. The amount this would be reduced will depend on which requirements are placed on installations in the TA. ▪ **It is expected that the TA via its Pillar 1 (reducing requirements) could reduce cost up to 20%. If Member State competent authorities chose to implement a TA for those already regulated, then costs for existing IRPP operators would be lowered for these farms in the EU27 by around € 20 m/year.** ▪ Farm operators that are SMEs would stand to benefit from the reductions in administrative burden. ▪ No detrimental environmental impacts are expected to be induced by the briefer TA, which will reduce administrative burden, but not compromise on pollution control.
PO5-b	Extend the current sectoral coverage to also include **battery production** within the scope of the IED **IED#34**	▪ The main environmental pressures from the sector are energy consumption, use of hazardous substances, water pollution and waste management, use of raw materials / circularity of the materials used and re-manufacturing of products. ▪ **Europe could see its share of global battery production increase from a 7% in 2020 up to 31% by 2030.** ▪ The EU's climate-neutral target includes an objective of at least 30 million zero-emission cars on the road by 2030, and the ambition of European companies meeting more than 90% of the demand for batteries. ▪ Re. total energy storage capacity, sector growth is primarily attributable to the electrification of transport (accounts for most of the	▪ The Commission has identified batteries as a value chain of strategic importance and has proposed an industry-led approach. ▪ The scope of the EU battery directive has recently been extended to cover sustainability and safety requirements targeting among others the restrictions of hazardous substances. Sustainability of batteries and their re-purposing is regulated by the (new draft – in co-legislation) Batteries Regulation ▪ More than half of the companies active in this field are SMEs thus there may be a considerate impact from the policy option on smaller companies. ▪ Apart from the pollution of air and

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
		battery demand in 2030). ▪ **The total production capacity in the EU ranges between 69.5 and 143.5 GWh. Plans have been revealed to build more than 20 large-scale battery factories in the EU in the coming years, with an expected production capacity of 600 GWh.** ▪ Inclusion of battery manufacturing and disposal and recovery would ensure that all types of facilities included in the life cycle of batteries are covered by the requirements. As such, it can contribute to the consistent framework and provide for more sustainable growth of the industry. ▪ Much of the batteries value chain is already covered by IED (non-ferrous metals and processing, chemicals, production of chemicals, waste treatment). ▪ **The rapidly changing scale of battery production, disposal and recovery is a key driver in determining whether this sector should be regulated under the IED or not.**	water, the IED (through BAT conclusions for the sector) could be effective in addressing energy consumption, use of resources, chemicals and in accident prevention (e.g. through an EMS). ▪ The number of production installations is expected to be c. 20-25 sites by 2030 and c. 45-95 by 2040 (central estimate used in the assessment is 25 installations).
	Extend the current sectoral coverage to also include **forging presses, cold rolling** with capacity exceeding 10 t/h, and **wire drawing** with capacity exceeding 2 t/h within the scope of the IED **IED#36**	▪ The environmental pressures from forging relate to energy use, noise, emissions to air, GHG emissions, and resource consumption.	▪ The measure would expand the existing scope and cover likely more than 250-400 installations (combined forging, cold rolling and wiredrawing installations). ▪ The IED could be effective in regulating the pollution typically arising from these activities.
	Extend the current sectoral coverage to also include **textile finishing activities** with	▪ Finishing processes are considered one of the most pollutant aspects of textiles. The main environmental issues relate to the amount of polluted water discharged and the chemical load it carries, including	▪ The measure would expand the existing scope to include the activity of 50-100 installations that may also have finishing activities. ▪ Textile manufacturing is a diverse industry dominated primarily by

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
	the existing capacity thresholds in IED activity 6.2 (pre-treatment or dyeing of textile fibres or textiles) **IED#37**	organic compounds. Moreover, the textile finishing sector consumes high rates of energy, water and chemicals. Other relevant issues to consider in this sector are those related to air emissions, solid wastes and odours, which can be of significant nuisance in certain treatments. ▪ The textile finishing industry market share in EU textile production was around 10% between 2011-2017. In 2018 the finishing of textiles industry accounted for 8% of the EU total textile manufacture. ▪ This is a gap-filling extension of scope as it would include textile finishing activities alongside textile production activities already covered under IED activity 6.2 (pre-treatment or dyeing of textile fibres or textiles).	SMEs. Manufacturers are typically small and highly specialised businesses ▪ The textile finishing industry in the EU is currently led by four countries (Italy, Germany, Spain and Portugal), which together account for almost 72% of the market share for the entire EU.
	Extend the current sectoral coverage to also include **smitheries** of 20 kilojoule per hammer with no threshold for the calorific power or reduce the capacity threshold for the calorific value to > 5 MW in activity 2.3(b) **IED#38**	▪ Environmental pressures from smitheries relate to emissions to air (dust, NOx, SO_2), noise, vibrations, and consumption of energy. ▪ The measure will encompass a larger proportion of the sector's emissions and impacts, particularly for releases to air.	▪ The number of smitheries with hammers that would be included in the scope is highly uncertain, with a possible range of 400-500 smitheries.
PO5-c	**Landfills:** Adoption of BAT conclusions for activity 5.4 landfills (**IED#39**) AND Revise the capacity threshold in Annex I for activity 5.4	▪ The key environmental issues from landfills relate to releases to water/soil and to air (GHG and air pollutants). ▪ Landfills remain an important source of GHG emissions: with **emissions of GHGs, equating to 1.6 – 2.4%, relative to the baseline scope of the IED.** ▪ **Landfills are also associated with associated with releases to water (leachate) of several heavy metals, including cadmium, zinc and**	<u>Adoption of BAT conclusions (IED#39)</u> ▪ **Currently, the existing requirements of the Landfill Directive are not shown to be out of date and may still represent state-of-the-art, however, adoption of BATC would lead to improvement in existing standards and <u>continuous improvement</u> moving forward.** ▪ **The measure would contribute to climate neutrality as the BATC**

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
	landfills (**IED#40**)	**chromium. These releases, relative to the baseline scope of the IED, can be sizeable, e.g. 4.7 – 9% of cadmium releases.** ▪ **No BATC exist for landfills, considered under activity 5.4**. This is owing to the coverage of this activity under Council Directive 1999/31/EC, the Landfill Directive. Currently the Landfill Directive provisions are deemed to constitute BAT (Art 1(2) of Directive 1999/31). ▪ **An updated BREF and BATC for landfill would allow the consideration of techniques that are nowadays more prevalently used in the sector, such as methane capture.**	**would cover management of landfill gas**. However, the impact of the measure is uncertain and dependent upon the eventual BREF. ▪ NB Repeal of Article 1(2) of 1999 Landfill Directive is necessary to enable Landfill BREF/ BAT conclusions, and update of reference from IPPC to revised IED. <u>Revising the capacity threshold (IED#40)</u> ▪ There were around 2 950 landfill sites in the EU-27 in 2018 (hazardous waste and non-hazardous waste). However, very limited data could be found regarding the distribution of landfills by capacity size, which limits the ability to assess impacts of this measure. The number of landfills with a capacity below the current threshold is expected to be very limited. ▪ Because the additional sites under the extended scope would be smaller landfills, there is the potential for this measure to disproportionately impact SMEs. Furthermore, given larger landfill operators already fall under the scope of the IED, any additional costs will only fall on smaller operators. ▪ Assuming no BATC are implemented alongside the threshold change, smaller operators that come into scope are only required to comply with wider monitoring and reporting requirements which have no significant direct impact.
PO5-d	Include **non energy minerals extraction activities** (E-PRTR Annex I activities 3a and 3b) and	▪ **Minerals extraction activities are considered as potentially highly polluting activities not within the scope of the IED.** ▪ The sector is responsible for **environmental impacts, particularly in terms of air**	▪ **The sector has a high share of SMEs** (over 90% of enterprises or 40% of all employees are classified as, or working within an SME). The measure, therefore, will impact upon SMEs within the sector. ▪ Among **the key environmental**

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
	extractive waste within the scope of the IED **IED#41**	**emissions, water pollution, waste and emissions to soil and groundwater, notably with regard to heavy metals.** ▪ **The demand for critical minerals and industrial minerals by other growing sectors will continue to place demands on specific mining installations** (although some of this would be outside of the EU, the EU wishes to be far more self-sufficient re. Critical Raw Materials in the future).	**issues, the strongest impacts across all mineral categories relate to structural and physical stability, emissions to soil and groundwater, and the discharge of suspended particles and metals in surface water**. Different extracted materials have different impacts on the water quality and the quantity used. ▪ Emissions to air during extractive practices relate to dust and particles, which are easily dispersed by wind. Such emissions differ substantially based on the techniques used and the composition of the ore, even within subsectors. ▪ **Minerals extraction activities may lead to substantial emissions of PM10 equivalent to around 4.4% of total industrial emissions covered by the IED (E-PRTR data).** ▪ Extractive waste resulting from mining activities is regulated by a dedicated directive, (Extractive Waste Directive 2006/21/EC) and a BREF on management of extractive wastes is already available. ▪ Potential benefits are likely to outweigh costs, especially for the extraction and treatment of metallic and industrial minerals. ▪ For quarrying, i.e. extraction of aggregates, given the fewer environmental issues and higher number of sites, benefits are not expected to outweigh costs. ▪ **It is concluded to focus the scope of the measure on only extraction and treatment of metallic and industrial minerals. It is estimated that this would include c. 800-900 "minerals extraction" installations to be regulated under the IED.**
PO5-e	Include **Aquaculture** in	▪ **The demand for seafood is expected to increase; European**	▪ In 2018 there were about 15 000 aquaculture companies in the EU,

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
	the IED scope **IED#42**	**aquaculture can help to meet that demand.** ▪ **There is a driver for a more sustainable and competitive EU aquaculture sector (aquaculture was identified to contribute to the EGD objective).** ▪ **Environmental impacts** from the sector **mainly relate to water pollution (N and P), waste generation and use of resources.** ▪ Aquaculture contributes to nutrient build-ups in the case of open water aquaculture (cages), which can lead to **eutrophication and/or nitrification** from non-consumed feed, faeces, dead fish. ▪ Depending on feed material, **pharmaceutical products, growth promoters, antibiotics, and anti-algae biocides can leach into the surrounding aquatic environment**, impacting other species, causing **localised pollution and leading to anti-microbial resistance.** ▪ **The measure could facilitate a level playing field in the EU** in terms of preventing and controlling environmental pollution.	employing 69 000 people and producing 1.2 million tonnes of produce. ▪ There are between 55 and 250 aquaculture installations which produce >1000t a year. ▪ Approx. 90% of aquaculture enterprises in the EU employ fewer than 10 people. ▪ Members States with the highest levels of production are Spain, France, Italy and Greece. ▪ Aquaculture may not contribute significantly to the emissions of pollutants regulated by the IED, apart from nutrient emissions to water. ▪ Further evidence on the environmental, social and economic impacts of the sector at EU level is currently being compiled, e.g. as part of the implementation of the Strategic Guidelines for a more sustainable and competitive EU aquaculture (COM/2021/236 final).
PO5-f	Include **Upstream oil and gas** in the IED scope **IED#43**	▪ Environmental impacts from hydrocarbon operations may include impacts to air, climate, water (surface and subsurface), noise, soil and subsurface geology and biodiversity. There is potential for the modification and/or destruction of species habitat, and the disturbance and displacement of flora and fauna. ▪ **Flaring, venting and fugitive emissions are widely recognised as a source of GHGs and air pollution. Methane** is a **primary constituent of produced gas.** ▪ Furthermore, handling and storage of chemicals is required for a variety of operations. ▪ Conventional offshore oil and gas extraction is contracting as a sector, although potential for unconventional gas to expand.	▪ There are around 1 000-2 000 installations (offshore and onshore) in the EU. ▪ The Member States with most offshore installations in the EU27 include Germany, Denmark, Ireland, Netherlands, and Spain. ▪ **Upstream oil and gas installations appear to contribute around 0.75% of NOx totals in the IED and 1.75% of NMVOC totals. The measure is likely to have a positive impact on air quality** ▪ **Upstream oil and gas industries are covered by a "hydrocarbons" BAT Guidance Document thus best available techniques have already been identified (2019). NB This is solely "guidance", not mandatory for operators.**

Option N°	Policy measure	Key impacts of the activities	Summary of evidence
		▪ **Baseline scenario projections suggest that, compared to 2020 levels, EU production of oil will be 10% lower in 2030 and accelerating to 40% decrease in 2040. For natural gas, the EU production is expected to drop by 20% by 2025 compared to 2020 levels, and then remain at this level to 2040** (source: PRIMES).	▪ Other legislation and guidelines applicable to the sector include the Offshore Safety Directive and work of the EU Offshore Authorities Group (OAG), the Seveso III Directive, and work under international conventions such as the Oslo and Paris (OSPAR) and Barcelona Conventions. These groups operate independently from the EU albeit that the EU and its Member States are generally members of such groups. ▪ The inclusion of upstream oil and gas activities within the scope of the IED, and thus making **binding recommendations for BAT and BAT-AELs for the sector through a BAT Conclusions document** would be expected **to target methane releases as a key environmental issue of the sector.** In this way, the measure would be expected to contribute to the EU Methane Strategy. ▪ **Legislation specifically targeting methane emissions from the energy sector is expected in the fourth quarter of 2021**.

Additional administrative have been estimated to the extent that is possible and are summarised in Table A10-6 below.

Table A10-6: Administrative burden from PO5-a to PO5-i

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
PO5-a		
IED#31 (+E-PRTR#20)	102-401 15.5	102-401 1
IED#32 (+E-PRTR#21)	80-194 13.4	80-194 1.5
IED#33	- 63-232	- 63-232
PO5-b		
IED#34 (+E-PRTR#22)	0.6 0.1	0.8 0.007

Policy options	Additional administrative burden on businesses, M€2020 annual average over 20 years	Additional administrative burden on public authorities, M€2020 annual average over 20 years
IED#36 (+E-PRTR#24)	6 0.6	4 0.03
IED#37 (+E-PRTR#25)	1 0.1	1 0.007
IED#38 (+E-PRTR#26)	7 1.8	5 0.07
PO5-c		
IED#39	0	0
IED#40 (+E-PRTR#27)	Not available	Not available
PO5-d		
IED#41	12	8
PO5-e		
IED#42	2	2
PO5-f		
IED#43	23	15
PO5-g		
E-PRTR#28	0.3	0.01
PO5-h		
E-PRTR#29	5.5	0.30
E-PRTR#30	3.5	0.19
PO5-i		
IED#44 (+E-PRTR#31)	N/A	N/A
sub-total IED measures	170.6-414.6	154.8-398.8
sub-total E-PRTR measures (with #29)	37.3	2.9
sub-total E-PRTR measures (with #30)	35.3	2.8
Total - all PO5 measures	**207.9-451.9€ (E-PRTR#29) 205.9-449.9 M€ (E-PRTR#30)**	**157.7-401.7 M€ (E-PRTR#29) 157.6-401.6 M€ (E-PRTR#30)**

Annex 11: Sector transformation case studies

Three case studies have been undertaken to illustrate how the expected industrial transformation would impact pollutant emissions, GHG emission and use of resources, and how this could affect the relevance of the IED and E-PRTR legal framework and coherence and synergies with related legislation. These concern the following sectors:

1. **Cement production**: a sector where both CCS/CCU and circular economy are expected to be important for the sector's transformation;

2. **Iron and steel**: a sector considered particularly advanced in terms of development of transformation technologies;

3. **Downstream oil and gas (refining):** a sector that will have to transform not only in process or ways of using energy but also in terms of moving to renewable feedstock materials.

The detailed case studies are included in the report from Ricardo supporting this impact assessment. This annex provides a summary table and an overview table describing the potential decarbonisation and transformation pathways and the related GHG and pollutant emission impacts, the maturity of their development and the related challenges BREF development and permitting under the IED.

Table A11-1: Key findings from the industrial transformation case studies

Transformation pathways across sectors	Cement	Iron and steel	O&G Refineries	Challenges from the IED perspective
1.Carbon Capture and Utilisation / Storage	• CCU/S with TRL 3-8, pilot projects and investments ongoing, expect only a few full-scale operations before 2030 • High GHG impact, could reach up to 95% abatement albeit uncertain • Unclear impacts on other KEI	• Two options (top gas recycling and/or STEPWISE) with TRL 4-8 • Medium-High GHG impact, could reach 65%-75% abatement albeit uncertain • Mixed impacts on air pollution, positive and negative respectively	• CCU/S with TRL 3-9, with some investments at commercial stage already, evidence suggests first-of-a-kind in 2021, and 13 plants in EU in 2030 • High GHG impact, could reach up to 95% abatement albeit uncertain • Unclear impacts on other KEI	• Need decision on whether to base BAT on the application of CCU/S. This might have significant implications for operator investment plans • CCU/S covers techniques applicable to multiple sectors and is an IED activity. BREF updates and/or a new BREF may be required to define BAT. A concern would be to ensure that CO2 'leaks' are avoided
2. Alternative energy sources	• Three options (electrification, hydrogen and biomass) with TRL 3-9, highest for biomass • Medium-high GHG impact, up to 100% abatement from final energy consumed • Likely positive impacts on reducing pollution; use of hydrogen could have negative impacts via NOx emissions	• Two options (electrification and biocoal) with TRL 5-9, highest for electrification • Medium-high GHG impact, 30%-100% abatement from final energy consumed • Varied and usually positive effects on pollution, including general reduction of emissions to air, water and soil	• Challenging for high temperature heat until hydrogen is available/affordable. To electrify (low temp) heat some options already TRL 9 • High GHG impact, could reach up to 100% abatement from final energy consumed • Overall positive impact on other KEI compared to the use of conventional energy sources	• The use of alternative energy sources cuts across multiple sectors and, in some cases, IED may have limited levers to influence transformation • For some energy sources, such as biomass and hydrogen, impact on pollutant emissions could be positive or negative (e.g. NOx emissions for the hydrogen case). BAT-AELs can be a driver or a barrier for increased substitution of energy sources • Some techniques would require expanding/ updating existing sectoral BREFs (e.g. biocoal)
3. Alternative feedstocks	• Two options (raw material substitution in clinker and clinker substitution), with TRL 4-9 depending on the substitute • Low-high GHG impact, could reach up to 95% abatement albeit uncertain • Uncertain, potentially positive impacts on air pollution (e.g. when fly ash or blast furnace slag are used in the process)	• Option to use hydrogen as a reducing agent instead of coal/coke. The process also utilises hydrogen as an alternative energy source. • High potential to reduce GHG emissions by approximately 70%. • Medium positive impact on reducing pollution to air, soil and water.	• Biocrude could become an option with TRL 3-7. Hydro-treated vegetable oils TRL 9 started in 2021 and 10 plants in 2030. Other options for later in decade • High GHG impact, with 65%-85% lower CO2e emissions compared to petroleum • Potentially negative impacts e.g. increases in NOx and NH3, potential increases in O3 and acidification	• In some cases, feedstock use depends on the availability and other regulations outside of the IED's framework • Further, impact on pollutant emissions of alternative feedstocks can be positive or negative. BAT-AELs can thus be a driver or barrier for the use of these alternatives • Activity definitions, e.g. for 'Mineral oil refinery', may need updating to cover a wider pool of feedstocks
4. New processes	• Two options (Vertical roller mills and roller presses; High efficiency separators), with high TRL 8-9, and and Fluidised bed kiln with TRL 4 • Low-Medium GHG impact, could reach reduction of 1.1-6.8 kg CO2/t cement, or 3% reduction • Positive impact on air emissions due to improved energy efficiency and reduction of NOx emissions	• Five options (smelting reduction - COREX, FINEX, Hisarna-, Advanced Mineral Recovery Technology, and iron ore electrolysis process) with TRL 2-9 • Low-high GHG impact, 10%-30% abatement for the first four options and greater potential for electrolysis • Low-high positive impacts in reducing emissions to air, lower water consumption and waste generation	• Various options including power-to-liquid to manufacture synthetic fuels and others, with TRL 6-8, first-of-a-kind in 2025 and 5 new plans in 2030 • High albeit uncertain GHG impact • Potentially lower emissions to air when compared to conventional fuel production	• In some cases, these processes are already covered as ETs in existing BREFs. • In other cases, these new processes may be covered in other sectoral BREFs, so this may offer a challenge in terms of consistency and efficiency of the process (e.g. LVOC) • Further, other processes would require expanding/ updating existing sectoral BREFs (e.g. AMRT)

Table A11-2: Overview of the industrial transformation case studies

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
Cement	1. Carbon Capture and Utilisation / Storage (CCU/S)	High albeit uncertain; could reach up to 95% of baseline emissions.	Unclear impacts on other KEIs e.g., emission to water, etc.	TRL 3-8, a number of pilot projects and investments are ongoing. VDZ/Cembureau expects no or only a few full-scale operations before 2030.	Decisions will be needed on whether to base BAT on application of CCS. This would lead to requiring large investments from operators. CCU/S is a technique applicable to multiple sectors and is an IED activity in itself. Hence a BREF may be developed to define BAT for CCU/S. A technical concern would be to ensure that CO2 'leaks' are avoided, as well as their impacts on groundwater quality.
	2. Alternative energy source i. Biomass and hydrogen	Medium (biomass & hydrogen) to high (electrification); with abatement potential reaching 100% of GHG emissions from final energy consumption (not process).	Dependent on the source of energy used; use of suitable waste only has a minor influence on metal emissions from the clinker burning process; For hydrogen, although overall positive, high levels of NOx possible.	TRL 3-9, highest TRLs for biomass, lowest for electrification .	Cuts across multiple sectors. For biomass and hydrogen, impact on pollutant emissions can be positive or negative (specifically NO_x emissions in the case of hydrogen), depending on characteristics of alternative materials. BAT-AELs can thus be a driver or a barrier for increased substitution.
	3. Alternative feedstock i. Raw material substitution in clinker, including material recovery and recycling	Medium to high; Dependant on the substitute. Generally, 20-30% reduction but some binders predicted to give up to 90% GHG reduction compared to Portland cement.	Uncertain, dependent on the characteristics of the alternative feedstock.	TRL 6-9, depending on the substitute.	Impact on pollutant emissions can be positive or negative, depending on characteristics of alternative materials. BAT-AELs for pollutants can thus be a driver or a barrier for increased substitution.
	3. Alternative feedstock ii. Clinker substitution/novel	Low; Dependant on the substitute. Ultimately will depend on the quantities of	Positive impact relative to amount of cement or concrete produced; reduced	TRL 4-9, depending on the substitute.	This is partly outside the scope and control of IED cement manufacturing operators. Depends on availability and on

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
	cement	feedstock used which depends on the application.	air pollution when fly ash or blast furnace slag are used in the process.		product/application, waste and by-product standards.
	4. New processes	Low-Medium GHG impact, could reach reduction of 1.1-6.8 kg CO2/t cement, or 3% reduction.	Positive impact on air emissions due to improved energy efficiency and reduction of NOx emissions.	TRL 4-9, depending on the process.	Few challenges, as the processes are currently reported in the BREF. Updates would be required.
Iron and steel	1. CCU/S i. Top gas recycling	Medium; reduced direct emissions and 65% secondary reduction.	Positive impact on reducing air pollutant emissions, including SO_2.	Varying degree of technology readiness. Steelanol and Carbon2Chem22 are more mature (TRL 6-8). IGAR technology is in the development phase (TRL 4).	Substantial modifications are required in the industrial processes and, therefore, a BREF update and/or review of BAT Conclusions would be needed to take this into account.
	1. CCU/S ii. STEPWISE (SEWGS technology)	High; potential to reduce emissions by 75%. SEWGS is a multi-column reactive hot Pressure Swing Adsorption (PSA) system where three processes are combined in one reactor: (1) water-gas shift reaction, (2) CO_2 adsorption, (3) simultaneous acid gas removal.	Slight increase in the air pollution indicator; lower; abiotic depletion potential, Ozone Layer Depletion Potential and Human Toxicity Potential than for the CCS with MEA.	The technology is in the development phase having been demonstrated in the laboratory (TRL 4-5).	Substantial modifications are required in the industrial processes and, therefore, a BREF update and/or review of BAT Conclusions would be needed to take this into account.
	2. Alternative energy sources i. Electrification	High; greater than 70% reduction in emissions.	Depends on the source of energy used for the generation of electricity. Overall, the air emissions would be eliminated when	Some options are already TRL 9, others will continue to progress in this decade.	No direct challenges expected for the IED. Electrified production technologies are well understood for producing secondary steel. Electrification is a cross-cutting pathway

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
			renewables are used except in cases of biomass or geothermal energy.		raising horizontal issues related to the energy production system that will have impacts beyond the I&S sector.
	2. Alternative energy sources ii. Biocoal (Torero Project)	Medium; 30-70% emission reduction due to lower carbon intensity than coal.	Reduces the air emissions linked to coke-making as the energy source is changed. The direct impact of combustion in the steel-making process is not significant.	The technology is in the deployment phase having been demonstrated in a prototype operational environment (TRL 7-8,).	This process replaces powered coal with wood waste-based coal. Minor impacts to IED and existing process for steel making. The Torero project captures carbon monoxide from exhaust gas to be further processed to bioethanol. Such processes would require expanding/ updating the sectoral BREF.
	3. Alternative feedstocks i. Hydrogen as a reducing agent instead of coal/ coke (H-DRI)	High; potential to reduce GHG emissions by over 70%. However, the reduction could vary depending on the source of hydrogen and the switch from fossil fuels to renewables to deliver the demand for process energy.	Direct air emissions could be significantly reduced; whilst noting that the technology would need very large amounts of electricity (3.5 TWh per million tonne steel), in particular for the preparation of water before the electrolysis, and the electrolysis process itself. Positive impacts from lower iron ore consumption, etc.	The technology is broadly in the development phase, demonstrated in controlled environments (TRL 4-8). Many different companies are developing their own version: tkH2Steel, Hybrit, GrINHy, H2Steel (H2Future, SuSteel), Hybrid Steel Making, SALCOS; DILCOS	Would require updating BREF documents for both hydrogen production and the operational changes expected from switching from coal/coke to hydrogen. Hydrogen production is a cross-cutting pathway across many IED activities.
	4. New processes i. Smelting reduction - COREX	Low; reduced GHG emission approximately 20%	Reduction by 30% NO_X, no VOC; significantly lower SO_2. No need for coking; fuel savings of 18%. Waste generation: Lower slag production (18%	Commercially available, with several operational plants (TRL 7-9).	Reported as emerging techniques in existing BREF, although this will need updating to keep up with innovation/ technological progress.

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
			reported).		
	4. New processes ii. Smelting reduction - FINEX	Low; less than 10% GHG emission reduction.	Same as COREX above.	Commercially available Limitations relate to the design and scale up of the fluidised bed reactors (TRL 6-9).	Same as COREX above.
	4. New processes iii. Smelting reduction – Hisarna	Medium; 20% carbon emission reduction compared to conventional process, increases to 80% if it is combined with CCS.	Reduction of the emission of NO_X, SO_x and fine dust, heavy metals and dioxins, due to the elimination of iron ore sintering and coke making Positive impacts on reducing water consumption and waste generation.	The technology is broadly in the development phase, demonstrated in controlled environments (TRL 5-7). Requires new plant, cannot be retrofitted.	Hisarna employs an upgraded smelt reduction process that processes iron ore in a single step, eliminating coke ovens and agglomeration. It is more efficient and produces a concentrated CO_2 stream. Therefore, this would require updating BREF documents for both hydrogen production and the operational changes expected from switching from coal/coke to hydrogen.
	4. New processes iv. Advanced Mineral Recovery Technology (AMRT)	Low; a novel EAF technology which can smelt red mud (the waste product from alumina production-Bayer process). Emission reduction would be below 30%.	No major change in air, water, or soil emissions. Positive impact on reducing consumption of virgin material and slightly reduced energy demand.	A prototype of the technology has been demonstrated in an operational environment (TRL 7). No strong economic case.	Generally reported as emerging techniques in existing BREF, although this will need updating to keep up with innovation/ technological progress.
	4. New processes v. Iron ore Electrolysis	High; the process achieves a potential 100% reduction in direct CO_2 process emissions. Total reduction depends on carbon intensity of power sector.	Positive impact across the emission of all pollutants to air, water, and soil. Positive impact expected regarding energy use and resource efficiency.	The technology is still in the research phase (TRL 2-3). There are four projects in the early stage of developing the process ULCOLYSIS, ULCOWIN, SIDERWIN, Boston Metal.	Electrolysis of iron ore does not require coke ovens or blast furnaces and operates with electricity as its primary energy input. This is a significant difference to existing processes detailed in the I&S BREF. The process is heavily dependent on electricity and, therefore, environmental

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
					impacts would depend on power sector decarbonisation.
O&G refineries	1. CCU/S	High albeit uncertain; could reach up to 95% of baseline emissions	Unclear impacts on other KEIs e.g., emission to water, etc.	TRL 3-9, some investments already at commercial stage. Evidence from FuelsEurope suggests first-of-a-kind in 2021 and 13 new plants in 2030. There are commercial CCU plants in O&G sector, for example in Jubail, Middle East since 2015 with German (Linde) technology. Sabic is a leading petrochemicals corporation.	Decision on whether to base BAT on application of CCU/S; BREF updates and/or new BREF required. CCU/S cover techniques applicable to multiple sectors and is an IED activity, hence a BREF may be developed to define BAT for CCU/S. A technical concern would be ensuring that the CO2 remains stored/avoiding leaks. This could lead to needing large investments from operators.
	2. Alternative sources of energy (e.g. renewable energy)	High; with abatement potential reaching 100% of GHG emissions from final energy consumption (not process).	Expect an overall positive impact when compared to conventional sources.	Some options are already TRL 9, others will continue to progress in this decade.	Cuts across multiple sectors; BAT-AELs can be drivers or barriers for deployment, where sources can increase the emissions of some pollutants (e.g. H2, biomass).
	3. Alternative feedstocks (e.g. biocrude)	High; the use of biocrude emits 65-85% less CO2e than petroleum, depending on the suitability of the biomass source.	Some potential negative impacts, such as emissions of NO_x (up to 20%) and NH_3 during the production of vegetable oils with potential increases of O3 and acidification problems.	TRL 3-7, with hydro-treated vegetable oils (HVO) TRL 9, starting in 2024 and 10 plants by 2030. Other options start later in the decade.	Activity currently "Mineral Oil refinery" in Annex I may need to be updated to a term that covers a wider pool of feedstocks. No major challenges are expected since manufacturing processes are very similar to other well-known processes covered by existing REF BREF (and LVOC BREF). The existing REF BREF has a section for hydrogen-consuming processes that could be updated to cover HVO production (now

Sector	Transformation pathways	GHG impact	Pollutant impact	Technology maturity	Challenges from IED perspective
					in emerging technique section).
	4. New processes (a number of options e.g. power-to-liquid to manufacture synthetic fuels)	High albeit uncertain; depends. Some processes involve a circular carbon cycle. On the power-to-liquid example, it is assumed that the hydrogen employed will be generated with renewable electricity.	Potentially lower emissions to air when compared to conventional fuel production, although uncertain.	TRL 6-8; first-of-a-kind likely in 2025, and 5 new plants in 2030 (FuelsEurope Report).	No disruptive policy challenges are expected as BREF processes are already likely to cover these aspects even if outside of the REF BREF (e.g. LVOC). Using CO2 as a feedstock would not require an “end of waste” criteria since it is already used in other processes such as soft drinks.

Annex 12: Screening Methodology and List of Screened-out Measures for the Revision of the IED

This Annex contains the list of measures that were contemplated, but that were then progressively screened out for the IED revision. The methodology adopted to achieve this is discussed, and then the results presented. Annex 14 separately presents those measures that were screened out for the revision of the E-PRTR regulation.

More than one-hundred and thirty policy measures were initially developed and considered in this study. Of these, over ninety measures were discarded from the in-depth impact assessment as a result of a thorough screening exercise, in line with the European Commission Better Regulation Guidance.

The criteria for screening the policy measures were developed in accordance with Tool #17 of the European Commission Better Regulation Toolbox[23] and agreed in advance between the external contractors and the European Commission. The criteria are outlined below.

1. **Legal feasibility:** Policy measures must respect the principle of conferral. They should also respect any obligation arising from the EU Treaties (and relevant international agreements) and ensure respect of fundamental rights. Legal obligations incorporated in existing primary or secondary EU legislation may also rule out certain options. Therefore, it was considered whether measures were compatible with EU law, and obligations arising from the EU treaties and international agreements, via answering these three questions:
   - Is the measure compatible with EU Treaties?
   - Is the measure legally feasible to implement and enforce?
   - Will the measure respect fundamental rights?

2. **Technical feasibility**: A second important criteria to consider is whether each measure may be technologically and technically feasible to implement, monitor and enforce, including by answering:
   - Would the measure be technologically and technically possible to implement the measure?
   - Is there a system in place to monitor the implementation and impact of the measure (or could it be established)?
   - Would Member States' Authorities be able to inspect and enforce any possible sanctions under the measure?

3. **Stakeholder acceptability**: Another criterion that is important to establish is whether the measure could garner the necessary stakeholder support for legislative adoption at the EU and MS level, including by answering:

[23] Tool #17. How to identify policy options. URL: https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-17_en_0.pdf

- Is the measure consistent with EU-level and MS policies and public positions?
- Does the measure instil legislative certainty?
- Could the measure cause competitive distortion (e.g. by limiting the growth of certain industries or creating discrimination between industries based in different Member States)?

4. **Effectiveness**: the fourth criterion considered is the extent to which each measure could contribute to addressing the specific problem and/or meeting the objectives that it is seeking to address, both specifically for the IED and the wider setting of the Commission's priorities in the short-, medium- and long-term. The following questions guided this exploration:
   - To what extent could the measure contribute the protecting the environment by reducing pollution (concerning air, water, soil and waste) and/or the use of potentially toxic substances?
   - To what extent could the measure contribute to achieving climate neutrality by 2050 and/or a more circular use of resources?
   - Does the measure directly promote or incentivise investment in technological innovation and/or rapid uptake of state-of-the-art technologies that can reduce the environmental footprint of industrial activities?

5. **Efficiency**: At a high-level, the fifth criterion utilised analyses the extent to which measures can improve social, economic and environmental welfare in an efficient way, especially when compared to the alternatives. The following queries guided the assessment:
   - Could the measure have significant, positive social and environmental impacts e.g. reduced pollution, lower GHG emissions, lower use of resources, more green jobs, etc.?
   - Could the measure have a high-cost burden on consumers, businesses and/or public institutions e.g. higher price of consumer goods, lower production efficiency, etc.?
   - How do the expected benefits and costs compare?

6. **Proportionality**: This criterion determines the extent to which the measure can address the problem that is targeting in a way that is proportionate to the costs or constraints that may arise from implementing the measure. The following questions guided this:
   - To what extent are the costs resulting from the regulatory actions taken by the EU are proportionate to the potential environmental and health benefits?
   - Could the measure disproportionately impact smaller companies?

7. **EU added value**: It is also important to consider the likely advantages of EU-level intervention to resolve these problems, compared to actions at the national level, including but not only by answering the following:
   - Could the measure result in a more consistent approach across the EU than national-level alternatives?
   - To what extent could the measure help raise standards in Member States lagging behind on environmental protection?
   - To what extent would the measure be more cost-effective at the EU versus national level?

8. **Coherence**: The last criterion considers the compatibility of each potential measure with existing and ongoing policy frameworks (also where being currently subject to dynamic revision) at the international and EU level (e.g. European Green Deal, Chemical Strategy for Sustainability, EU ETS legislation, E-PRTR, and the Urban Waste Water Treatment Directive). In particular, the experts assessing this were guided by the following queries:
   - Is the measure compatible with EU acquis?
   - Is the measure coherent with the objectives and/or actions set out in the European Green Deal, the Chemical Strategy for Sustainability, EU ETS, E-PRTR and UWWTD revisions, etc.?

The screening analysis was carried out by a team of experts, employing available evidence available, especially from the recent IED evaluation study, and expert judgement. These experts scored the measures against each of these criteria: 5-high score, 3-medium score, and 1-low score, or any integer in between.

The project team developed general guidelines outlined in Table A12-1 as to what constituted the score for each criterion. These general guidelines aimed at providing consistency to the task from the start, although the screening process was iterative. However, the experts carrying out this task had multiple opportunities to come together and calibrate their assessment effectively and collectively, based on the evidence available.

Table A12-1: General guidelines for scoring across each criterion

Criteria	(5) High score	(3) Medium score	(1) Low score
1 -Legal feasibility	Compatible with EU Treaties, and legally instruments to implement and enforce are available.	Compatible with EU Treaties, but some doubts as to whether legal instruments are readily available to implement and enforce.	Not compatible with EU Treaties or no legal instruments available.
2 -Technical feasibility	Technology and techniques available to implement, monitor, inspect and enforce measure.	Technology and techniques available to implement measure, but doubts on how to monitor, inspect, and enforce measure.	Measure cannot be implemented technically, or measure cannot be enforced, inspected, or monitored.

Criteria	(5) High score	(3) Medium score	(1) Low score
3 -Stakeholder acceptability	Consistent with policies and public positions, instils certainty and does not cause distortions.	Consistent with policies, but not necessarily fitting with public positions or instil certainty.	Inconsistent with current policies, not necessarily fitting with public positions, may not instil certainty and could cause unwanted market distortions.
4 -Effectiveness	Contributes significant/clearly to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Contributes, potentially, to one or two of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.	Doubtful contribution to any of: protecting environment, climate neutrality, circular use of resources, encouraging innovation.
5 -Efficiency	Evidence of clear balance of benefits to limited costs or significant benefits to some acceptable/ proportionate costs.	Doubtful evidence on benefits but limited costs, or clear evidence on strong benefits and doubtful evidence on potentially high costs.	Limited expected or high uncertainty on benefits, but some or clear evidence on high costs.
6 -Proportionality	Benefits are high and/or address objectives at the lowest possible cost, based on evidence. SMEs not impacted disproportionately.	Benefits are high and/or address objectives at relatively low cost, based on evidence, but SMEs affected disproportionately.	Costs are too high compared to potential benefits -e.g. industry struggles to compete, etc.- based on evidence. SMEs affected disproportionately.
7 -EU value added	Bringing more consistency across the EU, raising standards across countries, and more cost-effective at EU-level.	Clear evidence on one or two of: Bringing more consistency across the EU, raising standards in some countries, and more cost-effective at EU-level.	Unclear evidence on any of: More consistency across the EU, raising standards across countries, and more cost-effective at EU-level.
8 -Coherence	Compatible with EU acquis and coherent with the objectives of EU plans/ strategies.	Compatible with EU acquis and coherent with the objectives of EU plans/ strategies.	Not compatible with EU acquis or coherent with a limited set of EU plans/strategies' objectives.

The output of this exercise is a robust and consistent shortlist of retained policy measures selected to tackle the problem drivers, areas and consequences identified and taken forward for an in-depth assessment of their potential impacts.

The measures were grouped according to the same **6 problem areas** that were used at the outset of the IED Impact Assessment, i.e., those utilised in the breakdown of IED issues consulted upon in the Targeted Stakeholder Survey. These six problem areas are:

1. The environment is polluted (split by zero pollution ambition and non-toxic environment)
2. Climate crisis is happening

3. Natural resources are being depleted
4. Innovation - State of the art techniques cannot respond satisfactorily to problem areas #1 to #3
5. Private individuals have limited opportunities to get informed about, and take action regarding impacts caused by (agro-)industrial plants
6. Excessive burdens may affect the efficiency of policy instrument(s)

(It should be noted that the "problems areas" approach was partly revised when converted into Policy Options, as discussed in the main SWD report body, and e.g., SWD Annexes 7 and 12.)

Ninety measures were discarded from the in-depth impact assessment via adopting the above qualitative but objective process. Of these, ninety discarded measures:

- **Over seventy measures were identified to have overlaps** with other measures and/or there were better alternatives available to tackle the problems targeted; that is, they were replaced by better alternatives. Most measures were discarded, and instead are incorporated - via being expected at a future date to be taken forward - as part of the baseline (i.e., BAU going forward in a natural adaptive evolution), or where their score was assessed to be, on average, below "medium" levels across the agreed criteria. These measures are outlined in a table below.
- **Over twenty measures were identified as legal measures or amendments** with a low likelihood of any significant impacts. These measures mostly focussed on legislative simplification and/or update, and as such not required to be subject to the impact assessment process. These measures are outlined subsequently in Table A12-3.

Table A12-2 gives an overview of each policy measure that has been discarded, as assembled by "Problem Area" group, as well as a brief summary of the reason(s) for the measure to be discarded.

Table A12-2: Discarded policy measures and broad rationale

Discarded policy measures	Broad rationale
Include Data Centres under scope of the IED.	The environmental issues surrounding data centres mainly relate to product-related energy use consumption for the devices per se, and their cooling (off-site electricity); 'extended product' systems such as these are better regulated through standards and certification mechanisms that are being developed, rather than BAT-based cross-media permit conditions for data centres. . An extended product approach is being pursued elsewhere in product legislation and standardisation, which seems more appropriate.
Extending the production capacity thresholds for Medium Combustion Plants. Examine the scope of Chapter III - Large Combustion Plants (LCP), detailed under IED Article 28. Move the	ELVs have not yet come into force for all installations (entry inforce for existing installations in 2025 and 2030), depending on their size) and the first reporting on implementation is not yet available (Member States are

Discarded policy measures	Broad rationale
20-50 MWth capacity threshold from the Medium Combustion Plant Directive (MCPD) (Directive (EU) 2015/2193) to LCP. The main driver for this revision is to align with the EU ETS scope threshold.	required to report to the Commission in 2021, 2026 and 2031). It has also been cited that the MCPD is a good example of Better Regulation, having been designed to be affordable for SMEs and providing long-term certainty for all economic operators concerned, whilst minimising the administrative burden for both industry and Member States. The MCPD "as is" should encourage continued innovation and thus provide the opportunity for EU industry to share in the rapidly growing global market for pollution control technology. Bringing part or all of these MCPs under the scope would create legal uncertainty until BAT conclusions would be adopted, which would be unlikely in the coming years.
Extend the current sectoral coverage to include shipbuilding (other than coating) and ship dismantling within the scope of the IED.	**Shipbuilding** is already partly covered under IED Activity 6.7, for the coating activity (being one of the main environmental pressures from the activity). Shipbuilding and repair installations that carry out coating activities with an organic solvent consumption capacity of more than 150 kg per hour or more than 200 tonnes per year are included in the scope of the IED. Furthermore, there is already a set of minimum requirements for ship recycling facilities across the EU as a result of the EU Ship Recycling Regulation (regulation (EU) No 1257/2013, which was based on the Hong Kong Convention (2009) on transboundary movements of hazardous wastes and their disposals to the ship recycling industry. This is argued to already provide a (minimum) level playing field. **NB: this measure (IED#35) was discarded at a later stage in the impact assessment.**
Revise the scope of Chapter IV on waste incineration detailed in Article 42(2) of the IED	Superseded by other measures considered in the SWD and associated consultants' report.
Thresholds for subdivisions of chemicals industry.	The measure was excluded as evidence suggests it is unlikely to lead to significant reductions in pollution and as solutions are being developed as part of the BREF process to target BAT-AELs on the main emissions, thereby addressing potential inefficiencies. Superseded by measures part of Problem Area 6, refocussed on clarifying legal requirements.
Prohibit the indirect release of polluting substances to water.	Evidence and expert judgement suggest that this measure is likely to be technically infeasible, inefficient and ineffective (especially). There were also doubts as to the EU value added and questions about coherence with other water and wastewater legislation at the EU level.
Delete the flexibility that presently allows the setting of different ELVs in permit conditions	Evidence and expert judgement suggest that this measure is likely to be technically infeasible, inefficient and ineffective

Discarded policy measures	Broad rationale
in terms of values, periods of time and reference conditions (IED Article 15(3[b]).	(especially). There were also doubts as to the EU value added.
Add to the provisions of Article 15(3) to clarify setting different ELVs in permit conditions in terms of values, periods of time and reference conditions.	Expert judgment concluded that this measure is unlikely to be effective.
Further harmonisation, clarification or provision of guidance on EU-wide definition of (co)incineration, including pyrolysis, currently left to each Member State.	Superseded by other measures considered in the SWD and associated consultants' report.
Extend the scope of current monitoring to include the use of remote sensing data (e.g. satellite data) to monitor air, water and/ or soil quality at a distance.	Evidence and expert judgement suggest that this measure is unlikely to be technically feasible and potentially burdensome.
Extend the scope of monitoring/ reporting concerning Article 15(4) derogations.	IED experts have confirmed that Article 16(1) monitoring requirements cover installations with derogations granted via Article 15(4). Therefore, no legal change is required.
Changes to the BREF exchange of information process.	Burden and complexities of changes are expected to outweigh the benefits.
Ensure greater cooperation/ harmonisation between Member State competent authorities and nature conservation agencies/ groundwater control, including public consultation (IED Article 26)	Merged with another measure that has been shortlisted.
Introduce requirements for continuous monitoring and online reporting.	Evidence and expert judgement suggest that this measure is unlikely to be technically feasible.
Formalise the legal basis of the EU Registry.	Evidence and expert judgement suggest that this measure is unlikely to be technically feasible or coherent with the objectives of the E-PRTR.
Enhance public availability of baseline reports and periodic monitoring results (including regarding soil).	Already covered by Article 22 of the existing IED and EU registry.
Option to reinforce Art. 25 (on access to justice).	Overlaps with other measures, especially those strengthening Article 24, which may indirectly reinforce Article 25 through greater and easier access to information as well as increased requirements for public participation.
Simplify the requirements for specific IED chapters.	Superseded by a better alternative implementing the same principle.
Remove redundant ELVs from the current IED Annex V referred to in Chapter III or harmonise with LCP BATC.	Evidence and expert judgement suggest that this measure is unlikely to be effective.
Remove redundant ELVs from IED Annex VI	Evidence and expert judgement suggest that this measure is

Discarded policy measures	Broad rationale
referred to in Chapter IV or harmonise with WI BATC.	unlikely to be effective.
Set-up a tailored regulatory permitting framework for addressing emissions of pollutants and GHGs from the IED agro-activities.	Superseded by other measures considered in the SWD and associated consultants' report.
Modernise and merge Extractive Waste directive (2006/ 21) into the IED.	Superseded by other measures considered in the SWD and associated consultants' report.
Merge the existing 1990s VOC Stage I directive into the IED.	Expert judgement found this measure to be more complex than potentially beneficial.
Move 20-40 MWth installations from MCPD to LCP.	Superseded by other measures considered in the SWD and associated consultants' report.
Provide clarifications on the interaction between the IED and ETS Directive.	Superseded by other measures considered in the SWD and associated consultants' report.
Rationalise overlaps between E-PRTR and IED reporting requirements.	Superseded by other measures considered in the SWD and associated consultants' report.
Add specific thresholds to certain sub-activities within activity 4 'Chemical industry', e.g., pharmaceuticals, to account for lower scale 'artisanal' production.	Screened out, given that there is ongoing work in the WGC BREF on transfer rates, i.e., expected to be addressed as part of the baseline.
Amend the legislation to remove the ambiguity on the approaches to be taken in accounting for measurement uncertainty in compliance assessments for LCPs and waste (co)-incineration plants.	Superseded by other measures considered in the SWD and associated consultants' report.
Provide guidance on the implementation of BAT conclusions in permits focussed on establishing a more consistent approach across the EU.	EC expects to address this as part of the baseline scenario.
Provide guidance on the implementation of IED provisions concerning monitoring requirements specifically for indirect releases to water and emissions to soil (Articles 14, 15 and 16).	EC expects to address this as part of the baseline scenario.
Provide guidance on baseline reports submitted for environmental protection and stringency of requirements upon definitive cessation of activities (Article 22).	EC expects to address this as part of the baseline scenario.
Provide guidance on how environmental inspections shall be carried out across the EU (Article 23).	EC expects to address this as part of the baseline scenario.
Facilitate peer-to-peer support among Member States Competent Authorities for undertaking mutual/joint environmental inspections.	EC expects to address this as part of the baseline scenario.

Discarded policy measures	Broad rationale
Promote MS pilot projects for operators to link and share their installations' continuously monitored emissions data with Member State Competent Authorities and making such information available to the public on the Internet.	EC expects to address this as part of the baseline scenario.
Promote the setting of stricter ELVs	Superseded by a better alternative implementing the same principle.
Accelerated incorporation in BAT conclusions of breakthrough technologies.	Superseded by a better alternative implementing the same principle.
Set a forward-looking formal tiered approach (as in Ecodesign) in sectoral BREFs.	Legal complexity and unclear evidence of cost and benefit balance.
Establish stricter long-term BAT-AELs	Superseded by a better alternative implementing the same principle.
The pilot innovation observatory had identified LIFE and ETV as funding schemes for ETs. Potential links to accelerator funding via Green Deal.	The IED would be unlikely to have access to specific finance, and rather, would work to facilitate funding opportunities through existing mechanisms.
Require the coverage of emerging techniques in BREF processes.	Superseded by a better alternative implementing the same principle.
Require the inclusion of long-term forecast performance of emerging techniques in BREF processes.	Superseded by a better alternative implementing the same principle.
EC/EIPPCB to update BAT-AEL range (upper and lower) every 'x' years.	Evidence and expert judgement suggest that this measure's complexity outweighs any potential benefits.
Requiring permit conditions to meet upper BAT-AEL after 4 years of BATC adoption.	This can be achieved now without the need for IED modifications. With the IED current status, any competent authority could request the operators to meet the most stringent value of the BAT-AEL (the lower end of the AEL range).
Avoid "lock in" of good performance.	Superseded by a better alternative implementing the same principle.
Avoid marginal performance improvements. Promote breakthroughs.	Superseded by a better alternative implementing the same principle.
Provide guidance as suggested in Art 27 to promote emerging techniques via MS.	Superseded by a better alternative implementing the same principle.
Dynamic BAT-AEL concept	Superseded by a better alternative implementing the same principle.
Prohibit manufacture and use of REACH SVHCs within industrial settings where BAT identifies safer chemical alternatives.	This would already be possible via BREFs (the so-called "negative BAT" prohibition mechanism).

Discarded policy measures	Broad rationale
Introduce a requirement on operators to quantify emissions.	Evidence and expert judgement suggest that this measure may not be legally infeasible, and there are doubts as to how efficient and effective it could be.
Continuous update of ELVs based on current BAT conclusions.	This is already possible under current IED.
Mandate the development of ELVs for POPs to stimulate their thermal destruction.	POPS should already be addressed in the baseline BREF process and permits, where relevant.
Introduce reporting requirements so that, where BAT identifies safer chemical alternatives for SVHCs, the information is provided to ECHA as part of the prioritisation process for Authorisation.	Covered by another retained measure, where regular reporting on progress and outcome is expected.
Introduce a requirement for MS' competent authorities to check the Water Framework Directive's priority substance exceedances for relevant water bodies, when updating environmental permits, and take this into consideration for the permit.	Superseded by other measures considered in the SWD/ consultants' report.
Encourage the systematic inclusion of information on chemical substances of concern developed under other legislation related to IED and the availability of safer chemicals in the BREF process and BAT conclusions.	EC expects to address this as part of the baseline scenario.
Delete IED Art. 9(2) regarding energy efficiency-related BAT conclusions, i.e., thus enabling mandatory action on energy efficiency, even for activities covered by ETS.	Superseded by other measures considered in the SWD/ consultants' report.
Inclusion of sectoral benchmarking in BREFs to address e.g. energy use, water use, materials use, waste generation per unit of installation output.	The assessment suggested that this measure would lead to confusion with other concepts and measures proposed, so it was screened out to mitigate these.
Support industrial symbiosis through EU guidance on good practices and the inclusion of information in BREFs	Evidence and expert judgement suggest that there are doubts as to how efficient and effective this measure could be. Alternative measures were retained.
Set a forward-looking formal tiered approach (as in Ecodesign) in sectoral BREFs.	Discarded due to legal complexity and unclear evidence of cost and benefit balance.
Also establish "BNAT" (Best Not yet Available Techniques) long-term benchmarks for stricter long-term BAT-AELs.	Superseded by other measures considered in the SWD/ consultants' report.
Update guidance on information exchange to address issues associated with sharing potentially confidential business information when setting BAT-AEPLs.	EC expects to address this as part of the baseline scenario.

Discarded policy measures	Broad rationale
Introduce an explicit reference to the binding nature of resource efficiency BAT-AEPLs for new permits and permit reviews.	EC expects to address this as part of the baseline scenario.
Introduce a requirement for the data outputs of a shortlisted measure requiring a benchmarking exercise to become inputs to the EU ETS allocation of emission allowances.	Evidence and expert judgement suggest that this measure is likely to be ineffective and inefficient, and would require close alignment with EU ETS.
Expand scope of IED to cover agro-industrial, GHG-intensive activities.	Covered by another measure in Problem Area 1.1.
Allow the granting of longer deadlines for BAT implementation.	Covered by another measure in Problem Area 1.1.
Establish a financial and/or compensatory mechanism to encourage investment in breakthrough technologies.	The IED would be unlikely to have access to specific finance, and rather, would work to facilitate funding opportunities through existing mechanisms.
Undertake systematic data collection on GHG emissions at the IED installation level within the BREF process, for those installations and/or emissions covered by the EU-ETS at an EU level.	EC expects to address this as part of the baseline scenario.
Develop BAT-AELs systematically for direct and indirect GHG emissions not covered by the ETS. This shall include emissions of non-ETS GHG by ETS installations and emissions of any GHGs by non-ETS installations.	EC expects to address this as part of the baseline scenario.

As mentioned on page 4 of this Annex, of the more than ninety measures that were discarded from the in-depth impact assessment via the thorough screening exercise, twenty-two measures belonged to the second overall group of legal measures or amendments.

These legal measures/ amendments were identified as having a low likelihood of incurring any significant impacts, instead being mostly focussed on legislative simplification and/or updating measures. The pertinent measures that were deemed as not requiring detailed impact assessment are outlined in Table A12-3 below.

Table A12-3: Policy measures focussed on clarifying and/or simplifying policy measures not taken forward for the in-depth impact assessment

Legal policy measures	Problem Area
Recital 4 – update references to latest strategies	1
Recital 11 – amend references to Directive 85/337/EEC	1

Legal policy measures	Problem Area
Recital 19 – update strategy reference	1
Recital 20 – remove, obsolete	1
Recital 29 – update	1
Recital 28 – remove, obsolete	1
Recital 30 – remove, obsolete	1
Recital 43 – remove/update, obsolete	1
Article 30(9) – remove, obsolete	1
Article 31(3) – remove, obsolete	1
Article 32 – remove, obsolete	1
Article 34(1) – remove, obsolete	1
Article 35(2) – remove, obsolete [Art 35.1 expires end 2022]	1
Article 41 – remove, obsolete	1
Article 64 – consider if to remove or if EC still wishes to exchange further information	1
Article 72(3) and 72(4) – update to reflect reporting now to the Registry	1
Article 73(2) and 73(3) – remove, obsolete	1
Article 79 – update or remove	1
Article 80 – update	1
Article 81 (repeal) – remove, obsolete as now repealed	1
Article 82 (transitional provisions) – remove, obsolete.	1
Remove production of asbestos from Annex I.	1

Annex 13: Screening of measures (E-PRTR)

158 initial measures were developed. An initial screening was undertaken in order to test their suitability and whether or not they should be retained for more detailed analysis. 24 were excluded from further analysis. The screening considered a set of criteria for determining which measures to include as set out in BR Guidelines Tool #17[24]. The interpretation used of these criteria in this assessment has been as described below:

Legal feasibility: Measures must respect any obligation from EU Treaties, any relevant international agreements and ensure and respect fundamental rights. Legal obligations incorporated in existing or secondary EU legislation must also be taken into account. In general, legal feasibility is not expected to be e a major issue.

Technical feasibility: Technological and technical constraints may impact implementation, monitoring and/or enforcement of measures. While not directly technically unfeasible, there could be cases where monitoring or measurements of certain pollutants/parameters could be difficult.

Coherence with other EU policy objectives: Measures should be coherent with other general EU policy objectives. Several of the problem/improvement areas come from a desire to increase coherence by aligning definitions of sectors/activities or reporting requirements.

Effectiveness and efficiency: This has been interpreted as the potential increased reporting burden or costs of implementation that a measure may lead to. The main trade-off relevant for the majority of the options will be between covering a large share of the overall releases and facilities whilst limiting the reporting burden on a large number of facilities.

Proportionality: Some measures may clearly have a poor balance in relation to the importance of the additional releases or contextual data compared to the costs of collecting them.

Political feasibility: Measures that would clearly fail to garner the necessary political support for legislative adoption and/or implementation could also be discarded.

Relevance: When it can be shown that two options are not likely to differ materially in terms of their significant impacts or their distribution, only one should be retained.

At this stage, the screening analysis was largely qualitative since it would not be possible to conduct a more detailed analysis of such a long list of measures. Some of the required information came from the recently completed Commission study on '*Review of E-PRTR implementation and related guidance*'[25]. Other more subjective and specific indicators (such as political feasibility) have been informed by discussion with the Commission, taking into account the results of the public and/or targeted consultation(s), reviewing the responses to earlier consultations and/or expert judgement.

Each measure from the long list was given a corresponding colour: green, yellow or red; green when the measure fulfils the criteria, yellow when it is not clear and red if not feasible.

[24] https://ec.europa.eu/info/sites/default/files/file_import/better-regulation-toolbox-17_en_0.pdf
[25] https://europa.eu/!hm46gp

A measure was retained when considered green across all the criteria. If marked red on a single criterion, then the measure was discussed with the Commission and excluded if deemed appropriate. Measures marked as yellow (with or without green) were also retained for further assessment.

The process was an iterative one, where the result of the impact assessment led to changes to the definition of the measures. This helped to further elaborate the measures in terms of what they would entail in practice and also to define the data assessment needs and to gather the associated data.

Table 1 presents the discarded measures along with the reason for being screened out. In addition, some measures, such as updates to guidance, were identified as baseline measures and therefore not included in the more detailed analysis.

Table A13-1: Discarded measures

Problem area	Measure	Reason for screening out
5	2c – Include combustion plants between 1MW and 50 MW	It is anticipated that this measure would create a significant reporting burden, due to the number of MCPs between 1-5 MWth. In addition, the existing plants between 1-5MWth do not need to register under the MCPD (Medium Combustion plants directive) until 2029.
5	4 – Revise thresholds for biological treatment of waste	Analysis of PRTR data with activity thresholds below the E-PRTR show no facilities reporting releases or transfers undertaking biological treatment of waste below the current E-PRTR activity threshold. It is therefore anticipated that there will be a minimal increase in capture of releases/transfers with a potentially high increase in reporting burden to operators and Competent Authorities for the EU Registry dataflow.
5	13e – Revise activity thresholds for urban waste water treatment plants (1,000 p.e)	Since the urban waste water treatment directive only defines requirements for plants over 2,000 p.e (population equivalent) this measure would not give full coherence and may be technically difficult for many Member States due to not regulating facilities of this size. Additionally, this measure could increase the reporting burden on operators and Competent Authorities substantially.
5	15b – Include mixed livestock farms	This measure overlaps too significantly with the option to update the activity thresholds of activity 7(a) to LSU (thresholds of 150, 300 and 450 LSU are being considered) and as such was discarded. Updating the threshold to LSU would also result in mixed livestock farms being included within scope of the E-PRTR.
5	17 – Include data centres in activity list	While data centres are potentially interesting in terms of energy usage the majority of releases from these installations is expected to be from combustion activities – often off-site. However, while some will likely be regulated by the MCPD or even the LCPD and therefore fall under activity 1(c), especially if the threshold for this activity is reduced. However, many of the generators installed within these facilities are for back-up purposes only and would not be expected to be in use except for testing and emergencies so annual releases are not anticipated to be high and likely below the ELVs specified in the IED and below E-PRTR pollutant release thresholds. As such, this measure may be technically difficult if emissions are not monitored from these sites and not result in

Problem area	Measure	Reason for screening out
		many benefits with regards to additional capture of releases/transfers compared to the increased reporting burden.
5	19 - Include new activity of plastic convertors	The level of release from this activity is not well understood beyond releases of micro-plastics and, as the European Plastics Convertors association (EuPC) identifies that there are around 50,000 medium and small plastic convertor businesses across Europe, it is anticipated that the increased reporting burden would outweigh the benefits of capturing the potentially low releases and transfers from this activity.
5	22 – Include an additional sub sector for forging presses	This activity is not included as a specific sector for the development of ELVs in the Ferrous Metals Processing Industries BREF and therefore not thought to be a sector of high environmental concern. The additional reporting burden, and associated costs, is therefore likely to outweigh the benefits of capturing releases/transfers from this activity.
5	24 – Include and additional sub activity for metal working	With the variety of activities that fall under metal working it is difficult to define a production-based throughput threshold and potentially emission factors / methodology to calculate releases for these activities.
5	25 – Include intensive horticulture activities in activity list	While contextual information such as consumption levels may be useful from this activity, the majority of these facilities have a closed loop system and therefore releases are expected to be low. In addition, it is unknown if measurement methodologies and emission factors are available for this activity. As such the increased burden, and associated costs, are unlikely to be outweighed by the benefit of capture of a small number of releases from this activity.
5	26 – Include petrol storage	Depending on the reporting threshold, this could potentially result in a large number of additional facilities reporting to the E-PRTR. The additional VOC releases this would include within the E-PRTR is unlikely to outweigh the additional reporting burden and associated costs.
1	34 - Remove the pollutant reporting thresholds	Potential for considerable additional reporting burden in return for a small marginal improvement in data completeness.
3	36u – Include fluorinated ethers and alcohols in the Annex II pollutant list	This is a very broad pollutant group definition and therefore there are no harmonised methods of measurement for this group of pollutants, although there are methods for specific substances. Additionally, as the pollutant group definition is so broad it is not anticipated to increase the value of the E-PRTR dataset and as such the increased reporting burden, and associated costs, will outweigh the benefits.
3	36ab - Additional pollutants for inclusion - microplastics[26]	There is no harmonised method for measurement of microplastics. A 2009 report from NOAA includes "*Methods to isolate microplastics from surface waters (net tows, filters), sediments, and organisms are desperately needed before further progress can be made in this field.*"[27]
3	36ae – Additional pollutants for inclusion - nitrogen trifluoride (NF_3)	No measurement methodology was identified. As such this pollutant should not be included in the Annex II pollutant list yet.
3	36aw – Additional	While this pollutant is already required to be monitored under the IED

[26] Materials consisting of solid polymer-containing particles, where ≥ 1% w/w of particles have (i) all dimensions 1nm ≤ x ≤ 5mm, or (ii), for fibres, a length of 3nm ≤ x ≤ 15mm and length to diameter ratio of >3.

Problem area	Measure	Reason for screening out
	pollutants for inclusion - Total suspended particulate (TSP)	Annex II, TSP is the same as total dust. Particulate Matter of a small size is considered far more important to human health and PM_{10} is already included in the pollutant list. The addition of this outdated pollutant is therefore not expected to increase the value of the dataset. As such the increased reporting burden, and associated costs, will outweigh the benefits.
1	47a – Reduce reporting period to 3 months for all facilities	While reducing the reporting period to three months from the end of the reporting year would decrease the time before the data is available to the public, with the current reporting infrastructure, this could reduce data quality or require a large increase in resource from MS competent authorities. This will be especially difficult for entities that are regulated at the local level and where data passes through a chain of competent authorities. This increased burden on competent authorities will likely result in this option failing to get the necessary political support.
1	47b – Reduce reporting period to 3 months for some facilities	As with the previous measure, this is likely to reduce the data quality or require a large increase in resource from MS competent authorities, although the staggered approach would not require as large an increase in resource. This increased burden on competent authorities will likely result in this option failing to get the necessary political support.
1	48 – Require simultaneous direct reporting to EEA as well as to competent authorities	This measure has the potential to reduce the reporting time lag however would require a significant increase in resource within the EEA in order to undertake the simultaneous QA. Additionally, the QA undertaken by CAs, especially the more local authorities, that are closer to the facilities reporting and have a better understanding of what is expected from them is more likely to identify errors than that done by the EEA. This measure could therefore reduce the E-PRTR data quality. This measure is also procedurally very complex due to the parallel reporting flows and is therefore unlikely to garner the necessary political support.
1	49 – Near real time reporting for CEMs	The data collected by CEMS are principally for compliance assessment under the IED and are fundamentally different to E-PRTR release/transfer data. In addition, CEMS data would represent a considerable additional burden on the E-PRTR reporting infrastructure and there are concerns with ensuring data quality / understandability.
3	50 – Operators to establish a mandatory CMS	It would not be possible to implement this measure through the E-PRTR legislation.
1	54 - Integrate IED monitoring with E-PRTR reporting	It is anticipated that this measure would fail to garner the necessary political support for legislative adoption.
1	55 – Mandate reporting of expected pollutants for specific installations	It is anticipated that this measure would fail to garner the necessary political support for legislative adoption.
1	63 – Create a data reliability indicator	This measure would provide relatively little benefit above the existing E-PRTR requirement for operators to indicate whether data is measured, calculated or estimated.
1	64 – Remove reporting of releases to soil	Whilst the existing data on releases to soil is poor by comparison with data on releases to air and water, it remains an important component of understanding the environmental impact of facilities.

Annex 14: Description of the Industrial Emissions Directive Overview of Sectors Covered, Intervention Tools Available within the IED and Implementation Methods [Excerpt from the IED Evaluation, SWD(2020)182 final]

This Annex contains a description of the Industrial Emissions Directive 2010/75/EU; this description comes directly from the IED Evaluation carried out in 2020, the results of which were presented in SWD(2020)182 final.

Section 1 of the excerpt gives some background to the 2020 Evaluation, and the description of the IED per se is contained in Section 2.

Below is an excerpt of the above Staff Working Document, from Section 1 to Section 2 (sub-sections 2.1 to 2.4 inclusive) of the SWD Evaluation Report, pp. 5-17. The page numbering has been altered slightly by reformatting into the present version, but the content is reproduced in full.

SWD Excerpt, pp.5-17 [citing from original pagination, SWD(2020)182 final].

1. INTRODUCTION

This evaluation is being completed while the EU is working to implement the European Green Deal Communication adopted in December 2019[28]. This Staff Working Document (SWD) provides therefore important elements for informing this work, in particular with regard to the Zero Pollution ambition for a toxic-free environment.

The Industrial Emissions Directive[29] 2010/75/EU (IED) is the main instrument in place at the EU level to control and mitigate the environmental and human health impacts from industrial emissions in the EU. The IED regulates around 52 000 of the largest industrial installations covering a range of agro-industrial sectors. These include: power plants, refineries, and production of steel, non-ferrous metals, cement, lime, glass, chemicals, pulp and paper, food and drink as well as waste treatment and incineration and the intensive rearing of pigs and poultry. The general objective of the IED is to prevent, reduce and eliminate as far as possible emissions into air, water and soil and remediate soil pollution arising from industrial activities.

The IED installations account for about 20% of pollutant emissions by mass to air and a similar share of emissions to water. While IED sectors are large GHG emitters (around 40% of total EU GHG emissions), their CO_2 emissions are mainly regulated under the EU Emissions Trading System (ETS) and, as stipulated by the IED itself, their IED permit shall not include an emission limit value for that gas. Nevertheless, there are a number of IED installations whose CO_2 emissions are not regulated by the ETS, and

[28] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication-annex-roadmap_en.pdf

[29] https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm

there are emissions of GHGs other than CO_2 from IED installations, most of which are not regulated by the ETS. Altogether, it is estimated that around 10% of GHG emissions of IED plants are not covered by the ETS, representing around 4% of total EU GHG emissions[30].

This evaluation provides a particularly timely opportunity to assess how well the current legal framework on industrial emissions is working, how relevant it remains in light of the stated EU policy ambitions, and the degree to which it achieved its intended impacts. It includes a review of the implementation of the IED based on Member States reports and complementary information held by the Commission.

The evaluation has been carried out in line with the European Commission's Better Regulation guidelines[31]. Evidence gathering and its analysis was carried out with the support of independent experts. This SWD was supported by their report[32]. Other evaluations have recently been concluded for legislation with which the IED interacts strongly, notably on air quality[33], water management[34], and urban waste water treatment[35]. The relevant aspects of those interactions have been considered in this evaluation.

The general public, industrial stakeholders, public authorities, and representatives of civil society have been consulted throughout the process. The evaluation assesses the legislation against the five standard criteria of effectiveness, efficiency, coherence, relevance and EU-added value. It primarily covers the period from adoption of the IED, in 2010, to the present; however, in some aspects (e.g. emissions of large combustion plants), it was pertinent to look back further to its predecessor legislation.

In terms of legislation, the evaluation covers the IED, including the information exchange process for elaborating Best Available Techniques Reference Documents (BREFs)[36]. It covers all activities within the scope of Annex I to the IED and the whole of the EU. It also covers the following main implementing decisions adopted under the IED that govern its implementation:

- the Commission Decision setting up the IED Forum[37];
- the BREF Guidance[38].

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[30] Estimation based on E-PRTR data.
[31] https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en
[32] Ricardo Energy & Environment, Umweltbundesamt (AT), Milieu (2020) ,"Support to the evaluation of the Industrial Emissions Directive (Directive 2010/75/EU)", https://europa.eu/!nY63hc
[33] SWD(2019) 427 final, https://ec.europa.eu/environment/air/pdf/SWD_2019_427_F1_AAQ%20Fitness%20Check.pdf
[34] SWD(2019) 439 final, https://ec.europa.eu/environment/water/fitness_check_of_the_eu_water_legislation/documents/Water%20Fitness%20Check%20-%20SWD(2019)439%20-%20web.pdf
[35] SWD(2019) 700 final, https://ec.europa.eu/environment/water/water-urbanwaste/pdf/UWWTD%20Evaluation%20SWD%20448-701%20web.pdf
[36] This is referred to as the "BREF process" and is described in detail in Section 3.3.
[37] 2011/C 146/03, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0517(01)
[38] 2012/119/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2012.063.01.0001.01.ENG

The 17 implementing decisions containing the conclusions on Best Available Techniques (BAT conclusions) adopted so far under the IED are not individually assessed as part of the evaluation, but are indirectly addressed as a whole for the following reasons:

- The process to derive the BAT conclusions is analysed in detail and applies to all those adopted;
- The effectiveness of the IED is mainly the cumulative effectiveness of the implementation of the BAT conclusions;
- Most evaluation questions, e.g. on efficiency, apply to the BREF process, and consequently to the drawing up of all BAT conclusions. Where issues specific to individual BAT conclusions have been raised (usually by stakeholders) or assessed in studies, they have been documented.

A number of other implementing acts adopted under the IED have not been included in the evaluation. These are the following ones:

- Implementing rules on the determination of start-up and shut-down periods for large combustion plants[39] are not included because they cover a very specific technical issue;
- Implementing rules on transitional national plans[40] for ensuring compliance of Large Combustion Plants (LCPs) with IED requirements are time-limited and all expire in 2020;
- Implementing rules for Member State reporting[41] are not addressed, but they provide some of the data used in the evaluation.

This evaluation will also feed into an Impact Assessment on the revision of the IED, seeking to ensure its fullest contribution to the Zero Pollution ambition and coherence with other policy objectives, such as industrial decarbonisation, also taking note of the Masterplan[42] adopted by the High Level Group on Energy Intensive Industries, and a cleaner and more circular economy to the benefit of both public health and enhanced resilience of natural ecosystems, in line with the European Green Deal Communication.

2. BACKGROUND TO THE INTERVENTION

2.1. Description of the intervention and its objectives

Industry is responsible for a significant share of overall environmental impacts. The IED is the main EU legislation regulating the environmental impacts of large agro-industrial sources. It combines and strengthens requirements previously set under seven different EU Directives (see Annex 5 for details of legal instruments), namely:

- The Integrated Pollution Prevention and Control Directive (IPPCD)[43]
- The Large Combustion Plants Directive (LCPD) [44]

[39] 2012/249/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012D0249
[40] 2012/115/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012D0115
[41] (EU) 2018/1135, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018D1135
[42] https://ec.europa.eu/docsroom/documents/38403
[43] Directive 2008/1/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0001
[44] Directive 2001/80/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0080

- The Waste Incineration Directive (WID) [45]
- The Solvent Emissions Directive (SED)[46]
- Council Directive 78/176/EEC on waste from the titanium dioxide industry[47]
- Council Directive 82/883/EEC on procedures for the surveillance and monitoring of environments concerned by waste from the titanium dioxide industry[48]
- Council Directive 92/112/EEC on procedures for harmonising the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry[49]

As an example of better regulation, the IED was introduced following a review of the industrial pollution policy framework[50]. The motivation was to further control industrial pollution, while simplifying regulations, lowering the administrative burden, and improving enforcement. It aimed to support innovation and provide better coherence with other aspects of EU environmental policy acquis (specifically concerning air, water, soil, waste, circular economy).

2.2. Objectives of the IED and problems it is intended to solve

The IED is intended to respond to a number of needs. The first is to support a high level of protection of human health and the environment by preventing, reducing and eliminating, as far as possible, adverse impacts arising from industrial activities (e.g. emissions to air, water and soil, waste, resource consumption). The second is to ensure a level playing field for operators within sectors and across the EU for industrial pollution prevention and control. The third is to ensure access to information, public participation in decision-making and access to justice on industrial activities' environmental permitting and performance. The fourth is to reduce unnecessary or excessive administrative costs for economic operators from previous legislation controlling industrial emissions.

In response to these needs, the IED has a number of objectives. These include:

- to establish a framework for the control and permitting of the main industrial activities;
- to avoid distortion of competition by ensuring consistent environmental requirements for all economic operators within each sector;
- to ensure that permitting of industrial installations is based on best available techniques;
- to stimulate innovation by encouraging the development and application of emerging techniques;

[45] Directive 2000/76/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32000L0076
[46] Directive 1999/13/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0013
[47] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31978L0176
[48] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31982L0883
[49] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31992L0112
[50] https://ec.europa.eu/environment/archives/air/stationary/ippc/ippc_revision.htm

- to ensure simplification and clarity of the legal framework and reduce or avoid unnecessary administrative burden.

2.3. Key requirements and principles

Scope of the Directive

More industrial activities fall under the scope of the IED than under its preceding legislation, the IPPCD. In 2015, around 51 700 installations were reported as undertaking industrial activities within the scope of the IED. Implementation of the IED, while driven by EU actions, is therefore much decentralised. It depends on the correct and consistent implementation by a large number of competent authorities across the EU.

The IED is based on several principles, in particular: an integrated approach to pollution prevention and control, the use of best available techniques in permitting, flexibility, inspections and monitoring, public participation and access to justice.

Integrated Approach and Permitting

The IED requires that emissions from industrial sources are dealt with in an integrated way and minimised. All installations conducting activities listed in IED Annex I are required to operate according to a permit issued by the competent authority of the concerned Member State, and reflecting the principles and provisions stipulated by the IED. These are the general requirements set out in Chapters I and II of the IED. The permit extends to all environmental aspects of an installation's operating activities, including emissions of pollutants to air, water and soil, waste generation, resource use, noise, odour prevention of accidents and restoration of the site upon closure.

For certain activities, i.e. large combustion plants (LCPs), waste incineration (WI) and co-incineration plants, solvent using activities (SE) and titanium dioxide production (TiO_2), the IED also sets, in specific sectoral chapters, minimum requirements based on the predecessor Directives.

Best Available Techniques (BAT)

Permit conditions must be based on the use of Best Available Techniques (BAT), which are the most environmentally effective of the economically viable techniques available. EU wide BAT conclusions are adopted as sector specific implementing decisions that define BAT and the related environmental performance to be incorporated in permits issued by Member States' competent authorities.

In order to define BAT and the BAT-associated environmental performance at EU level, the Commission organises an exchange of information with experts from Member States, industry and environmental organisations. This work is co-ordinated by the European IPPC Bureau[51](EIPPCB) at the EU Joint Research Centre in Seville (Spain). This process results in BAT Reference Documents[52] (BREFs). The BAT conclusions are a distinctive chapter of the BREFs. More information on the production of BREFs is contained in section 3.3. Figure A14-2-1 shows a schematic view of the IED.

[51] https://eippcb.jrc.ec.europa.eu/
[52] https://eippcb.jrc.ec.europa.eu/reference

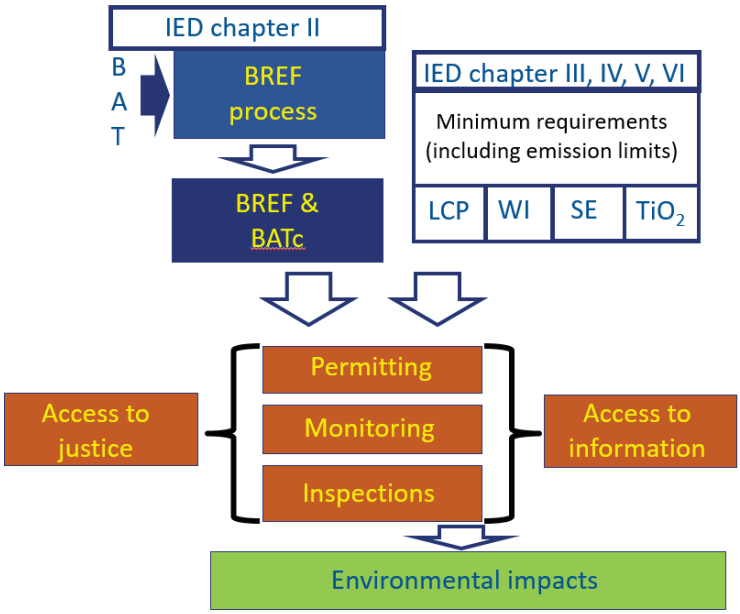

Figure A14-2-1: Schematic overview of the IED (legend: LCP - large combustion plant, WI - waste incineration and co-incineration plants, SE - solvent using activities, TiO_2 - titanium dioxide production)

The setting of BAT and BAT-AEPLs at EU level is in general based on imbalances between installations with high environmental performance and those less performing ones. The BAT used in well performing installations can then be generalised across all installations through the BREF processes, creating a level playing field and a high level of environmental performance within each industrial sector. Market demand leads to continual innovation in techniques and improved performance at lower cost. This process continues independently of the BREF review process, ensuring that better performing techniques are available in a subsequent cycle.

BREFs have a standard format, set out in the BREF Guidance, consisting of the following chapters:

Preface
Scope
General information about the sector concerned
Applied processes and techniques
Current emission and consumption levels
Techniques to consider in the determination of BAT
Best Available Techniques (BAT) conclusions (BATc)
Emerging techniques
Concluding remarks and recommendations for future work

References
Glossary of terms and abbreviations
Annexes (dependent upon relevance to the sector and availability of information)

The BAT conclusions identify a non-exhaustive and non-prescriptive list of BAT, as well as the environmental performance levels achievable with the use of BAT. They can contain:

- BAT-Associated Emission Levels (BAT-AELs), i.e. a numerical range of emission levels for specific pollutants,
- BAT-Associated Environmental Performance Levels (BAT-AEPLs) other than emission levels, which usually address the consumption of raw materials, energy or water, as well as waste generation, and/or
- Descriptive BAT which are not associated with either BAT-AELs or BAT-AEPLs, e.g. concerning monitoring, site remediation, environmental management systems, or the limitation or ban of the use of hazardous substances.

IED Article 14(3) makes BAT conclusions the mandatory reference for setting permit conditions. Article 15(3) makes BAT-AELs the binding requirements for pollutant emissions, usually to air and water. Their upper level is the upper boundary for the corresponding emission limit values set in permits, unless a derogation is granted by a competent authority subject to strict conditions set by the IED. BAT-AEPLs and descriptive BAT are not binding in the same way as BAT-AELs, but authorities must use them as a reference for setting permit conditions.

Competent authorities must update installation permits to be in line with the content of the BAT conclusions, and operators must be compliant with them within 4 years of publication of the BAT conclusions in the Official Journal of the EU. This gives BAT conclusions a more prominent role than under the IPPCD, where they were not legally binding. In doing so, permitting authorities must also ensure compliance with relevant minimum requirements contained in IED Chapters III to VI.

Flexibility

The IED allows competent authorities some flexibility to set less strict emission limit values. Such derogations are possible only in specific cases, where an assessment shows that achieving the emission levels associated with BAT described in the BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to the geographical location, local environmental conditions, or the technical characteristics of the installation, preventing the implementation of BAT. However, the use of this derogation procedure is strictly limited as the competent authority has to ensure that no significant pollution is caused and that a high level of protection of the environment as a whole is achieved. The competent authority shall always document its justification for granting such derogations. In the case of the sectors covered also by the

specific Chapters IV, V, VI, VII, derogations cannot exceed those minimum requirements.

At the same time, competent authorities must set stricter emission limits when an environment quality standard is exceeded.

Figure A14-2-2 illustrates the different regimes for emission limits under the IED.

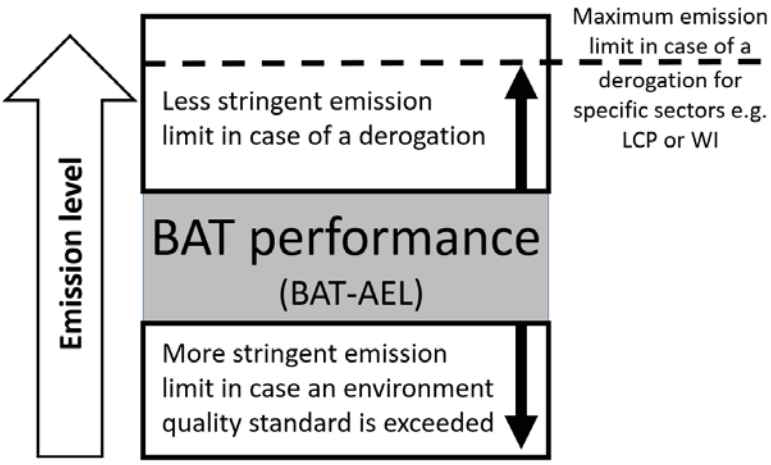

Figure A14-2-2: Emission limits under the IED

Inspections and Monitoring

The IED contains mandatory requirements on environmental inspections. Member States must set up a system of environmental inspections and draw up inspection plans accordingly. The IED requires a site visit to take place at least every 1 to 3 years, using risk-based criteria.

Operators have to report to Member State authorities the results of the monitoring requirements set by BAT conclusions, and Member States are reporting to the EU on several aspects of the implementation of the Directive. This is described in more detail in Section 3.4.

Access to Information and Access to Justice

Access to information and public participation are key elements of the IED. They enable the public to have a right to participate in the decision-making process, and to be informed of its consequences in accordance with the Aarhus Convention. This requires, in particular, ensuring public information on applications for permits by industrial operators and access to permits issued by competent authorities and the results of emissions monitoring held by them. In view of the large number of IED installations, public involvement is also key to police the correct implementation of IED requirements in permits and their respect by operators. Access to justice is another aspect of the Aarhus Convention transposed in the IED. It aims to ensure that, where a problem arises, individuals affected or NGOs can take legal action to ensure the respect of the IED requirements.

Figure A14-2-3 outlines the different roles and obligations of the Competent Authorities and operators of industrial installations in the permitting process.

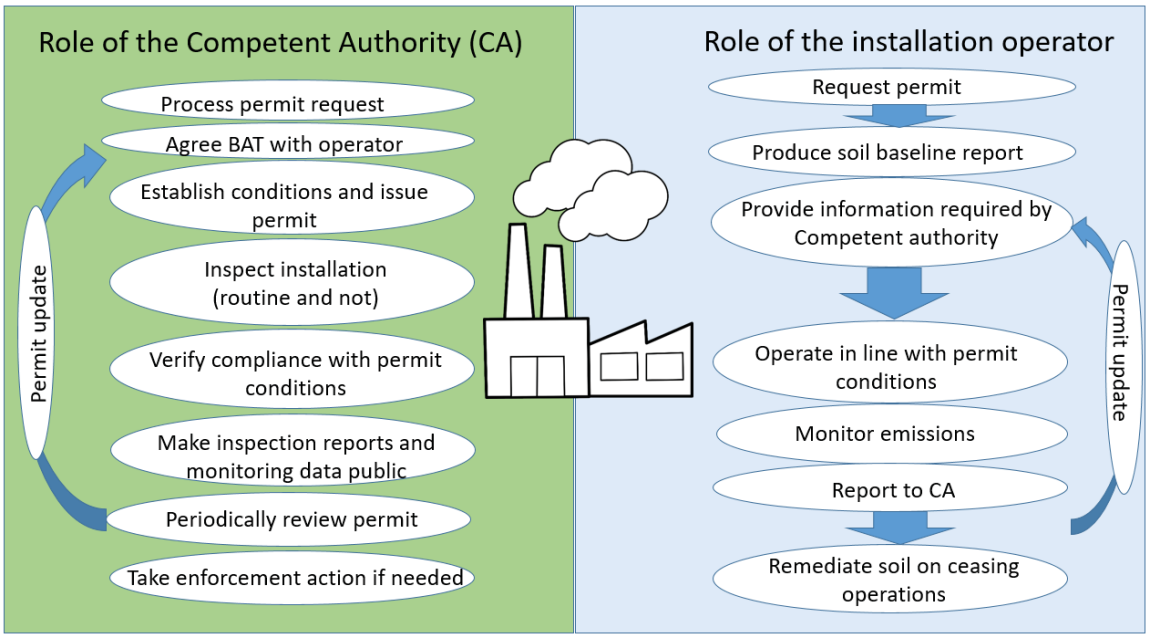

Figure A14-2-3: Roles and obligations of the Competent Authorities and installation operators

The IED Forum

The IED requires the Commission to establish and regularly convene a Forum to support the information exchange. The Forum is composed of representatives of Member States, industry and environmental NGOs. It has been created as a formal expert group through a Commission decision, and is chaired by the Commission. New members of the Forum, who are not Member States, are appointed by the Director General of DG Environment. The IED Forum has so far held 14 meetings and all documents relating to them are publicly available on the internet on CIRCABC[53].

The Commission is required to obtain the opinion of the Forum on the proposed content of BREFs and make it publicly available. The Commission must also take into account this opinion for the adoption of the BAT conclusions. The Commission also obtains the opinion of the Forum on the practical arrangements for the exchange of information including on the work programme for the revision of BREFs. This has, over the years, led to incremental improvements of the BREF process. Forum members nominate participants in the Technical Working Groups who carry out the detailed work on each BREF.

[53] https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf

2.4. Intervention logic

For illustrative purposes, the approach through which the IED operates can be described through a simplified sequence:

→ IED identifies sectors with large environmental impacts

→ IED creates a framework for BAT based permitting

→ BREF process identifies BAT and associated environmental performance levels

→ MS competent authorities issue BAT-based permits for installations

→ Industrial operators apply BAT to comply with permit conditions

→ MS competent authorities undertake inspection, compliance and enforcement actions

→ Emissions and environmental impacts decrease to levels prescribed

→ Civil society can access information and challenge permit decisions

→ IED contributes to the EU's environmental quality objectives.

Figure A14-2-4 shows a summary intervention logic for the IED, the elements of which are explained below. A more detailed version is presented in Annex 2.

Objectives

The main **objectives** of the IED are described in Section 2.2.

Inputs

The **inputs** needed are essentially human and financial resources. These are made available by the European Commission, Member State authorities, economic operators and other stakeholders. EU inputs are primarily needed for the EU level actions, while Member States provide input at EU, national, regional and local levels.

Activities

The resources provided are used to undertake a range of **activities** at various different levels. The first of these, at EU level, was the preparation and adoption of the IED. From that time onwards the main actions of the Commission are to manage the production of BREFs and adoption of BAT conclusions, oversee implementation of the IED and report on it. Member States had to ensure that the necessary structures were in place at national and sub-national levels to implement the IED. Member States, industry and NGOs then participate together with the Commission in the development of BREFs and BAT conclusions. At installation level, Member State competent authorities have to engage with operators to grant permits, review them when necessary, ensure that permit conditions are respected, inspect installations and carry out enforcement action, if needed. Operators of installations must make investments, as needed, to reduce their environmental impacts and ensure that they are compliant with the permit requirements. NGOs and citizens are able to participate in permitting processes, access emissions

monitoring information and bring complaints and information to the competent authorities when needed.

Outputs

There are a number of **outputs**. All installations covered by Chapter II of the IED should hold regularly updated and BAT-based permits. Permitting decisions should be guided by BREFs and BAT conclusions. The permits should be complied with by operators and compliance should be enforced by competent authorities. The public should be involved in permitting decisions and have access to information on the environmental performance of industrial installations. Innovative techniques may be deployed to reduce the environmental impacts of industrial activities. To ensure compliance and enforcement, appropriate monitoring and reporting systems should be in place at all IED installations. Member States' competent authorities should collect accurate emissions data for all IED installations and make them publicly available. The European Pollutant Release and Transfer Register (E-PRTR) provides the legal framework for monitoring aggregate pollutant emissions from IED installations and making that information public, in line with the requirements of the Aarhus Convention.

The IED should lead to the improvement of the environmental performance of industrial installations across the EU.

Effects

If the implementation of the IED is **effective**, this should lead to benefits in four areas:

i. reduced impacts on human health and the environment through lower emissions to air, water and soil, reduced waste generation and higher resource efficiency;
ii. a contribution to increased industrial and technology innovation in the EU;
iii. reduced distortion of competition across the EU;
iv. improved transparency for the public regarding information on the environmental performance of industrial activities.

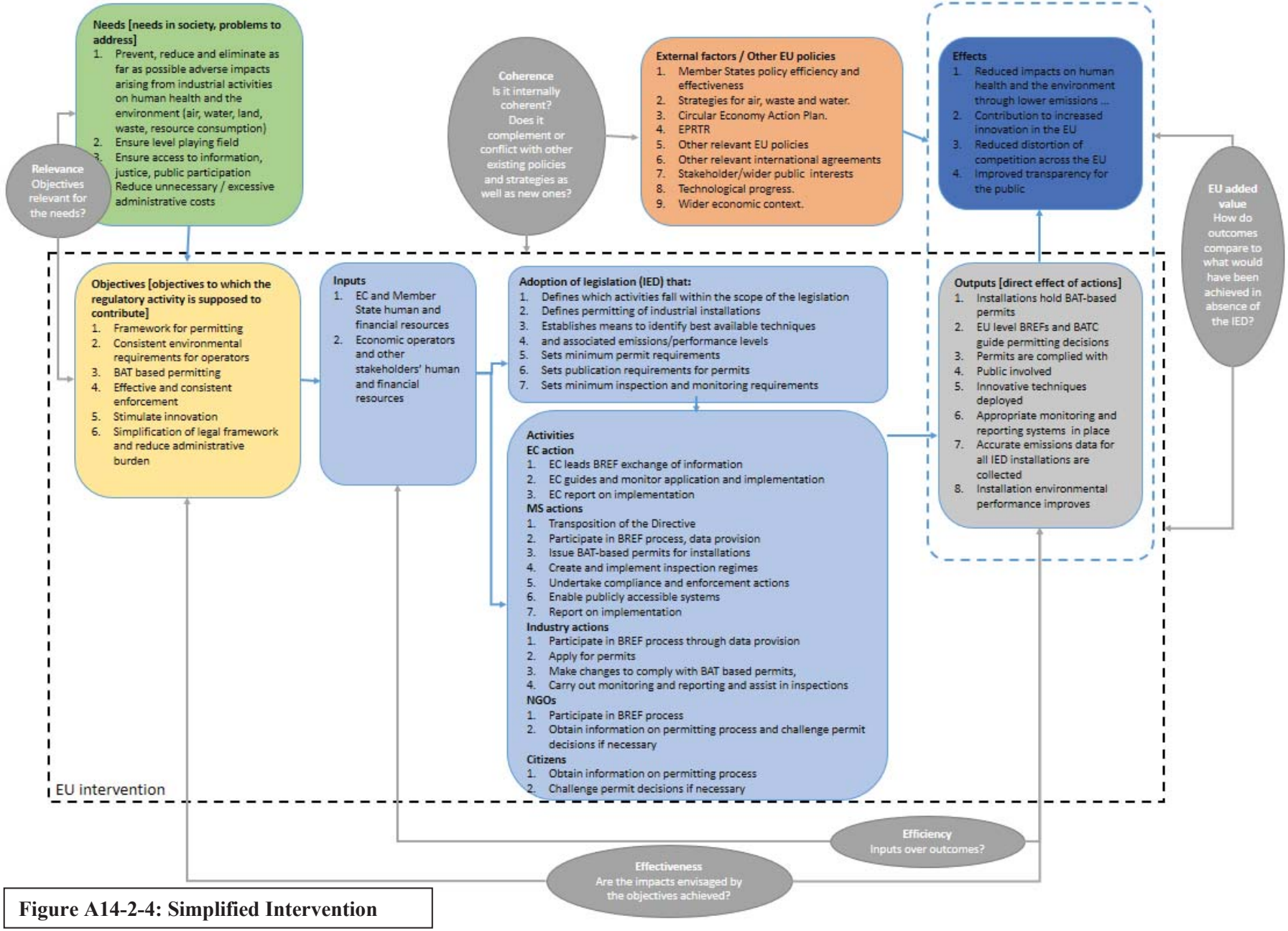

Figure A14-2-4: Simplified Intervention

Annex 15: Description of the European Pollution Release and Transfer Register (E-PRTR)

Regulation (EC) No.166/2006: Overview and Implementation Methods [Excerpt: E-PRTR 'REFIT' Exercise, SWD(2017)710 final]

This Annex contains a description of the European Pollution Release and Transfer Register (E-PRTR), Regulation (EC) No.166/2006; this description comes directly from the E-PRTR 'REFIT' exercise carried out in 2017, the results of which were summarised in the European Commission SWD(2017)710 final.

Section 1 of the excerpt gives some details regarding the purpose of the 2017 'REFIT' assessment, the description of the E-PRTR per se is contained in the background information of Section 2, and the implementation "state-of-play" in 2017 is presented in Section 3.

Below is an excerpt of the above Staff Working Document, from Section 1 to Section 3 of the SWD 'REFIT' assessment report, pp. 2-9. The page numbering has been altered slightly by reformatting into the present version, but the content is reproduced in full.

SWD Excerpt, pp.2-9 [citing from original pagination, SWD(2017)710 final].

1. INTRODUCTION

Purpose of the evaluation

To check that European Union (EU) legislation is 'fit for purpose', the Commission routinely reviews selected policy instruments through its Regulatory Fitness and Performance (REFIT) programme[54]. REFIT is about ensuring that EU legislation effectively and efficiently pursues public policy objectives that are best achieved at Union level.

In its Communication *Regulatory Fitness and Performance (REFIT): Results and Next Steps*[55], the Commission announced that the European Pollutant Release and Transfer Register (E-PRTR) Regulation would be assessed for its effectiveness, efficiency, relevance, coherence and EU added value.

The assessment looked at both the benefits delivered by the E-PRTR, as well as the potential for simplification and reduction of regulatory costs and burdens. Furthermore, it took account of Article 17 of the E-PRTR Regulation which requires that the Commission reviews E-PRTR implementation every three years on the basis of Member State returns. The second such review was exceptionally extended to four years (2010-2013) to fit with the evaluation timing.

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[54] Commission Communication on Regulatory Fitness and Performance (REFIT) http://ec.europa.eu/smart-regulation/better_regulation/documents/com_2013_en.pdf

[55] Regulatory Fitness and Performance (REFIT): Results and Next Steps, COM/2013/0685 final http://ec.europa.eu/smart-regulation/docs/20131002-refit-annex_en.pdf

In the interests of efficiency, the REFIT evaluation and the review were considered together.

Scope of the evaluation

The E-PRTR Regulation supports the EU in meeting the obligations of the (United Nations Economic Commission for Europe) UNECE Kiev Protocol on pollutant release and transfer registers[56]. The E-PRTR and the Kiev Protocol have aligned objectives around enhanced public access to information through the establishment of coherent, nationwide pollutant release and transfer registers (PRTRs).

Since the EU would have to deliver Kiev Protocol obligations even if the E-PRTR Regulation did not exist, the REFIT evaluation concentrates on requirements that are additional to those required by the Kiev Protocol, or in other EU law. In practice, distinction between the two was sometimes difficult for evaluation purposes.

The evaluation looked at E-PRTR implementation from its 2006 inception to the end of 2013 (for which the most recent data were available). In view of the improvements made during this period, more weight is given to issues that are still prevalent. And because Croatia only joined the EU in 2013, the geographical scope of the evaluation covers the other 27 Member States.

A contractor conducted a supporting study[57] to assist the REFIT evaluation, while also addressing the routine triennial check on implementation. This Staff Working Document summarises the REFIT evaluation's findings and the Commission's responses to them.

2. BACKGROUND TO THE INITIATIVE

Objective of the E-PRTR Regulation

The main aim of the E-PRTR Regulation is to transpose the Kiev Protocol in Europe and to assist Member States in implementing it consistently. Flowing from this, the E-PRTR helps improve public access to environmental information on pollutant releases and transfers from Europe's largest industrial facilities. By establishing a coherent and integrated database with clear data on the annual mass emissions (and transfers) of pollutants, the E-PRTR enables the public to become more closely involved in environmental decision-making.

An informed public is able to influence the behaviour of operators and thus encourage lower pollutant releases and transfers. So although the E-PRTR relates to information on pollutants, rather than setting controls on actual pollutant releases *per se*, it exerts downward pressure on emissions since companies do not want to be identified as among the biggest emitters.

[56] UNECE Kiev Protocol http://www.unece.org/env/pp/prtr.html

[57] Supporting the evaluation of Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register and its triennial review – Final report. August 2016, Amec Foster Wheeler Environment & Infrastructure UK Ltd and IEEP https://circabc.europa.eu/sd/a/fd585562-0c60-48f0-ad62-9d1ff7151059/E-PRTR%20evaluation_Final%20report%20.pdf

Policy-makers also use the knowledge and evidence base provided by E-PRTR data to assess other policy instruments that deal with emissions from industrial sources, such as the Industrial Emissions Directive (IED)[58].

Legal context of the E-PRTR

UNECE Kiev Protocol: The E-PRTR Regulation is the EU's sole means of delivering obligations under the Kiev Protocol[59]. The Protocol binds its Parties "*to enhance public access to information through the establishment of coherent, nationwide pollutant release and transfer registers (PRTRs)"* that:

- are publicly accessible through the Internet, free of charge;
- can be searched using separate parameters (facility, pollutant, location, etc.);
- are user-friendly in their structure and provide links to other relevant registers;
- present standardised, timely data on a structured, computerised database;
- cover releases and transfers of at least 86 pollutants covered by the Protocol;
- cover releases and transfers from certain types of major point sources;
- accommodate available data on releases from diffuse sources (e.g. transport and agriculture);
- have limited confidentiality provisions;
- allow for public participation in their development and modification.

Such PRTRs should be based on a reporting scheme that, as a minimum, is: mandatory, annual, multi-media (i.e. covers air, water, and land), facility-specific and pollutant-specific. To date the Protocol has been ratified by the European Union and 34 countries, including all EU Member States, except for Greece and Italy.

UNECE Aarhus Convention: The Kiev Protocol is part of the broader Aarhus Convention[60] which establishes a number of people's rights as regards to the environment and for involvement in decision-making. Parties to the Convention are required to take steps so that public authorities (at national, regional or local level) deliver the right to:

- receive the environmental information that is held by public authorities;
- participate in environmental decision-making;
- review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general.

[58] Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075
[59] Kiev Protocol on Pollutant Release and Transfer Registers to the UNECE Aarhus Convention http://www.unece.org/fileadmin/DAM/env/pp/prtr/Protocol%20texts/PRTR_Protocol_e.pdf
[60] UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters http://live.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf

E-PRTR Regulation: The E-PRTR Regulation was adopted in 2006 to implement the Kiev Protocol at EU level and to ensure consistent implementation by Member States of their obligations arising from the Protocol.

The E-PRTR provides pollutant emission and waste data on large industrial facilities, spanning not only the EU Member States, but also the European Free Trade Area (EFTA) nations and Serbia.

This data covers:

- emissions and transfers covering 65 economic activities from nine main industrial sectors[61] (as defined in Annex I to the Regulation)
- 91 pollutants (as detailed in Annex II to the Regulation) including heavy metals, pesticides, greenhouse gases and dioxins. In all, there are five additional water pollutants above the minimum requirements of the Kiev Protocol.

Contribution to the 7th Environmental Action Program:

The E-PRTR is crucial to several objectives of the 7th Environmental Action Programme (7th EAP)[62]. Priority objective 5 (*to improve the knowledge and evidence base for Union environment policy*), states that Union environment policy is based on *environmental monitoring, data, indicators and assessments linked to the implementation of Union legislation*.

The 7th EAP recognises that there has been *considerable progress on strengthening this knowledge base, raising awareness and improving the confidence of policy-makers and the public in the evidence which underpins policy, including policies where the precautionary principle has been applied. This has facilitated better understanding of complex environmental and societal challenges* (see paragraph 66 of the Annex to the Decision).

Paragraph 69 goes on to acknowledge *improvements in the way environmental information and statistics are collected and used at Union and at national, regional and local level, as well as globally. However, data collection and quality remain variable and the multiplicity of sources can make access to data difficult. Continuous investment is therefore needed to ensure that credible, comparable and quality-assured data and indicators are available and accessible to those involved in defining and implementing policy. Environmental information systems need to be designed in order to enable new information on emerging themes to be easily incorporated. Union-wide electronic data-exchange should be further developed, with enough flexibility to encompass new areas*.

[61] Energy; production and processing of metals; mineral industry; chemical industry; waste and waste water management; paper and wood production and processing; intensive livestock production and aquaculture; animal and vegetable products from the food and beverage sector; others.

[62] Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, p. 171–200) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D1386

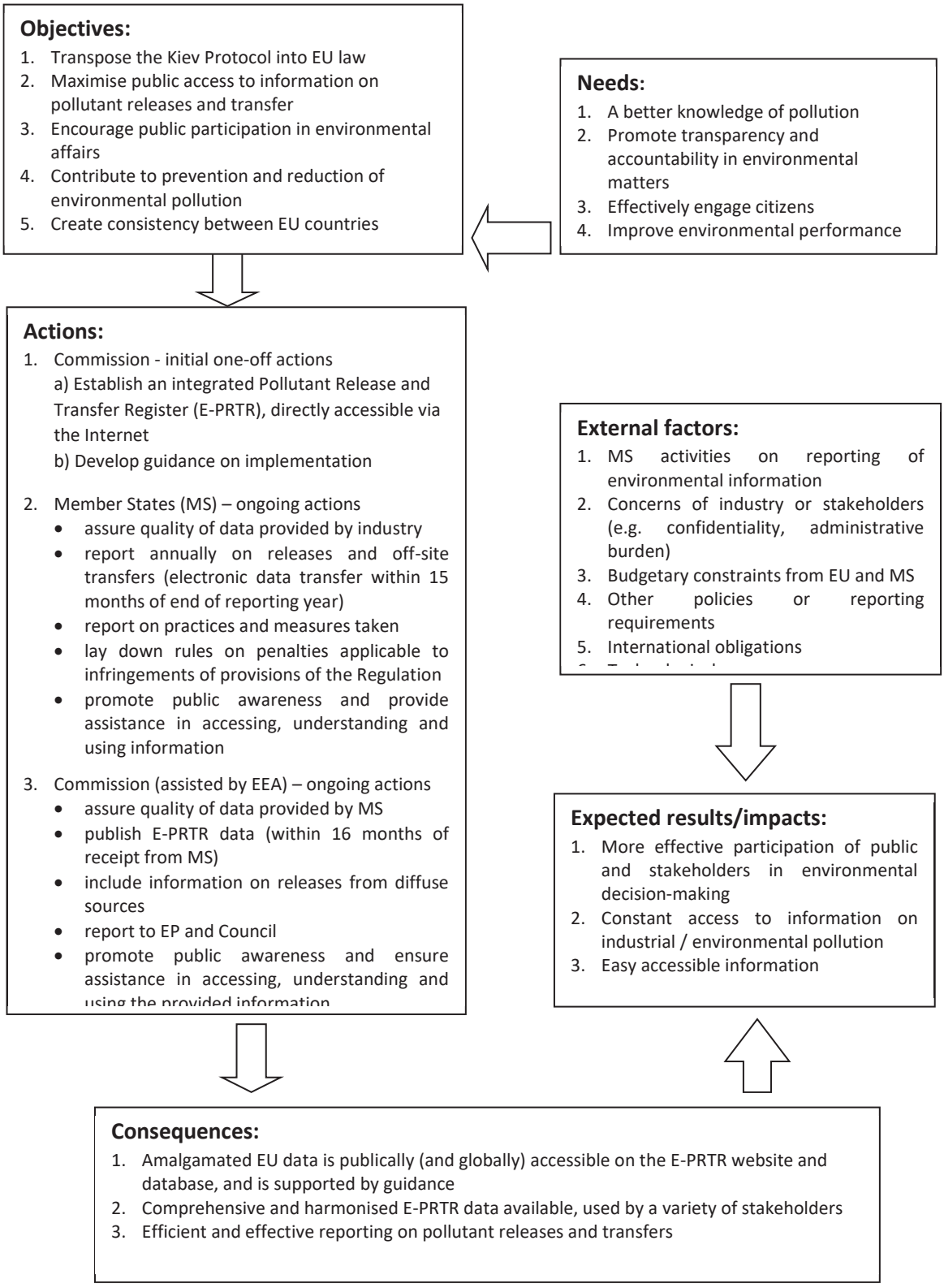
Baseline

The first E-PRTR data cover 2007 and succeed a previous EU-initiated industry registry, the European Pollutant Emission Register (EPER), under which data were reported for the years 2001 and 2004. The fact that the EPER pre-dated and evolved into the E-PRTR makes it difficult to establish an exact baseline for assessing the E-PRTR's additional impact.

No impact assessment was prepared for the E-PRTR Regulation, which is designed to transpose the EU's international obligations.

Intervention logic

The following intervention logic provides an overview of the main E-PRTR actions and their expected outcomes.


Objectives:
1. Transpose the Kiev Protocol into EU law
2. Maximise public access to information on pollutant releases and transfer
3. Encourage public participation in environmental affairs
4. Contribute to prevention and reduction of environmental pollution
5. Create consistency between EU countries
Needs:
1. A better knowledge of pollution
2. Promote transparency and accountability in environmental matters
3. Effectively engage citizens
4. Improve environmental performance
Actions:
1. Commission - initial one-off actions
a) Establish an integrated Pollutant Release and Transfer Register (E-PRTR), directly accessible via the Internet
b) Develop guidance on implementation
2. Member States (MS) – ongoing actions
• assure quality of data provided by industry
• report annually on releases and off-site transfers (electronic data transfer within 15 months of end of reporting year)
• report on practices and measures taken
• lay down rules on penalties applicable to infringements of provisions of the Regulation
• promote public awareness and provide assistance in accessing, understanding and using information
3. Commission (assisted by EEA) – ongoing actions
• assure quality of data provided by MS
• publish E-PRTR data (within 16 months of receipt from MS)
• include information on releases from diffuse sources
• report to EP and Council
• promote public awareness and ensure assistance in accessing, understanding and using the provided information
External factors:
1. MS activities on reporting of environmental information
2. Concerns of industry or stakeholders (e.g. confidentiality, administrative burden)
3. Budgetary constraints from EU and MS
4. Other policies or reporting requirements
5. International obligations
Expected results/impacts:
1. More effective participation of public and stakeholders in environmental decision-making
2. Constant access to information on industrial / environmental pollution
3. Easy accessible information
Consequences:
1. Amalgamated EU data is publically (and globally) accessible on the E-PRTR website and database, and is supported by guidance
2. Comprehensive and harmonised E-PRTR data available, used by a variety of stakeholders
3. Efficient and effective reporting on pollutant releases and transfers

3. IMPLEMENTATION / STATE OF PLAY

All Member States have adopted national legislation and procedures to implement the requirements of the E-PRTR Regulation. Appendix D of the [2017 contractors'] supporting study summarises implementation measures in each Member State. The following are general observations:

E-PRTR website

According to Article 10(1) of the Regulation, the Commission must make the register publicly accessible free of charge on the Internet. The E-PRTR website (http://prtr.ec.europa.eu) is hosted and maintained by the European Environment Agency (EEA), allowing for further integration of E-PRTR data with other datasets that the EEA manages.

The website is designed to maximise ease of public access and the information is continuously and readily accessible. At present, the E-PRTR website provides online access to data reported by more than 30 000[63] major industrial facilities covering 65 economic activities[64] in the main industrial sectors. For each facility, it provides information on the quantity of pollutant releases to air, water and land, together with off-site transfers of waste and of pollutants in waste water for 91 key substances. In addition to those core datasets, which are the main point sources of pollution, the E-PRTR also contains spatially disaggregated data on releases from diffuse sources into air and water.

Every year, industrial establishments with pollutant emissions above certain thresholds report their pollutant emissions to Member States' competent authorities. These data take the form of total masses of pollutants released to air, water and land, as well as off-site transfers of waste and of pollutants in wastewater.

In turn, Member States check these data and electronically report them annually to the Commission via a portal managed by the EEA. The reporting deadline is 15 months from the end of the reporting year (e.g. the deadline for reporting 2014 data was 31 March 2016). Since the first reporting year (2007), the deadline has by and large been met by Member States. Some minor delays (of up to a few months) have occurred but no structural issues are apparent.

The EEA then incorporates the information reported by Member States into the E-PRTR database within 16 months of the end of the reporting year (e.g. the target for publishing 2014 data was 30 April 2016)[65].

The EEA publishes the data on the E-PRTR's interactive website and also separately make it available for detailed use in its data service facilities. Emission data can be accessed in

[63] In the year 2014, data was reported by 33,246 facilities.
[64] See Annex I of the E-PRTR Regulation
[65] In practice two months are needed for the necessary consistency tests and addressing Member State reporting issues.

different ways on the E-PRTR website i.e. by searching on criteria such as pollutant, industrial activity type, country, or river-basin. The website includes a link to the EEA website, from which the full E-PRTR database and summary tables can be downloaded.

Reporting 2014

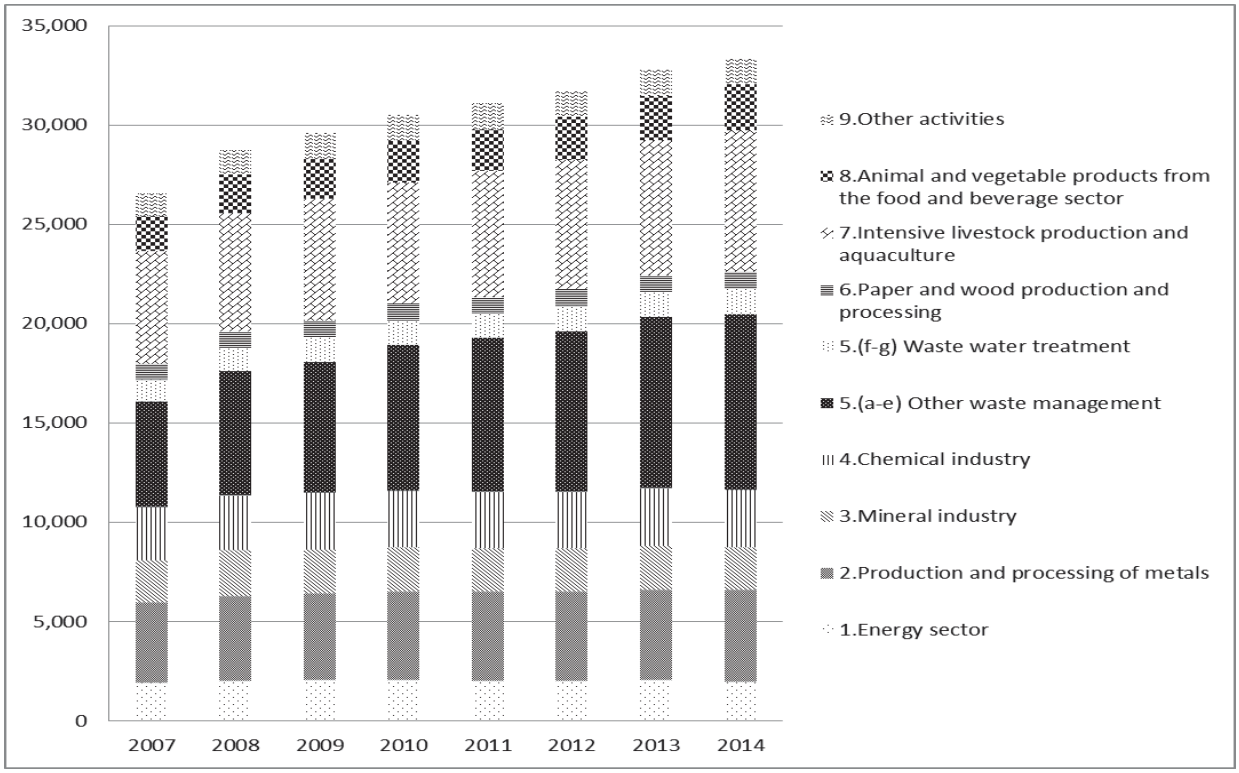
The EEA's *E-PRTR Summary Report 2014*[66] presents overall statistics for 2014 E-PRTR data and shows selected data time series since 2007.

Some key observations are listed below:

- In 2014, emissions were reported by 33 084 facilities in 33 countries – the EU-28, Iceland, Liechtenstein, Norway, Switzerland and Serbia. This was an increase of about 2% over the 32,480 facilities that reported in 2013.
- Of the E-PRTR facilities that reported in 2014, 46% had reported every year since 2007. The level of continuity is probably higher still as it does not include facilities that have changed name or are close to the reporting thresholds in Annex II of the Regulation (and so do not need to report every year).
- 11% of facilities reported for the first time in 2014, including those in Croatia.
- In 2014 the largest number of facilities carried out *waste and waste-water management* (31%), followed by *intensive livestock production and aquaculture* (21%).
- Between 2007 and 2014, some industrial activities saw significant increases in the number of facilities reporting emissions. For instance, the figure for waste and waste water management was up 58% and for food and beverage industries it rose by 28%. This probably reflects higher reporting by existing facilities, rather than the opening of new facilities.

The following figure shows the number of E-PRTR facilities per main activity over the period 2007 to 2014.

[66] EEA Summary Report on 2014 E-PRTR Data https://circabc.europa.eu/sd/a/fb8035be-a0b3-4b0f-9de1-58e2c602063f/E-PRTR%20Summary%20Note%202014.pdf



Quality assurance

After receiving annual data returns from facility operators, Member States carry out quality checks before transmitting their compiled data to the EEA.

An automated validation tool developed by the EEA helps Member States validate E-PRTR data and assure compliance with the agreed reporting format. The validation covers information such as: pollutant types, industrial sector codes, geographical coordinates, mandatory checks for formatting, quantitative checks of release / waste values (including outliers), and checks for confidential data. If errors are found, Member States may resubmit data.

To help implement the Regulation, the EEA also checks the quality of data in the E-PRTR annually through a process known as the 'informal review', after which:

- Member States are provided with detailed feedback on the quality and completeness of their submitted data. EEA checks cover an evaluation of the number of facilities and release reports, the amounts of releases and transfers reported, confidentiality claims and accidental releases;
- to identify and address potential inconsistencies, E-PRTR data are also subsequently compared with data reported under other reporting obligations (e.g.

the National Emission Ceilings Directive[67], the Emissions Trading Scheme[68], the Urban Waste-Water Treatment Directive[69] and the Waste Statistics Regulation[70]).

Commission guidance

As required under Article 14 of the Regulation, the Commission published a guidance document[71] in 2006 to support implementation of the E-PRTR. The guidance covers practical matters such as who should report, what information is required and how data should be submitted. It also includes an indicative list of sectors and pollutants for which data reporting is expected.

Enforcement action

The Commission has had little need to resort to formal action against Member States to enforce the requirements of the Regulation. There has only been one pilot action (now closed) and that hinged on whether an activity carried out at a facility was covered by the Regulation. While there have been some delays with the annual submission of data by Member States, these have been resolved through informal reminders and have not necessitated formal action.

[67] Directive 2001/81/EC http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV%3Al28095

[68] Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1488376075580&uri=CELEX:32003L0087

[69] Directive 91/271/EEC

[70] Regulation (EC) No 2150/2002 http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32002R2150

[71] Guidance Document for the implementation of the European PRTR http://prtr.ec.europa.eu/docs/EN_E-PRTR_fin.pdf

Annex 16: Mapping of the scope of IED, E-PRTR, ETS and other relevant instruments

E-PRTR	IED	EU-ETS	Other instruments
1(a) Mineral oil and gas refineries	1.2. Refining of mineral oil and gas	Refining of mineral oil	
1(b) Installations for gasification and liquefaction	1.4. Gasification or liquefaction of: (a) coal; (b) other fuels in installations with a total rated thermal input of 20 MW or more.		
1(c) Thermal power stations and other combustion installations with a heat input of 50 megawatts (MW)	1.1. Combustion of fuels in installations with a total rated thermal input of 50 MW or more	Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste)	Directive (EU) 2015/2193 on medium combustion plants covers MCPs with a total rated thermal input exceeding 1 MW
1(d) Coke ovens	1.3. Production of coke	Production of coke	
1(e) Coal rolling mills with a capacity of 1 tonne per hour			
1(f) Installations for the manufacture of coal products and solid smokeless fuel			
2(a) Metal ore (including sulphide ore) roasting or sintering installations	2.1. Metal ore (including sulphide ore) roasting or sintering	Metal ore (including sulphide ore) roasting or sintering, including pelletisation	
2(b) Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting with a capacity of 2,5 tonnes per hour	2.2. Production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2,5 tonnes per hour	Production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2,5 tonnes per hour	
2(c) Installations for the processing of ferrous metals:	2.3. Processing of ferrous metals:	Production or processing of ferrous metals (including ferro-alloys)	
(i) Hot-rolling mills with a capacity of 20 tonnes of crude steel per hour	(a) operation of hot-rolling mills with a capacity exceeding 20 tonnes of crude steel per hour	Where combustion units with a total rated thermal input exceeding 20 MW are operated. Processing includes, inter alia, rolling mills, re-heaters, annealing furnaces, smitheries, foundries, coating and pickling	
(ii) Smitheries with hammers with an energy of 50 kilojoules per hammer, where the calorific power used exceeds 20 MW	(b) operation of smitheries with hammers the energy of which exceeds 50 kilojoule per hammer, where the calorific power used exceeds 20 MW		
(iii) Application of protective fused metal coats with an input of 2 tonnes of crude steel per hour	(c) application of protective fused metal coats with an input exceeding 2 tonnes of crude steel per hour		

E-PRTR	IED	EU-ETS	Other instruments
2(d) Ferrous metal foundries with a production capacity of 20 tonnes per day	2.4. Operation of ferrous metal foundries with a production capacity exceeding 20 tonnes per day		
		Production of primary aluminium	
		Production of secondary aluminium where combustion units with a total rated thermal input exceeding 20 MW are operated	
2(e) Installations:	2.5. Processing of non-ferrous metals:		
(i) For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes	(a) production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes	Production or processing of non-ferrous metals, including production of alloys, refining, foundry casting, etc., where combustion units with a total rated thermal input (including fuels used as reducing agents) exceeding 20 MW are operated	
(ii) For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.) with a melting capacity of 4 tonnes per day for lead and cadmium or 20 tonnes per day for all other metals	(b) melting, including the alloyage, of non-ferrous metals, including recovered products and operation of non-ferrous metal foundries, with a melting capacity exceeding 4 tonnes per day for lead and cadmium or 20 tonnes per day for all other metals.		
2(f) Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process where the volume of the treatment vats equals 30 m3	2.6. Surface treatment of metals or plastic materials using an electrolytic or chemical process where the volume of the treatment vats exceeds 30 m3		
3(a) Underground mining and related operations			
3(b) Opencast mining and quarrying where the surface of the area effectively under extractive operation equals 25 hectares			
3(c) Installations for the production of:	3.1. Production of cement, lime and magnesium oxide:		
(i) Cement clinker in rotary kilns with a production capacity of 500 tonnes per day	(a) production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other kilns with a production capacity exceeding 50 tonnes per day	Production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day	

E-PRTR	IED	EU-ETS	Other instruments
(ii) Lime in rotary kilns With a production capacity of 50 tonnes per day	(b) production of lime in kilns with a production capacity exceeding 50 tonnes per day	Production of lime or calcination of dolomite or magnesite in rotary kilns or in other furnaces with a production capacity exceeding 50 tonnes per day	
(iii) Cement clinker or lime in other furnaces with a production capacity of 50 tonnes per day	(a) production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other kilns with a production capacity exceeding 50 tonnes per day	Production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day	
	(c) production of magnesium oxide in kilns with a production capacity exceeding 50 tonnes per day.		
3(d) Installations for the production of asbestos and the manufacture of asbestos-based products	3.2. Production of asbestos or the manufacture of asbestos-based products		
3(e) Installations for the manufacture of glass, including glass fibre with a melting capacity of 20 tonnes per day	3.3. Manufacture of glass including glass fibre with a melting capacity exceeding 20 tonnes per day	Manufacture of glass including glass fibre with a melting capacity exceeding 20 tonnes per day	
3(f) Installations for melting mineral substances, including the production of mineral fibres with a melting capacity of 20 tonnes per day	3.4. Melting mineral substances including the production of mineral fibres with a melting capacity exceeding 20 tonnes per day	Manufacture of mineral wool insulation material using glass, rock or slag with a melting capacity exceeding 20 tonnes per day	
3(g) Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain with a production capacity of 75 tonnes per day, or with a kiln capacity of 4 m3 and with a setting density per kiln of 300 kg/m3	3.5. Manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain with a production capacity exceeding 75 tonnes per day and/or with a kiln capacity exceeding 4 m^3 and with a setting density per kiln exceeding 300 kg/m^3	Manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day	
		Drying or calcination of gypsum or production of plaster boards and other gypsum products, where combustion units with a total rated thermal input exceeding 20 MW are operated	
4(a) Chemical installations for the production on an industrial scale of basic organic chemicals, such as:	4.1. Production of organic chemicals, such as:		
(i) Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	(a) simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	Production of bulk organic chemicals by cracking, reforming, partial or full oxidation or by similar	

E-PRTR	IED	EU-ETS	Other instruments
		processes, with a production capacity exceeding 100 tonnes per day	
(ii) Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins	b) oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters and mixtures of esters, acetates, ethers, peroxides and epoxy resins		
(iii) Sulphurous hydrocarbons	(c) sulphurous hydrocarbons		
(iv) Nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate compounds, nitriles, cyanates, isocyanate	(d) nitrogenous hydrocarbons such as amines, amides, nitrous compounds, nitro compounds or nitrate compounds, nitriles, cyanates, isocyanates		
(v) Phosphorus-containing hydrocarbons	e) phosphorus-containing hydrocarbons		
(vi) Halogenic hydrocarbons	(f) halogenic hydrocarbons		
(vii) Organometallic compounds	(g) organometallic compounds		
(viii) Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres)	(h) plastic materials (polymers, synthetic fibres and cellulose-based fibres)		
(ix) Synthetic rubbers	(i) synthetic rubbers		
(x) Dyes and pigments	(j) dyes and pigments		
(xi) Surface-active agents and surfactants	(k) surface-active agents and surfactants		
4(b) Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as:	4.2. Production of inorganic chemicals, such as:		
(i) Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride	(a) gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride	Production of ammonia	
(ii) Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids	(b) acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids	Production of nitric acid; Production of adipic acid; Production of glyoxal and glyoxylic acid	
(iii) Bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide	(c) bases, such as ammonium hydroxide, potassium hydroxide, sodium hydroxide		
(iv) Salts, such as ammonium chloride, potassium	(d) salts, such as ammonium chloride, potassium		

E-PRTR	IED	EU-ETS	Other instruments
chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate	chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate		
(v) Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide	(e) compounds such as calcium carbide, silicon, silicon carbide		
4(c) Chemical installations for the production on an industrial scale of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers)	4.3. Production of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers)		
4(d) Chemical installations for the production on an industrial scale of basic plant health products and of biocides	4.4. Production of plant protection products or of biocides		
4(e) Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	4.5. Production of pharmaceutical products including intermediates		
4(f) Installations for the production on an industrial scale of explosives and pyrotechnic products	4.6. Production of explosives		
		Production of carbon black involving the carbonisation of organic substances such as oils, tars, cracker and distillation residues, where combustion units with a total rated thermal input exceeding 20 MW are operated	
		Production of hydrogen (H2) and synthesis gas by reforming or partial oxidation with a production capacity exceeding 25 tonnes per day	
		Production of soda ash (Na2CO3) and sodium bicarbonate (NaHCO3)	
5(a) Installations for the recovery or disposal of hazardous waste receiving 10 tonnes per day	5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities: (a) biological treatment;		

E-PRTR	IED	EU-ETS	Other instruments
	(b) physico-chemical treatment; (c) blending or mixing prior to submission to any of the other activities listed in points 5.1 and 5.2; (d) repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2; (e) solvent reclamation/regeneration; (f) recycling/reclamation of inorganic materials other than metals or metal compounds; (g) regeneration of acids or bases; (h) recovery of components used for pollution abatement; (i) recovery of components from catalysts; (j) oil re-refining or other reuses of oil; (k) surface impoundment.		
5(a) Installations for the recovery or disposal of hazardous waste receiving 10 tonnes per day	5.2. Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants: (b) for hazardous waste with a capacity exceeding 10 tonnes per day		
5(a) Installations for the recovery or disposal of hazardous waste receiving 10 tonnes per day	5.6. Underground storage of hazardous waste with a total capacity exceeding 50 tonnes		
5(b) Installations for the incineration of non-hazardous waste in the scope of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste with a capacity of 3 tonnes per hour	5.2. Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants: (b) for non-hazardous waste with a capacity exceeding 3 tonnes per hour		
5(c) Installations for the disposal of non-hazardous waste with a capacity of 50 tonnes per day	5.3.(a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment:		

E-PRTR	IED	EU-ETS	Other instruments
	(i) biological treatment; (ii) physico-chemical treatment; (iii) pre-treatment of waste for incineration or co-incineration; (iv) treatment of slags and ashes; (v) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.		
5(d) Landfills (excluding landfills of inert waste and landfills, which were definitely closed before 16.7.2001 or for which the after-care phase required by the competent authorities according to Article 13 of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste has expired) receiving 10 tonnes per day or with a total capacity of 25 000 tonnes	5.4. Landfills, as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste		
5(e) Installations for the disposal or recycling of animal carcasses and animal waste with a treatment capacity of 10 tonnes per day	6.5. Disposal or recycling of animal carcases or animal waste with a treatment capacity exceeding 10 tonnes per day		
5(f) Urban waste-water treatment plants with a capacity of 100 000 population equivalents			Council Directive 91/271/EEC concerning urban waste water treatment defines standards and emission limits for UWWTP above 2 000 population equivalents
5(g) Independently operated industrial waste-water treatment plants which serve one or more activities of this annex with a capacity of 10 000 m3 per day	6.11. Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation covered by Chapter II		
	5.3(b) Recovery, or a mix of recovery and		

E-PRTR	IED	EU-ETS	Other instruments
	disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC: (i) biological treatment; (ii) pre-treatment of waste for incineration or co-incineration; (iii) treatment of slags and ashes; (iv) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components. When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.		
	5.5. Temporary storage of hazardous waste not covered under point 5.4 pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6 with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated		
6(a) Industrial plants for the production of pulp from timber or similar fibrous materials	6.1(a) Production in industrial installations of pulp from timber or other fibrous materials;	Production of pulp from timber or other fibrous materials	
6(b) Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood) with a production capacity of 20 tonnes per day	6.1. Production in industrial installations of: (b) paper or card board with a production capacity exceeding 20 tonnes per day; (c) one or more of the following wood-based panels: oriented strand board, particleboard or fibreboard with a production capacity exceeding 600 m3 per day.	Production of paper or cardboard with a production capacity exceeding 20 tonnes per day	
(c) Industrial plants for the preservation of wood and wood products with chemicals with a	6.10. Preservation of wood and wood products with chemicals with a production capacity		

E-PRTR	IED	EU-ETS	Other instruments
production capacity of 50 m3 per day	exceeding 75 m^3 per day other than exclusively treating against sapstain		
7(a) Installations for the intensive rearing of poultry or pigs (i) With 40 000 places for poultry (ii) With 2 000 places for production pigs (over 30 kg) (iii) With 750 places for sows	6.6. Intensive rearing of poultry or pigs: (a) with more than 40 000 places for poultry; (b) with more than 2 000 places for production pigs (over 30 kg), or (c) with more than 750 places for sows.		
7(b) Intensive aquaculture with a production capacity of 1 000 tonnes of fish or shellfish per year			
8(a) Slaughterhouses with a carcass production capacity of 50 tonnes per day	6.4(a) Operating slaughterhouses with a carcass production capacity greater than 50 tonnes per day		
8(b) Treatment and processing intended for the production of food and beverage products from:	6.4(b) Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed from: (iii) animal and vegetable raw materials, both in combined and separate products, with a finished product production capacity in tonnes per day greater than: - 75 if A is equal to 10 or more; or, - [300- (22,5 × A)] in any other case, where 'A' is the portion of animal material (in percent of weight) of the finished product production capacity. Packaging shall not be included in the final weight of the product.		
(i) Animal raw materials (other than milk) with a finished product production capacity of 75 tonnes	(i) only animal raw materials (other than exclusively milk) with a finished product		

E-PRTR	IED	EU-ETS	Other instruments
per day	production capacity greater than 75 tonnes per day		
(ii) Vegetable raw materials with a finished product production capacity of 300 tonnes per day (average value on a quarterly basis)	(ii) only vegetable raw materials with a finished product production capacity greater than 300 tonnes per day or 600 tonnes per day where the installation operates for a period of no more than 90 consecutive days in any year		
Treatment and processing of milk with a capacity to receive 200 tonnes of milk per day (average value on an annual basis)	(c) Treatment and processing of milk only, the quantity of milk received being greater than 200 tonnes per day (average value on an annual basis)		
9(a) Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles with a treatment capacity of 10 tonnes per day	6.2. Pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of textile fibres or textiles where the treatment capacity exceeds 10 tonnes per day		
9(b) Plants for the tanning of hides and skins with a treatment capacity of 12 tonnes of finished product per day	6.3. Tanning of hides and skins where the treatment capacity exceeds 12 tonnes of finished products per day		
9(c) Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating with a consumption capacity of 150 kg per hour or 200 tonnes per year	6.7. Surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating, with an organic solvent consumption capacity of more than 150 kg per hour or more than 200 tonnes per year		
9(d) Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitisation	6.8. Production of carbon (hard-burnt coal) or electrographite by means of incineration or graphitisation		
9(e) Installations for the building of, and painting or removal of paint from ships with a capacity for ships 100 m long			
	6.9. Capture of CO_2 streams from installations covered by this Directive for the purposes of geological storage pursuant to Directive	Capture of greenhouse gases from installations covered by this Directive for the purpose of transport and geological storage in a storage site	

E-PRTR	IED	EU-ETS	Other instruments
	2009/31/EC	permitted under Directive 2009/31/EC	
		Transport of greenhouse gases by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC	
		Geological storage of greenhouse gases in a storage site permitted under Directive 2009/31/EC	