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**COMMISSION STAFF WORKING DOCUMENT**

**Technical information**

*Accompanying the document*

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND  
THE COUNCIL**

**EU Climate Action Progress Report 2023**

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# 1 OVERVIEW OF EU CLIMATE TARGETS

Table 1: Overview of new climate targets as adopted under the Fit for 55 package

|                                   | International commitments                         | EU domestic legislation                        |                                      |                               |                                              |                                                                              |                                       |                                             |                                                                |
|-----------------------------------|---------------------------------------------------|------------------------------------------------|--------------------------------------|-------------------------------|----------------------------------------------|------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------|----------------------------------------------------------------|
|                                   | The EU's commitment under the Kyoto Protocol (KP) | The EU's commitment under the Paris Agreement  | 2020 Climate and Energy Package      |                               | 2030 Climate and Energy Framework            |                                                                              |                                       | 2050                                        |                                                                |
|                                   |                                                   |                                                | EU ETS                               | Effort Sharing Decision (ESD) | EU ETS (ETS1)                                | ETS 2 for buildings, road transport and small-emitting industry <sup>1</sup> | Effort Sharing Regulation (ESR)       | LULUCF                                      |                                                                |
| Target year of period             | Second commitment period (2013-2020)              | Already in force – covers the period post 2020 | 2013-2020                            |                               | 2021 - 2030                                  |                                                                              |                                       |                                             | 2050                                                           |
| Overall emission reduction target | -20%                                              | at least -55% net emissions in 2030            | -20% GHG emissions reduction vs 1990 |                               | at least -55% net domestic reduction vs 1990 |                                                                              |                                       |                                             | climate neutrality<br>(Balance between emissions and removals) |
| Emission reduction target         |                                                   |                                                | -21% in 2020 compared to 2005        | -10% in 2020 compared to 2005 | -62% in 2030 compared to 2005 for            | -42% in 2030 compared to 2005 for ETS 2 emissions                            | -40% in 2030 compared to 2005 for ESR | First phase 2021-2025 'no-debit' commitment |                                                                |

<sup>1</sup> Surrendering of allowances under the new ETS 2 will start in 2027.

|                                                         |                                                                                                                  |      |                                                                                                      |                                     |                                                                                          |      |                                |                                                                                                                                                                                                      |     |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------|------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                                                         |                                                                                                                  |      | for ETS emissions                                                                                    | for non-ETS emissions               | EU ETS emissions                                                                         |      | emissions (non-ETS1 emissions) | to maintain current carbon sink levels. In a second phase 2026-2030: EU-wide target of -310 Mt CO <sub>2</sub> equivalent of net removals by 2030, each MS will have nationally binding 2030 targets |     |
| Base year                                               | 1990, but subject to flexibility rules. 1995 or 2000 may be used as its base year for Nitrogen trifluoride (NF3) | 1990 | 2005                                                                                                 | 2005                                | 2005                                                                                     | 2005 | 2005                           | Subject to accounting rules                                                                                                                                                                          | N/A |
|                                                         |                                                                                                                  |      | 1990 for overall emission reduction target                                                           |                                     | 1990 for overall emission reduction target                                               |      |                                |                                                                                                                                                                                                      |     |
| Carry-over of units from preceding periods <sup>2</sup> | Subject to KP rules including those agreed in the Doha Amendment                                                 | No   | EU ETS allowances can be banked into subsequent ETS trading periods since the second trading period. | No carry over from previous period. | Indefinite validity of allowances not limited to trading periods. No need to carry over. | No   | No                             | No                                                                                                                                                                                                   |     |

<sup>2</sup> For the CP2 it refers to carry over from CP1. For the ETS it refers to carry-over from previous trading period under the scheme itself. For the effort sharing legislation it refers to carry over from ESD to ESR. For LULUCF it refers to carry-over from Kyoto Protocol period.

|                                |                                                                                                                   |                                                                                                     |                                                                                   |                                                                                   |                                                                                                         |                                                                                                             |                                                                                          |                                                                  |              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------|
| Gases covered                  | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs <sup>3</sup> , PFCs, SF <sub>6</sub> , NF <sub>3</sub> | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub> | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub>                       | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub>         | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O                                     | CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs |              |
| Sectors included               | Energy, IPPU, agriculture, waste, LULUCF                                                                          | Energy, IPPU, agriculture, waste, LULUCF                                                            | Power & heat generation, intensive industry sectors, aviation                     | Transport (except aviation), buildings, non-ETS industry, agriculture and waste   | Electricity & heat generation, energy-intensive industry, aviation <sup>4</sup> , maritime <sup>5</sup> | Buildings, road transport and small-emitting sectors (i.e. emissions from fuel combustion in these sectors) | Domestic transport (except aviation), buildings, non-ETS industry, agriculture and waste | Land use, land use change and forestry                           | Economy-wide |
| Global Warming Potentials used | IPCC SAR                                                                                                          | IPCC AR4                                                                                            | IPCC AR5                                                                          | IPCC AR4                                                                          | IPCC AR5                                                                                                |                                                                                                             |                                                                                          | IPCC AR5                                                         |              |
| Applicable to number of MS     | 15 (additional KP targets for single MS)                                                                          | EU-27, UK and Iceland                                                                               | EU-27                                                                             | EU-27 <sup>6</sup>                                                                | EU-27 <sup>7</sup>                                                                                      |                                                                                                             |                                                                                          | EU-27 <sup>8</sup>                                               |              |

<sup>3</sup> HFCs are also covered by the Kigali Amendment to the Montreal Protocol, which entered into force on the 1<sup>st</sup> of January 2019.

<sup>4</sup> Emissions from flights between EEA airports as well as flights departing to airports in Switzerland and in the UK.

<sup>5</sup> Emissions from all large ships entering EU ports in respect of 50% of emissions from voyages starting or ending outside of the EU and 100% of emissions that occur between two EU ports and when ships are within EU ports.

<sup>6</sup> In addition to the 27 Member States, Northern Ireland, Iceland, Liechtenstein and Norway are also covered under the EU-ETS. The UK was initially also covered by the ESD.

<sup>7</sup> In addition to the 27 Member States, Northern Ireland, Iceland, Liechtenstein and Norway are also covered under the EU-ETS. Norway and Iceland have also incorporated the ESR.

<sup>8</sup> Within the Agreement on the European Economic Area, Iceland and Norway cooperate with the EU-27 towards achieving the 2030 targets in the LULUCF and Effort Sharing sectors.

## 2 OVERVIEW OF RECENTLY ADOPTED LEGISLATION CONTRIBUTING TO THE CLIMATE-NEUTRALITY OBJECTIVE

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### 2.1 FIT-FOR-55 PACKAGE

The European Climate Law lays down a binding EU target to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels and to achieve climate neutrality at the latest by 2050. In July 2021, the Commission proposed the **Fit-for-55 package**, containing the legislative proposals needed to reach those targets, including revision of existing legislation and new measures. In September 2023, nearly all proposals under this package were adopted (or close to adoption) by co-legislators, with several measures already in force.<sup>9</sup> Key elements of those proposals are summarised below.

#### *EU Emissions Trading System*

- Revision of the EU Emissions Trading System (ETS)<sup>10</sup> to increase the system's **ambition to 62%** emissions reductions by 2030, compared to 2005 levels.
- Extension of ETS to **maritime transport**, covering carbon dioxide (from 2024), methane and nitrous oxide emissions (from 2026) from ships above 5 000 gross tonnage in respect of all emissions from voyages within the EU and emissions from ships within EU ports and of 50% of emissions from international voyages starting or ending in the EU. The obligations for shipping companies to surrender allowances is introduced gradually: 40% of emissions reported for 2024, 70% for 2025 and 100% for 2026.
- Increasing the **aviation** sector's contribution to emission reductions through a strengthening of the EU ETS for aviation and implementing the global market-based measure CORSIA (Carbon Offset and Reduction Scheme for International Aviation)<sup>11</sup>.
- The **Market Stability Reserve**, which stabilises the carbon market by removing surplus allowances, is strengthened.

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<sup>9</sup> Nearly all acts under the Fit-for-55 package were adopted by the Parliament and the Council, with the exception of the Renewable Energy Directive, the ReFuel EU Aviation Regulation (both provisionally agreed, pending final vote) and the Energy Taxation Directive (negotiations still ongoing).

<sup>10</sup> Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system.

<sup>11</sup> Decision (EU) 2023/136 of the European Parliament and of the Council of 18 January 2023 amending Directive 2003/87/EC as regards the notification of offsetting in respect of a global market-based measure for aircraft operators based in the Union.

- Free emission allowances to certain industry sectors gradually phased out as a new **Carbon Border Adjustment Mechanism (CBAM)**<sup>12</sup> will be phased in between 2026 and 2034. CBAM puts a carbon price on imports of products in the covered sectors to avoid 'carbon leakage'.
- The size of the **Innovation Fund** and the **Modernisation Fund** funded from revenues of the EU ETS, is increased. Additional resources of the Modernisation Fund are supporting three more Member States with their transition. The Innovation Fund, which funds the demonstration of innovative low-carbon technologies, is expanded to new sectors, including maritime transport.
- A new separate emissions trading system for buildings, road transport and small emitting sectors (ETS2) is established, with compliance starting in 2027. It is complementing Member States' emission reduction targets under the Effort Sharing Regulation. The ETS 2 is contributing to 42% emission reductions compared to 2005 in the sectors covered.
- The new **Social Climate Fund**<sup>13</sup> is introduced together with the ETS 2 to mitigate any social effects of carbon pricing in the covered sectors. It will pool revenues from the new system to provide dedicated financial support to Member States to help vulnerable citizens and micro-enterprises with investments in energy efficiency (such as home insulation, heat pumps, solar panels), and low- and zero-emissions mobility. Member States will also be able to provide direct income support to households up to 37.5% of the total cost of their Social Climate Plans. The Fund will be launched in 2026, a year before ETS 2. In 2026-32, it is expected to mobilise EUR 86.7 billion – directly from ETS 2 revenues and co-financing by Member States. As a result, energy costs for vulnerable households, micro-enterprises and transport users will be reduced.

### ***Effort Sharing Regulation***

- Increased ambition of the EU's Effort Sharing Regulation<sup>14</sup> to a **-40%** reduction of emissions in domestic transport, buildings, agriculture, waste and small industrial installations by 2030 compared to 2005 levels (from -29% for EU-27 in 2018). The updated emission reduction targets for Member States range from -10% to -50%.

### ***Land use, land use change and forestry***

- Introduction of an EU target for **net greenhouse gas removals** by natural sinks of 310 million tonnes of CO<sub>2</sub> equivalent by 2030 and setting ambitious and fair targets for each

<sup>12</sup> Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism.

<sup>13</sup> Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060.

<sup>14</sup> Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999.

Member State to reverse the decreasing trend of the EU's carbon sink<sup>15</sup>. For the period from 2026-2030, each Member State will have a binding national target for 2030, which together will deliver the collective EU target of 310 Mt. In addition, the Regulation sets a commitment for each Member State to achieve a sum of net greenhouse gas emissions and removals for the period from 2026 to 2029 ('the budget 2026-2029').

### *Standards for new cars and vans*

- More ambitious targets for reducing CO<sub>2</sub> emissions of new cars and vans with the adoption of the **regulation on emission performance standards for new cars and vans**<sup>16</sup>, to reduce 55% of CO<sub>2</sub> emissions for new cars and 50% for new vans from 2030 until 2034, and for 100% CO<sub>2</sub> emissions reductions from 2035 for new cars and vans.

### *Other acts under the Fit-for-55 package*

- Ambitious **targets for improving energy efficiency**<sup>17</sup> and **for increasing renewables**<sup>18</sup> in the EU energy mix have been agreed. In line with the European Commission's plan to make Europe independent from Russian fossil fuels well before 2030 (RePowerEU), the EU has agreed to increase ambition on energy savings through an enhanced target to **reduce final energy consumption at EU level by 11,7% in 2030**, compared to projections made in 2020, and a new target for **increasing renewable energy in final energy consumption of at least 42,5% by 2030**, with an additional 2,5% indicative top up that would allow to reach 45%.
- The **ReFuelEU Aviation Regulation**<sup>19</sup> will increase the uptake of sustainable fuels, such as advanced biofuels or hydrogen, in the aviation sector. It obliges EU airports and fuel suppliers to ensure that, starting from 2025, at least 2% of aviation fuels will be green, with this share increasing every five years and reaching 70% in 2050.
- The **FuelEU Maritime Regulation**<sup>20</sup> will ensure that the greenhouse gas intensity of fuels used by the shipping sector gradually decreases over time, by 2% in 2025 and 6% in 2030 to as much as 80% by 2050. It promotes sustainable alternative fuels in shipping and at

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<sup>15</sup> Regulation (EU) 2023/839 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/841 as regards the scope, simplifying the reporting and compliance rules, and setting out the targets of the Member States for 2030, and Regulation (EU) 2018/1999 as regards improvement in monitoring, reporting, tracking of progress and review.

<sup>16</sup> Regulation (EU) 2023/851 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2019/631 as regards strengthening the CO<sub>2</sub> emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition.

<sup>17</sup> Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955.

<sup>18</sup> Proposal for an amendment to the Renewable Energy Directive to implement the ambition of the new 2030 climate target (COM/2021/557).

<sup>19</sup> Proposal for a Regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport (COM/2021/561 final).

<sup>20</sup> Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC.

European ports by limiting the greenhouse gas intensity of the energy used on-board large ships and by mandating the use of onshore power supply for certain ship types.

- With the new Regulation for the deployment of an **alternative fuels infrastructure (AFIR)**<sup>21</sup>, more **recharging and refuelling stations** for alternative fuels will be deployed in the coming years across Europe. It will ensure minimum infrastructure to support the required uptake of alternative fuel vehicles across all transport modes and in all EU Member States, ensure full interoperability of the infrastructure and comprehensive user information and adequate payment options at alternative fuels infrastructure. It sets mandatory national targets for the deployment of alternative fuels infrastructure in the EU, for road vehicles, vessels and stationary aircraft.
- The proposal for a revised **Energy Taxation Directive**<sup>22</sup> aims to align the taxation of energy products with EU energy and climate policies, promote clean technologies and remove outdated exemptions and reduced rates that currently encourage the use of fossil fuels (*legislative procedure ongoing*)

## 2.2 ADDITIONAL POLICY CONTRIBUTING TOWARDS THE ACHIEVEMENT OF THE EU'S CLIMATE TARGETS

The proposals to revise the **fluorinated greenhouse gases (F-gases) Regulation**<sup>23</sup> and the **Ozone Regulation**<sup>24</sup> will further reduce emissions from those highly potent, human-made greenhouse gases which are often several thousand times stronger than carbon dioxide (CO<sub>2</sub>). In particular, the current HFCs phase-down, which is gradually reducing the volume of hydrofluorocarbons placed on the EU market, will become steeper. The Commission also proposed more ambitious emission-reduction targets for **heavy-duty vehicles**<sup>25</sup> to ensure that this segment of the road transport sector contributes to the EU's climate and zero pollution objectives. The proposed revision of the TEN-T Regulation<sup>26</sup> and the Greening freight package<sup>27</sup> will further support the decarbonisation of the transport sector. These saved emissions will support Member States' efforts to reach their target

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<sup>21</sup> Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU.

<sup>22</sup> Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (COM/2021/563 final).

<sup>23</sup> Proposal for a Regulation of the European Parliament and of the Council on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014, (COM/2022/150 final).

<sup>24</sup> Proposal for a Regulation of the European Parliament and of the Council on substances that deplete the ozone layer and repealing Regulation (EC) No 1005/2009, (COM/2022/151 final).

<sup>25</sup> Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO<sub>2</sub> emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956, (COM/2023/88 final).

<sup>26</sup> Proposal for a Regulation of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) 1315/2013, (COM(2021)812 final).

<sup>27</sup> Proposal for a Regulation on the use of railway infrastructure capacity in the single European railway area (COM(2023)443), Proposal for a Revision of the Weights and Dimensions Directive (COM(2023)445), Proposal for a Regulation on the accounting of greenhouse gas emissions of transport services (COM(2023)441).

under the Effort Sharing Regulation. The **hydrogen and gas markets decarbonisation package**<sup>28</sup> will decarbonise the EU gas market by facilitating the uptake of renewable and low carbon gases, including hydrogen and will ensure energy security for all citizens in Europe. New rules on **methane emissions**<sup>29</sup> in the energy sector will increase understanding of where methane emissions come from and will contribute to reduce those emissions. The revised **Energy performance of buildings Directive**<sup>30</sup> will contribute to achieving a zero-emission and largely decarbonised building stock by 2050. The proposed EU-wide voluntary framework to reliably **certify high-quality carbon removals**<sup>31</sup> will boost innovative carbon removal technologies and carbon farming solutions.

Tackling climate change and ensuring healthy and biodiverse ecosystems are intrinsically linked. **Natural carbon sinks** are of crucial importance to sequester carbon. The new proposals to conserve and restore ecosystems such as wetlands and forests. The **Nature Restoration Law**<sup>32</sup>, **Soil Monitoring Law**<sup>33</sup> and the upcoming framework for **resilient European forests**<sup>34</sup> will also make a significant contribution to maintaining, managing and enhancing natural carbon sinks and to increasing biodiversity while fighting climate change.

By promoting energy and material efficiency, and reducing the amount of waste produced, circularity has the potential to cut global emissions. The Commission adopted the **Ecodesign for Sustainable Products Regulation**<sup>35</sup> to ensure products are built to be sustainable and recyclable and to extend their lifetime. The initiative on the **Right to Repair**<sup>36</sup> makes repair easier and more attractive for consumers. The Commission proposed several measures to reduce waste such as a targeted revision of the **Waste Framework Directive (WFD)**<sup>37</sup> or the EU rules on **Packaging and Packaging Waste**<sup>38</sup>. Consumers in the EU indicated lacking reliable information about the sustainability of products and facing misleading commercial practices, such as greenwashing and

<sup>28</sup> Proposal for a Directive of the European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen (COM(2021)803 final) and proposal for a Regulation of the European Parliament and of the Council on the internal markets for renewable and natural gases and for hydrogen (COM(2021)804 final).

<sup>29</sup> Proposal for a Regulation of the European Parliament and of the Council on methane emissions reduction in the energy sector and amending Regulation (EU) 2019/942 (COM(2021)805 final)

<sup>30</sup> Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings, (COM/2021/802 final).

<sup>31</sup> Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals, (COM(2022) 672 final).

<sup>32</sup> Proposal for a Regulation of the European Parliament and of the Council on nature restoration, (COM/2022/304 final).

<sup>33</sup> Proposal for a Directive of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law), (COM(2023) 416 final).

<sup>34</sup> Under preparation, see [EU forests – new EU Framework for Forest Monitoring and Strategic Plans \(europa.eu\)](https://europa.eu/eu-press/pr/2024/04/24/04242024-01)

<sup>35</sup> Proposal for a Regulation of the European Parliament and of the Council establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC, (COM/2022/142 final).

<sup>36</sup> Proposal for a Directive of the European Parliament and of the Council on common rules promoting the repair of goods and amending Regulation (EU) 2017/2394, Directives (EU) 2019/771 and (EU) 2020/1828, COM/2023/155 final.

<sup>37</sup> Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, (COM/2023/420 final).

<sup>38</sup> Proposal for a Regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC, (COM/2022/677 final).

early obsolescence practices. To address this, the Commission proposed a **Directive on Empowering Consumers for the Green Transition**<sup>39</sup> to ensure better information is provided to consumers on durability and reparability, and to strengthen the fight against misleading practices linked to sustainability. The Commission also proposed an **EU Green Claims Directive**<sup>40</sup> under which companies will be required to substantiate the claims they make.

In February 2023, the Commission adopted “a **Green Deal Industrial plan for the net zero age**<sup>41</sup>” to enhance the competitiveness of the EU’s net zero industry and leading globally the transition to climate neutrality. The plan aims at creating a predictable and simplified regulatory environment, enabling faster access to sufficient funding, turning skills into quality jobs, and supporting open trade for resilient supply. As part of this, the Commission has proposed the **net-zero industrial act (NZIA)**<sup>42</sup>, the **critical raw material act**<sup>43</sup>, and a **reform of the electricity market**<sup>44</sup>. The NZIA aims to scale up net zero technology manufacturing in the EU to provide at least 40% of the EU’s annual deployment needs by 2030 and sets a union level objective of 50 million tonnes of annual CO<sub>2</sub> storage capacity by 2030. A key element in the strategy is the promotion of renewable hydrogen as a substitute to fossil fuels, for which the Commission has set the target of 20 million tonnes of supply by 2030. To facilitate its deployment, in 2023 the Commission created the European hydrogen bank, which will support amongst other things the creation of a domestic market with funds from the ETS innovation fund, starting with a public auction by the end of 2023.

The availability of **relevant skills** is a precondition for a successful transition towards climate neutrality. With the necessary skills in place, significant jobs creation on the 2030 time horizon will take place not only within the clean energy sector, but also in manufacture, construction transportation, and services linked to boosted manufacturing and deployment of these technologies. Under the Net Zero Industry Act, the Commission will support the setting up of specialised **European Net-Zero Industry Academies**, each focusing on a net-zero technology to provide up-skilling and re-skilling programmes. With the Council Recommendation on **ensuring a fair transition** towards climate neutrality<sup>45</sup>, Member States have committed to devise and

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<sup>39</sup> Proposal for a Directive of the European Parliament and of the Council amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and better information, (COM/2022/143 final).

<sup>40</sup> Proposal for a Directive of the European Parliament and of the Council on substantiation and communication of explicit environmental claims (Green Claims Directive), (COM/2023/166 final).

<sup>41</sup> Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, A Green Deal Industrial Plan for the Net-Zero Age, (COM/2023/62 final).

<sup>42</sup> Proposal for a regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe’s net-zero technology products manufacturing ecosystem (Net Zero Industry Act), (COM(2023)161).

<sup>43</sup> Proposal for a regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/102, (COM(2023)160).

<sup>44</sup> Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union’s electricity market design, (COM/2023/148 final).

<sup>45</sup> Proposal for a Council recommendation on ensuring a fair transition towards climate neutrality, (COM(2021) 801 final).

implement measures to address the employment and social aspects of the transition, including in the energy sector. It specifically asks Member States to consider the guidance provided in the Recommendation as part of their assessments during the update of the National Energy and Climate Plans (NECPs).

**Future EU spending** will also be directed **to action on the green and just transition**. To meet the need to boost investment in critical technologies in Europe, the Commission proposed the **Strategic Technologies for Europe Platform**<sup>46</sup>. It will supplement and leverage existing EU instruments to swiftly channel financial support to clean technologies, deep and digital technologies, and biotechnologies. In addition, the proposal for a revised **Financial Regulation**<sup>47</sup> includes the do-no-significant-harm principle to ensure that the EU budget is implemented without doing significant harm to the environmental objectives, including climate change mitigation and adaptation.

The Joint Communication on the **Climate and Security Nexus**<sup>48</sup> mainstreams climate and environmental considerations into EU external action and takes steps to make Member States' security and defence actors more climate-proof. This will enhance their contribution to the EU climate, energy and environmental objectives and policies, while respecting its specificities and preserving their operational effectiveness in rapidly changing strategic context.

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<sup>46</sup> Proposal for a Regulation of the European Parliament and of the Council establishing the Strategic Technologies for Europe Platform ('STEP') and amending Directive 2003/87/EC, Regulations (EU) 2021/1058, (EU) 2021/1056, (EU) 2021/1057, (EU) No 1303/2013, (EU) No 223/2014, (EU) 2021/1060, (EU) 2021/523, (EU) 2021/695, (EU) 2021/697 and (EU) 2021/241, (COM(2023) 335 final).

<sup>47</sup> Proposal for a Regulation of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union, (COM(2022) 223 final).

<sup>48</sup> Joint Communication to the European Parliament and the Council, A new outlook on the climate and security nexus: Addressing the impact of climate change and environmental degradation on peace, security and defence (JOIN(2023) 19 final).

## 3 EU's GREENHOUSE GAS EMISSIONS: TRENDS AND PROJECTIONS

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### 3.1 EU GREENHOUSE GAS EMISSIONS AND REMOVALS: RECENT DEVELOPMENTS

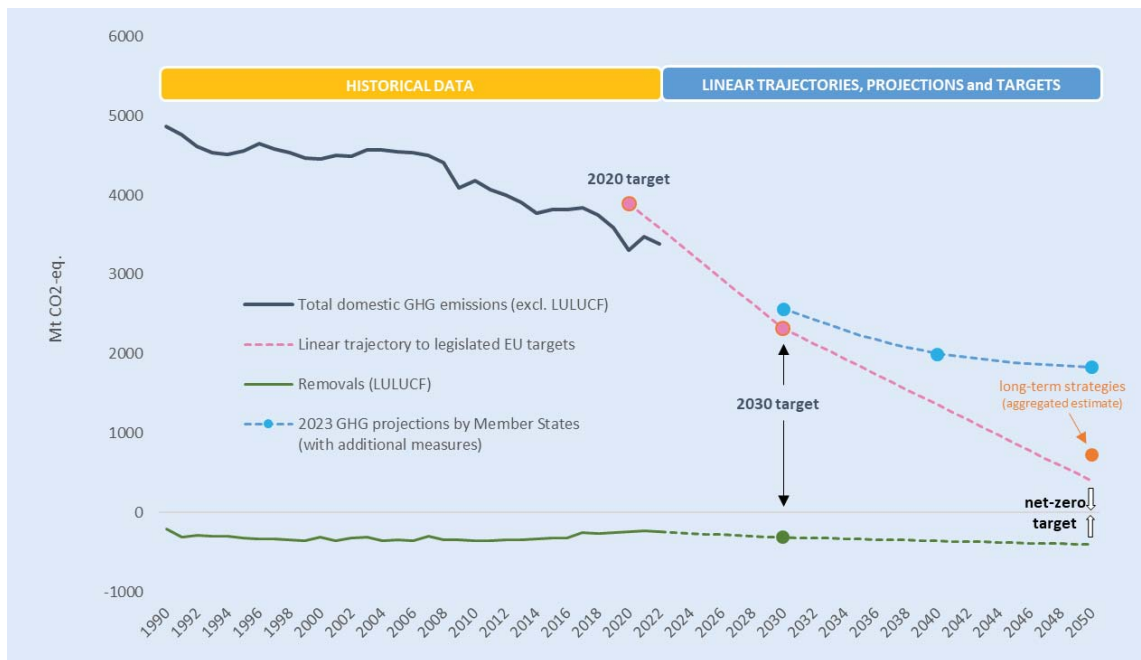
After the 2021 strong rebound in greenhouse gas (GHG) emissions following the unprecedented fall in 2020 due to the COVID-19 pandemic, EU emissions in 2022 are expected to bounce back to the 30-years descending trend (**Figure 1**). According to provisional data, total EU domestic GHG emissions (i.e. excluding LULUCF and international aviation) decreased by 2.4% in 2022 compared to 2021, whilst EU GDP grew by 3.5% in the same year. This translates into a reduction in GHG emissions of 30.4% compared to the 1990 base year (or 29% when international aviation is included). Over the same period, there is an approximated increase in reported GHG net removals from land use, land use change, and forestry (LULUCF) of 14 million tonnes of CO<sub>2</sub> equivalent compared to 2021.<sup>49</sup> As a result, net GHG emissions for 2022 (i.e. including LULUCF) are expected to be 32.5% below the 1990 level (or 31.1% when international aviation is included).

*Figure 1: Total EU GHG emissions (excluding international aviation) and removals (1990-2022), linear trajectories to EU targets, and Member States' latest GHG emissions projections (2022-2050).<sup>50</sup>*

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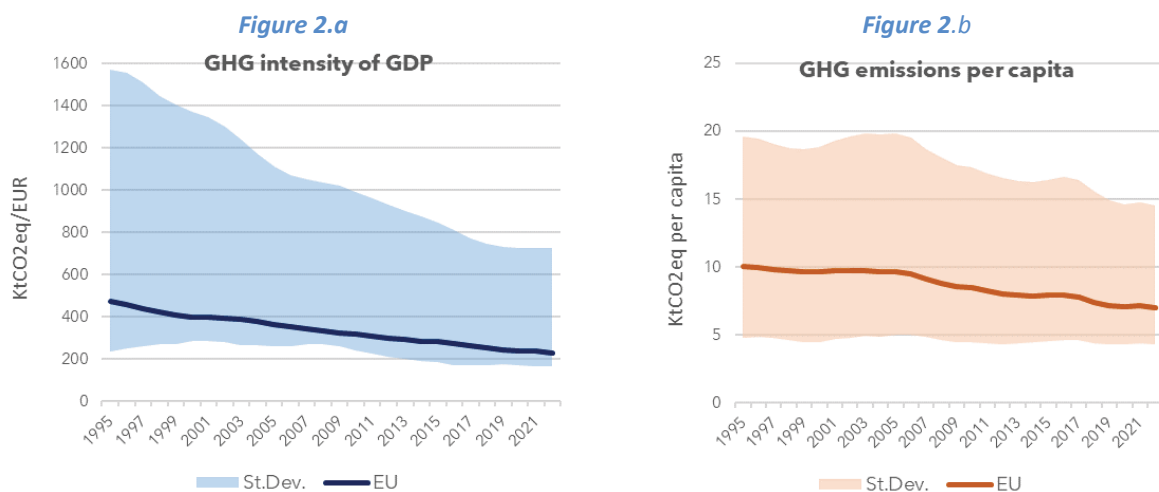
<sup>49</sup> Approximated 2022 data could suggest a break to the declining trend in the LULUCF sink observed in recent years. However, the assessment takes into consideration the large uncertainty of these data and as it will possibly be subject to larger revisions.

<sup>50</sup> Notes: (1) Historical GHG emissions and removals (1990-2022) are based on European Environment Agency's 2023 GHG Inventory and Approximated emissions and removals. (2) Linear trajectories for GHG emissions and removals (2022-2050) are based on the legislated EU 2030 targets, while emissions and removals by 2050 reflect estimates from the different model-based analyses supporting the "Delivering the European Green Deal". (3) The -55% 2030 target (EU Climate Law) considers a contribution of removals of -225 MtCO<sub>2</sub>eq.



This is also evidenced by the continued relative decoupling between emissions and economic growth with the GHG emission intensity of the economy, defined as the ratio between emissions and GDP, falling to 229 gCO<sub>2</sub>-eq/EUR in 2022, less than half the 1990 level. As shown in Figure 2.a, the steady decline in the GHG emission intensity was accompanied by a convergence among Member States. The similar pattern is shown by the GHG emissions per capita, although the decline seems have plateaued in the most recent years (Figure 2.b).

**Figure 2: GHG emission intensity of GDP and GHG emissions per capita (1995-2022)<sup>51</sup>**



<sup>51</sup> Sources: EU greenhouse gas inventory 1990-2021. Real GDP in 2015 prices, data from AMECO database (European Commission, DG ECFIN). For GHG intensity of GDP, first available data are: BG and LT 1997; EE and SK 1993; HR 1995; LV 1992; HU, SI, MT 1991; and RO 1999.

However, more effort is needed in the next years and decades to reach the EU's long-term climate targets. The annual average reduction in domestic GHG net emissions observed over the last decade (i.e. around 53 MtCO<sub>2</sub>-eq or 1 ½ percentage point) has almost to triple in order to achieve the 2030 target of -55% and keep up the pace beyond 2030 to reach climate neutrality by 2050 (see **Table 2**).<sup>52</sup>

In terms of sectors, emission reductions in the last three decades were significant in the energy industry (e.g. electricity and heat production, -42%), in the fuel combustion in the manufacturing industry and construction (e.g. iron and steel production, -48%) and in the industrial processes and product use industries (e.g. chemical industry, -65%; metal industry, -44%). Conversely, emissions in the transport sector have increased, especially in road transportation (+16%) although they have been slightly decreasing in the last ten years. Emission reduction in the agriculture sector (excluding fuel combustion) has somewhat halted at the half-way, showing even a moderate increase since 2010.<sup>53</sup> Finally, the traditional role of natural sink of CO<sub>2</sub> of the LULUCF sector, declined at a worrying speed in the last decade.

**Table 2: Change in EU's GHG emissions over 1990-2021 and expected change by 2030: a sectoral perspective.**<sup>54</sup>

| EU-27                                                    | 1990 | 2010             |         |       |                      | 2021             |       |                      |       | 2030                 |        |
|----------------------------------------------------------|------|------------------|---------|-------|----------------------|------------------|-------|----------------------|-------|----------------------|--------|
|                                                          |      | compared to 1990 |         |       |                      | compared to 1990 |       | compared to 2010     |       | compared to 2021     |        |
|                                                          |      | MtCO2eq          | MtCO2eq | %Δ    | annual μΔ<br>MtCO2eq | MtCO2eq          | %Δ    | annual μΔ<br>MtCO2eq | %Δ    | annual μΔ<br>MtCO2eq | %Δ     |
| 1- Energy                                                | 3747 | 3305             | -12%    | -22.1 | 2663                 | -29%             | -35.0 | -19%                 | -58.4 | -41%                 | -122.4 |
| 1.A.1 - Energy Industries                                | 1442 | 1254             | -13%    | -9.4  | 840                  | -42%             | -19.4 | -33%                 | -37.6 | -42%                 | -39.0  |
| of which:                                                |      |                  |         |       |                      |                  |       |                      |       |                      |        |
| 1.A.1.a - Public Electricity and Heat Production         | 1233 | 1083             | -12%    | -7.5  | 717                  | -42%             | -16.6 | -34%                 | -33.3 |                      |        |
| 1.A.2 - Manufacturing Industries and Construction        | 729  | 481              | -34%    | -12.4 | 440                  | -40%             | -9.3  | -9%                  | -3.7  | -46%                 | -22.4  |
| of which:                                                |      |                  |         |       |                      |                  |       |                      |       |                      |        |
| 1.A.2.a - Iron and Steel                                 | 152  | 93               | -39%    | -2.9  | 80                   | -48%             | -2.3  | -15%                 | -1.2  |                      |        |
| 1.A.2.c - Chemicals                                      | 102  | 76               | -25%    | -1.3  | 72                   | -30%             | -1.0  | -6%                  | -0.4  |                      |        |
| 1.A.2.f - Non-metallic minerals                          | 129  | 100              | -22%    | -1.4  | 84                   | -34%             | -1.4  | -16%                 | -1.4  |                      |        |
| 1.A.3 - Transport                                        | 672  | 818              | 22%     | 7.3   | 782                  | 16%              | 3.5   | -4%                  | -3.2  | -25%                 | -22.1  |
| of which:                                                |      |                  |         |       |                      |                  |       |                      |       |                      |        |
| 1.A.3.b - Road Transportation                            | 620  | 771              | 24%     | 7.6   | 748                  | 21%              | 4.1   | -3%                  | -2.1  |                      |        |
| 1.A.4 - Other Sectors                                    | 713  | 656              | -8%     | -2.8  | 533                  | -25%             | -5.8  | -19%                 | -11.2 | -53%                 | -31.4  |
| 1.A.4.a - Commercial/Institutional                       | 172  | 163              | -5%     | -0.4  | 130                  | -25%             | -1.4  | -20%                 | -3.0  |                      |        |
| 1.A.4.b - Residential                                    | 450  | 413              | -8%     | -1.8  | 325                  | -28%             | -4.0  | -21%                 | -8.0  |                      |        |
| 1.A.4.c - Agriculture/Forestry/Fishing                   | 91   | 80               | -12%    | -0.5  | 78                   | -14%             | -0.4  | -2%                  | -0.2  |                      |        |
| 2- Industrial Processes and Product Use                  | 445  | 358              | -19%    | -4.3  | 318                  | -29%             | -4.1  | -11%                 | -3.7  | -19%                 | -6.6   |
| 2.A - Mineral Industry                                   | 134  | 110              | -18%    | -1.2  | 104                  | -22%             | -1.0  | -6%                  | -0.6  |                      |        |
| 2.B - Chemical Industry                                  | 154  | 68               | -56%    | -4.3  | 52                   | -66%             | -3.3  | -24%                 | -1.5  |                      |        |
| 2.C - Metal Industry                                     | 134  | 78               | -42%    | -2.8  | 75                   | -44%             | -1.9  | -4%                  | -0.3  |                      |        |
| 2.D,E,F,G,H - Other production                           | 22   | 102              | 358%    | 4.0   | 87                   | 292%             | 2.1   | -14%                 | -1.3  |                      |        |
| 3- Agriculture                                           | 485  | 376              | -22%    | -5.4  | 378                  | -22%             | -3.4  | 1%                   | 0.2   | -5%                  | -2.0   |
| of which:                                                |      |                  |         |       |                      |                  |       |                      |       |                      |        |
| 3.1 - Livestock                                          | 317  | 249              | -21%    | -3.4  | 245                  | -23%             | -2.3  | -1%                  | -0.3  |                      |        |
| 4- Land Use, Land-Use Change and Forestry                | -209 | -353             | 69%     | -7.2  | -230                 | 10%              | -0.7  | -35%                 | 11.1  | 35%                  | -8.9   |
| 5- Waste management                                      | 184  | 137              | -26%    | -2.4  | 109                  | -41%             | -2.4  | -20%                 | -2.5  | -17%                 | -2.0   |
| Total emissions (UNFCCC)                                 | 4867 | 4181             | -14%    | -34.3 | 3472                 | -29%             | -45.0 | -17%                 | -64.5 | -35%                 | -134.4 |
| Total emissions with international aviation (EU 2020)    | 4921 | 4281             | -13%    | -32.0 | 3541                 | -28%             | -44.5 | -17%                 | -67.2 | -33%                 | -129.5 |
| Total net emissions (UNFCCC)                             | 4658 | 3828             | -18%    | -41.5 | 3242                 | -30%             | -45.7 | -15%                 | -53.3 | -40%                 | -143.3 |
| Total net emissions with international aviation (EU NDC) | 4712 | 3929             | -17%    | -39.2 | 3311                 | -30%             | -45.2 | -16%                 | -56.1 | -38%                 | -138.4 |

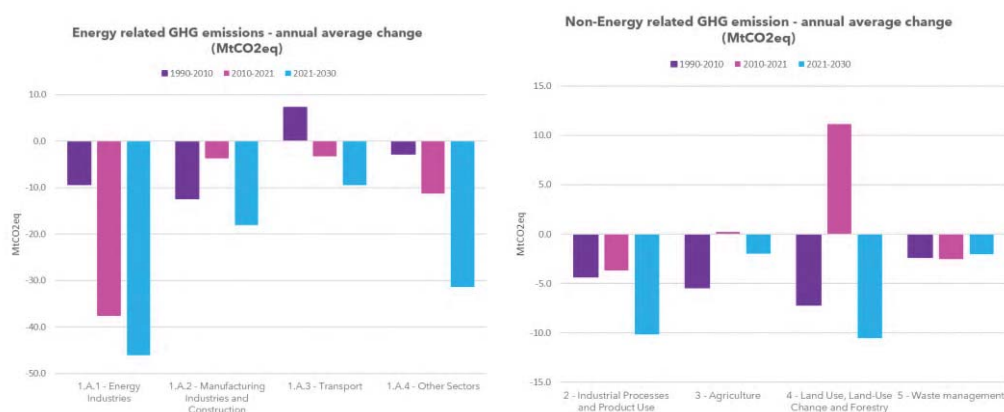
<sup>52</sup> These figures assume a quite significant improvement of LULUCF in absorbing the remaining emissions, therefore clear actions are expected for the sector to revert recent trends.

<sup>53</sup> <https://www.eea.europa.eu/ims/greenhouse-gas-emissions-from-agriculture>

<sup>54</sup> Based on the 2023 GHG inventory data submitted by Member States. Ending values for 2030 based on the model results under the MIX policy scenarios for delivering the European Green Deal [https://energy.ec.europa.eu/data-and-analysis/energy-modelling/policy-scenarios-delivering-european-green-deal\\_en](https://energy.ec.europa.eu/data-and-analysis/energy-modelling/policy-scenarios-delivering-european-green-deal_en)

Looking forward (**Figure 3**), based on the analysis supporting the “Delivering the European Green Deal”, the speed of reduction needs to significantly accelerate almost in all sectors, particularly in transport (i.e. from an average reduction of 3 to 22 MtCO<sub>2</sub>eq), manufacturing (i.e. from 4 to 22 MtCO<sub>2</sub>eq), and residential emissions (from 11 to 31 MtCO<sub>2</sub>eq), while agriculture and LULUCF need to reverse the last decade’s trend in order to meet the EU -55% reduction target by 2030.

**Figure 3: Annual average change (1990-2010, 2010-2021, 2021-2030) in EU GHG emissions (MtCO<sub>2</sub>eq)**



### 3.2 DRIVERS OF GREENHOUSE GAS EMISSION REDUCTION SINCE 1990

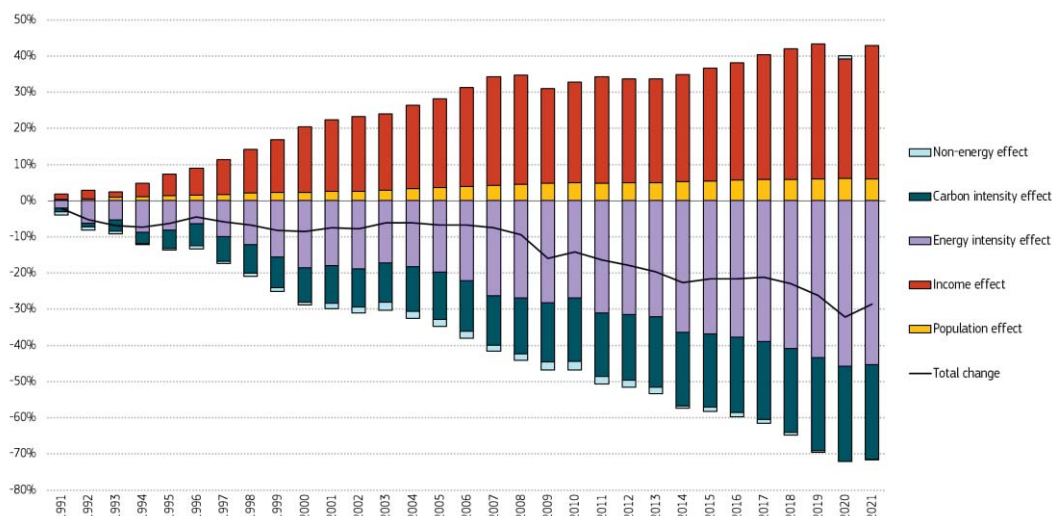
A combination of factors has helped the EU to reduce total greenhouse gas emissions (excluding the LULUCF sector) by about 29% over the past three decades. Figure 4 shows an annual breakdown of this trend into factors using a decomposition analysis with an extended Kaya identity. The underlying methodology follows that of earlier studies, e.g. by the European Environment Agency.<sup>55</sup> As with all methods of this style, the effects should not be understood as an actual causality but rather a useful indication of the drivers’ contribution.

Without technological advances in energy efficiency and carbon intensity, i.e. holding all other factors at 1990 level, the growth in GDP and population would have led to a substantial increase in GHG emissions (income and population effect). However, just the emission reduction from the decrease in primary energy use per unit of output generated (energy intensity effect) more than compensated this. Compared to 1990, 41% less energy was needed to produce a unit of GDP in 2021. Better energy transformation processes, for example through electrification, as well as a general shift to the less energy-hungry service sector can be identified as the main reasons behind this efficiency gain.

**Figure 4: Drivers of total GHG emissions cumulated over 1990-2021** <sup>56</sup>

<sup>55</sup> The methodology of the Logarithm Mean Divisia Index (LMDI) method and the formula itself can be found in the EEA report No 03/2020 on trends and drivers of EU greenhouse gas emissions.

<sup>56</sup> Data sources: EU inventories to the UNFCCC, AMECO, Eurostat energy balances.

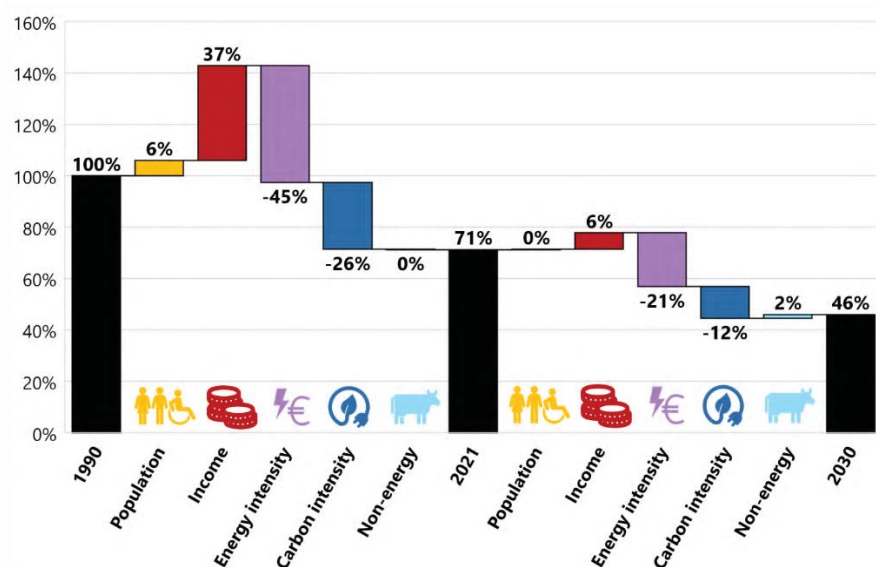


In addition to using less energy to produce the same value of output, this energy also got cleaner over the years, which further reduced emissions. Energy-related emissions per Terajoule of primary energy were 26% lower in 2021 than three decades before. In the 1990s and early 2000s this drop was mainly caused by a switch from coal to gas which emits substantially less carbon dioxide to deliver the same amount of energy. Thus, the carbon intensity of all fossil fuels sank by 12% in the time period. Since the beginning of the millenium also renewable energy sources have been picking up speed. This decreased the share of fossil fuels in primary energy consumption by 15% and brought down emissions further.

Energy-related emissions made up about three quarters of total GHG emissions excluding the LULUCF sector in 1990. The remaining quarter came from other sources, such as industrial processes, agriculture or waste management. Over the past three decades this share has not changed much and remained at a ratio of 3:1. Thus, the non-energy effect expressing this relationship (total vs. energy-related emissions) is zero as non-energy emissions have been mitigated at the same pace as energy-related ones.

**Figure 5: Effects on total GHG emissions between 1990-2021 and 2021-2030 based on the modelling for the 2030 target (in % of 1990 emissions)** <sup>57</sup>

<sup>57</sup> The remaining total emissions excluding LULUCF as shown in the chart is in line with EU's net emissions target of 57% mitigation.



To set these achievements into perspective, **Figure 5** combines this assessment of past emission trends with a glance into the future. Based on the European Commission’s central scenario supporting the Fit for 55 legislative package,<sup>58</sup> a faster pace is needed in this decade to achieve the EU 2030 target. To reach it, emissions have to fall by roughly 134 MtCO<sub>2</sub>eq or 2.8% of 1990 emissions annually until 2030 compared to the historical annual mitigation of 45 MtCO<sub>2</sub>eq or 0.9% of 1990 emissions in 1990-2021, i.e. the pace of reduction has to more than triple. As in the last three decades the modelling suggests the largest emission reductions coming from a substantially lower energy intensity (-30% versus 2021) and a less carbon-intense primary energy consumption (-19%). Overall, energy-related emissions are expected to decrease at a faster pace than those from other sources as implied by the slightly positive non-energy effect.

<sup>58</sup> [https://energy.ec.europa.eu/data-and-analysis/energy-modelling/policy-scenarios-delivering-european-green-deal\\_en](https://energy.ec.europa.eu/data-and-analysis/energy-modelling/policy-scenarios-delivering-european-green-deal_en)

## 4 GREENHOUSE GAS EMISSIONS COVERED BY THE UNFCCC, THE KYOTO PROTOCOL AND THE CLIMATE AND ENERGY PACKAGE

Under the **UNFCCC**, the EU and its Member States committed to achieving a joint quantified economy wide greenhouse gas emission reduction target of 20 % below the 1990 level by 2020 ('the **Cancun pledge**'). The United Kingdom remains part of this joint EU 2020 target under the Convention along with the 27 Member States. The scope of GHG emissions excludes LULUCF and includes international aviation.

The EU has implemented its UNFCCC target through EU legislation in the **2020 Climate and Energy Package** that was adopted in 2009. The package stipulates that the target will be met jointly by the EU and its Member States through a 21% reduction below the 2005 level in GHG emissions from installations under the EU Emissions Trading System, and a 10% reduction below the 2005 level of emissions from sectors covered under the Effort Sharing Decision.

The EU's greenhouse gas inventory report for EU-27 + UK submitted under the Convention in 2022 together with its submission of the fifth Biennial Report later the same year were the basis for assessing the EU target achievement of the Cancun pledge. This target has been overachieved. Total emissions in 2020 were 34 % lower than 1990 emissions for EU-27 and the United Kingdom (**Table 3**).<sup>59</sup>

**Table 3: Emissions covered by the Cancun pledge under the UNFCCC and the EU Climate and Energy Package in 1990 and 2020 (Mt CO<sub>2</sub>-eq. and % change from base year emissions)**

| UNFCCC, Climate and energy package:                                                            | Base year emissions (Mt CO <sub>2</sub> -eq.) | 1990 emissions (Mt CO <sub>2</sub> -eq.) | 2020 emissions (Mt CO <sub>2</sub> -eq.) | 2020 emissions (% change from base year) | 2020 targets (Mt CO <sub>2</sub> -eq.) | 2020 target (% change from base year) |
|------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|----------------------------------------|---------------------------------------|
| <b>Total GHG Emissions, including international aviation</b><br>(EU-27 + UK, Convention scope) | 5 711                                         | 5 711                                    | 3 772                                    | -34%                                     | 4 569                                  | -20%                                  |

Under the **Kyoto Protocol's** second commitment period in 2013-2020 (KP2), the EU, its Member States, the UK and Iceland committed jointly to reducing greenhouse gas emissions by 20% on average in comparison to 1990, the base year.<sup>60</sup> Under this framework, the EU, its Member States, the UK and Iceland were given a joint emission budget, a so-called **joint assigned amount**, for the second commitment period, equal to 80 per cent of their emissions in the base year times 8.

<sup>59</sup> For the EU-27, GHG emissions in 2020 were 32 % below 1990 emissions.

<sup>60</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O for all Member States except Bulgaria (1988), Hungary (1985–1987), Poland (1988), Romania (1989) and Slovenia (1986), and 1995 for HFCs, PFCs and SF<sub>6</sub> for all Member States except Austria, Croatia, France, Italy, Malta and Slovakia (1990), Romania (1989), and Iceland (1990), and 1995 for NF<sub>3</sub> for all Member States except Austria, Croatia, Greece, Poland, Portugal, Romania and Slovakia (2000).

This amount corresponds to 37 604 million tonnes of CO<sub>2</sub> equivalent for the whole commitment period (**Table 4**).

The geographical scope of KP2 includes the EU, Iceland, the UK and certain of its overseas regions not included in the Climate and Energy Package. Emissions from international aviation are excluded under KP2.

Under KP2, Member States had to account for emissions and removals from certain activities of land use, land use change and forestry (LULUCF) by applying the accounting rules of the Kyoto Protocol. For the EU, the LULUCF sector was an accounted net sink in 2013-2020, thereby contributing to achieving the EU's joint commitment.

The EU's greenhouse gas inventory report submitted in 2022 (for EU-27 + UK and Iceland)<sup>61</sup> and reviewed by the UNFCCC in December 2022 is the basis for assessing whether the EU, its Member States, the UK and Iceland comply with their joint commitment under KP2. The inventory report shows that the EU, its Member States, the UK and Iceland overachieved their joint KP2 reduction target by reducing emissions by 28% (**Table 4**).

The UNFCCC will also review the EU's so-called true-up period report to check that the EU and the other parties to the joint fulfilment agreement (Member States, UK and Iceland) have retired sufficient assigned amount units and any other Kyoto units in their Kyoto retirement accounts. This final step of KP compliance is expected to be concluded in 2024, after the review of the true-up period reports have been finalised.

**Table 4: Emissions covered by the Kyoto Protocol's second commitment period (Mt CO<sub>2</sub>-eq. and % change from base year emissions)**

| Kyoto Protocol:                                                                                  | Base year emissions<br>(Mt CO <sub>2</sub> -eq.) | 2013 - 2020<br>emission<br>reduction<br>target<br>(% change from<br>base year) | Joint Assigned<br>Amount in Mt<br>CO <sub>2</sub> -eq.<br>(2013-2020) | Emissions in<br>Mt CO <sub>2</sub> -eq.<br>(2013 - 2020) | Over (+) /<br>Under (-)<br>achievement<br>in Mt CO <sub>2</sub> -eq.<br>(2013 - 2020) | 2013 - 2020<br>emission<br>reduction<br>(% change from<br>base year) |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Total GHG emissions,<br/>excluding international<br/>aviation<br/>(EU-27+UK+IS, KP scope)</b> | 5 876                                            | -20%                                                                           | 37 604                                                                | 33 731                                                   | 3 873                                                                                 | -28%                                                                 |

<sup>61</sup> As part of the yearly official EU GHG inventory submission to UNFCCC, the EU prepared and submitted two sets of inventory tables corresponding to the EU's geographical scopes under the Convention and under the second Kyoto Protocol (KP2), respectively. The scope under the Convention is consistent with the European Union territorial boundaries, which, in addition to the 27 Member States, included the EU-territory of the United Kingdom until 2020 (England, Scotland, Wales, Northern Ireland and Gibraltar). The scope of the EU's submission under KP2 included the EU-27 Member States, Iceland, and the EU-territory of the United Kingdom together with its Crown Dependencies and Overseas Territories that ratified the Kyoto Protocol. The final emissions and removals of the European Union were confirmed in the last UNFCCC inventory review under the Kyoto Protocol that took place in December 2022.

## 5 PROGRESS TOWARDS CLIMATE NEUTRALITY: ADDITIONAL INDICATORS

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In this decisive decade for climate action, a thorough understanding of progress is needed to ensure that we are on track to achieve our common climate objectives, including of reaching net-zero emissions by 2050. The transition to climate neutrality is an unprecedented and far-reaching socio-economic project, which implies transformation across all sectors. Therefore, different source of data and indicators are needed to carry out a comprehensive analysis. Table 5 provides an overview of past and more recent GHG emission trends, across countries and sectors, while Table 6 looks at emission projections and the climate targets in the years ahead.

### 5.1 GREENHOUSE GAS EMISSIONS: RECENT DEVELOPMENTS IN EU MEMBER STATES

Historical data show that for some EU Member States, i.e. Finland, Latvia, Lithuania, and, to a lesser extent, Cyprus, Poland, Malta, Estonia, and Ireland, GHG net emissions have been rising in recent years (i.e. between 2015 and 2022). Drivers varied among these countries. In the case of Finland, Latvia and Estonia, the upward trend was mainly related to the strong declining of removals by the land use, land use change and forestry sector (LULUCF, cf. Chapter 4 of the Climate Action Progress Report), while for Lithuania, transport and building also contribute to the increase in GHG emissions. Transport emissions increased in Hungary, Malta and Poland, while in Ireland emissions in agriculture continued to grow. For Latvia and Finland, the increased emissions, due to a decrease of net removals in the LULUCF sector, had an impact on both the GHG intensity of GDP and on GHG emissions per capita, which increased between 2015 and 2022 (see **Table 5**).

Reductions in GHG emissions were achieved, but were at a slow pace (i.e. below the EU average) for another group of countries, namely Czechia, Italy, Hungary, Croatia, France, and Denmark. In the case of Italy, approximated GHG net emissions in 2022 are expected to be 2% higher than the pre-pandemic level. Overall, the slow progress in these countries appears to be related to a lack of significant emission cuts in the energy production (Italy, France), increased emissions in transport (Hungary, Czechia), in LULUCF (Denmark), or even a change from net removals to net emissions in LULUCF (i.e. Czechia).

### 5.2 GREENHOUSE GAS EMISSIONS PROJECTIONS: EXPECTED TRENDS IN EU MEMBER STATES

Table 6 looks at the challenges ahead. By 2030, based on the GHG projections submitted by EU Member States in March 2023, six countries (i.e. Poland, Ireland, Estonia, Czechia, Luxembourg, Latvia) expect emissions per capita to be significantly higher than 5 tonnes of CO<sub>2</sub>-eq, which represents the EU average GHG net emissions per capita by 2030 broadly consistent with the EU -55% target.<sup>62</sup> Projected emission reductions in the years to 2030 are, in certain cases (i.e. Finland,

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<sup>62</sup> Five tonnes of CO<sub>2</sub>-eq GHG emissions are roughly equivalent to 27.000 km with a medium-sized petrol car, or 20 round-trip flights Brussels to Rome in economy class, or again 2 beef-based meals per day in a year, of course without any other human activity generating direct or indirect GHG emissions. The net GHG emissions consistent with the EU 2030 target are around 2100 MtCO<sub>2</sub>eq (including the contribution of 225 MtCO<sub>2</sub>eq of net removals from LULUCF). Divided by the latest Eurostat population projections for the EU-27 by 2030 (around 550 million EU residents), is equal to 4.7 tonnes of CO<sub>2</sub>eq per capita.

Estonia, Latvia, Denmark, Ireland, Czechia, Lithuania, and Germany) significantly higher (i.e. more than 25 ppt.) than the emission reductions shown between 2015-2022. Most of the contribution to emission savings is expected from the power sector, with shares ranging between 20 and 30 percent, while transport is expected to contribute significantly to the decarbonisation in Lithuania.

**Table 5: GHG emission dashboard indicators (historical data)<sup>63</sup>**

|             | Historic data <sup>(1)</sup>       |           |           |           |                                                        |          |           |                          |             |       |        |                                                 |                                            |                                 |                                                |
|-------------|------------------------------------|-----------|-----------|-----------|--------------------------------------------------------|----------|-----------|--------------------------|-------------|-------|--------|-------------------------------------------------|--------------------------------------------|---------------------------------|------------------------------------------------|
|             | Total net GHG emissions (% change) |           |           |           | Sector performance (2022-2015, contribution to change) |          |           |                          |             |       |        | GHG intensity and GDP per capita <sup>(3)</sup> |                                            |                                 |                                                |
|             | 2022-1990                          | 2022-2021 | 2022-2019 | 2022-2015 | Power                                                  | Industry | Transport | Buildings <sup>(2)</sup> | Agriculture | Waste | LULUCF | GHG intensity of GDP (2022)                     | GHG intensity of GDP (2022-2015, % change) | GHG emissions per capita (2022) | GHG emissions per capita (2022-2015, % change) |
| Austria     | -7%                                | -7%       | -24%      | -14%      | -3%                                                    | -1%      | -3%       | -1%                      | 0%          | -1%   | -5%    | 162                                             | -23%                                       | 6.9                             | -18%                                           |
| Belgium     | -26%                               | -4%       | -8%       | -10%      | -2%                                                    | -4%      | -2%       | -2%                      | 0%          | 0%    | 0%     | 229                                             | -19%                                       | 9.1                             | -13%                                           |
| Bulgaria    | -43%                               | 6%        | 6%        | -10%      | -7%                                                    | 0%       | 2%        | 0%                       | 0%          | -1%   | -3%    | 857                                             | -26%                                       | 6.9                             | -5%                                            |
| Croatia     | -30%                               | -5%       | -7%       | -7%       | -6%                                                    | 1%       | 0%        | 1%                       | -1%         | 0%    | -1%    | 308                                             | -26%                                       | 4.6                             | 2%                                             |
| Cyprus      | 54%                                | -1%       | -2%       | 4%        | 1%                                                     | 1%       | 2%        | -1%                      | 1%          | 0%    | 1%     | 349                                             | -23%                                       | 9.4                             | -2%                                            |
| Czechia     | -37%                               | -5%       | -8%       | -1%       | -10%                                                   | 0%       | 2%        | -1%                      | 0%          | 0%    | 10%    | 561                                             | -22%                                       | 11.5                            | -1%                                            |
| Denmark     | -42%                               | -1%       | -5%       | -9%       | -10%                                                   | 0%       | -1%       | -2%                      | 0%          | 0%    | 3%     | 143                                             | -23%                                       | 7.8                             | -13%                                           |
| Estonia     | -53%                               | 11%       | 10%       | 0%        | -19%                                                   | -2%      | 0%        | 0%                       | 1%          | 0%    | 21%    | 671                                             | -19%                                       | 12.9                            | -1%                                            |
| Finland     | -1%                                | -7%       | -3%       | 17%       | -11%                                                   | -6%      | -2%       | -3%                      | 0%          | -2%   | 41%    | 190                                             | 5%                                         | 8.1                             | 15%                                            |
| France      | -26%                               | -3%       | -6%       | -7%       | -1%                                                    | -4%      | -2%       | -4%                      | -1%         | 0%    | 5%     | 162                                             | -15%                                       | 5.7                             | -9%                                            |
| Germany     | -42%                               | -3%       | -6%       | -16%      | -10%                                                   | -2%      | -2%       | -1%                      | -1%         | 0%    | 1%     | 228                                             | -22%                                       | 8.9                             | -18%                                           |
| Greece      | -30%                               | 0%        | -11%      | -22%      | -18%                                                   | -4%      | 2%        | -1%                      | 0%          | 1%    | -1%    | 373                                             | -28%                                       | 6.9                             | -19%                                           |
| Hungary     | -42%                               | -7%       | -11%      | -6%       | -6%                                                    | -2%      | 5%        | -1%                      | -1%         | 0%    | -2%    | 472                                             | -6%                                        | 5.5                             | -4%                                            |
| Ireland     | 10%                                | -2%       | 0%        | 0%        | -3%                                                    | 0%       | 0%        | -1%                      | 3%          | 0%    | 2%     | 151                                             | -42%                                       | 13.5                            | -7%                                            |
| Italy       | -25%                               | -1%       | 2%        | -4%       | -3%                                                    | -2%      | 1%        | -2%                      | 0%          | 0%    | 3%     | 222                                             | -9%                                        | 6.5                             | -1%                                            |
| Latvia      | 4%                                 | 8%        | 61%       | 30%       | -7%                                                    | 0%       | 0%        | 1%                       | 1%          | -1%   | 37%    | 491                                             | 10%                                        | 7.6                             | 38%                                            |
| Lithuania   | -69%                               | -7%       | -9%       | 7%        | -5%                                                    | -7%      | 8%        | 2%                       | -1%         | -2%   | 15%    | 280                                             | -14%                                       | 4.7                             | 12%                                            |
| Luxembourg  | -41%                               | -15%      | -28%      | -25%      | -3%                                                    | -3%      | -14%      | -2%                      | 0%          | 0%    | -4%    | 118                                             | -36%                                       | 11.6                            | -35%                                           |
| Malta       | -17%                               | 2%        | 1%        | 2%        | -3%                                                    | -1%      | 3%        | 0%                       | -1%         | 3%    | 0%     | 153                                             | -28%                                       | 4.2                             | -14%                                           |
| Netherlands | -31%                               | -8%       | -15%      | -21%      | -12%                                                   | -2%      | -2%       | -4%                      | -1%         | -1%   | -1%    | 199                                             | -31%                                       | 9.0                             | -24%                                           |
| Poland      | -18%                               | -4%       | -1%       | 3%        | -3%                                                    | 0%       | 6%        | -1%                      | 0%          | 0%    | 2%     | 720                                             | -13%                                       | 9.7                             | 4%                                             |
| Portugal    | -24%                               | 1%        | -15%      | -21%      | -16%                                                   | -2%      | 1%        | -1%                      | 0%          | -1%   | -4%    | 246                                             | -32%                                       | 4.9                             | -21%                                           |
| Romania     | -75%                               | -14%      | -16%      | -15%      | -16%                                                   | -1%      | 4%        | 1%                       | -2%         | 0%    | 0%     | 301                                             | -28%                                       | 3.0                             | -11%                                           |
| Slovakia    | -54%                               | -11%      | -13%      | -15%      | -4%                                                    | -5%      | 1%        | 0%                       | 0%          | 0%    | -6%    | 323                                             | -26%                                       | 5.5                             | -15%                                           |
| Slovenia    | -8%                                | 2%        | -4%       | -25%      | -7%                                                    | 0%       | 4%        | -2%                      | -1%         | -1%   | -20%   | 268                                             | -41%                                       | 6.3                             | -27%                                           |
| Spain       | -2%                                | 2%        | -6%       | -14%      | -10%                                                   | -3%      | 2%        | -1%                      | 0%          | -1%   | 0%     | 212                                             | -21%                                       | 5.3                             | -16%                                           |
| Sweden      | -86%                               | -42%      | -71%      | -51%      | -12%                                                   | -18%     | -68%      | -7%                      | -1%         | -8%   | 66%    | 8                                               | -51%                                       | 0.3                             | -54%                                           |
| EU27        | -32%                               | -3%       | -6%       | -10%      | -7%                                                    | -2%      | 0%        | -2%                      | 0%          | 0%    | 2%     | 229                                             | -20%                                       | 7.0                             | -11%                                           |

An assessment of EU Member States' progress towards the respective targets set in the Effort Sharing (ESR) and LULUCF regulations has been provided in Chapter 3 and 4 of the main report,

<sup>63</sup> Note to the table: (1) Historical GHG emissions and removals (1990-2022) are based on EEA's 2023 GHG Inventory and Approximated emissions and removals. (2) Including agriculture CO<sub>2</sub> emissions. (3) GHG intensity of GDP (gCO<sub>2</sub>-eq/EUR2015) and GHG per capita (tCO<sub>2</sub>-eq) use net GHG emissions (i.e. including LULUCF and excluding international aviation). Real GDP and population data from Eurostat.

showing that more efforts are needed to reach the EU targets. Table 6 only provides an indication of the projected emissions compared to the targets in 2030 based on estimated emission allocations under the ESR and estimated GHG net removals target under the LULUCF regulation but does not reflect Member States' progress towards their 2030 targets. For example, the table does not take into account the flexibilities that are available for Member States under these legislations which are part of Member States progress to their ESR and LULUCF targets. Based on Member States' projections, also shown by Table 12 of the main report, five countries (i.e. Malta, Cyprus, Austria, Romania and Italy) expect significantly higher emissions compared to their ESR 2030 target (above 15 ppt).<sup>64</sup> Five Member States are expected to fall significantly behind their LULUCF targeted values (i.e. Poland, Estonia, Croatia, Ireland and Latvia) relative to the available lands (agriculture plus forest areas).<sup>65</sup>

When it comes to the climate neutrality target, ten Member States (i.e. Poland, Latvia, Austria, Belgium, Czechia, Greece, Hungary, Ireland, Netherlands and Malta) project net GHG emissions in 2050 higher than the EU-average projections of 3.6 tonnes of CO<sub>2</sub> equivalent per capita, obtained by aggregating Member States' projections. Of notice, the EU aggregated value falls short of the EU collective objective of climate neutrality (i.e. zero net emissions).

Trajectories are also relevant. Table 6 provides two similar metrics, which compare for each Member States the cumulative projected emissions between 2022 and 2050 with a linear trajectory and, alternatively, with an indicative benchmark trajectory, built as the median pathway of the seven climate neutrality scenarios that were proposed by the European Scientific Advisory Board<sup>66</sup> (cf. Chapter 1 of the main report). Malta, Romania, Croatia, Austria, Hungary, Poland, Italy, and Greece are among the top ten overshoots according to both metrics. Moreover, as of today, Ireland, Poland and Romania have still to officially submit to the Commission their national long-term strategies, due by January 2020, and some other countries (Bulgaria, Croatia, Cyprus, Czechia and Malta) have not yet reported a clear (e.g. legally binding) climate neutrality objective.

Overall, based on the available information, progress by Member States towards the EU climate neutrality objective appear insufficient for Poland, Ireland, Latvia, Malta and Croatia, and, to a lesser extent, for Austria, Estonia, Czechia, Cyprus, Italy and Romania. Lack of significant progress in the most recent years is not consistent with the effort required in the next decades to meet both the medium- and the long-term climate targets. Latest GHG projections submitted by those Member States show significant gaps to specific sector targets by 2030 and to the EU climate neutrality objective by 2050. Without additional efforts from all Member States, the EU will miss the collective climate objectives.

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<sup>64</sup> While the NECP process is ongoing and pending the use of flexibilities the Commission will come back to the assessment of progress towards the ESR targets.

<sup>65</sup> LULUCF projections compared to the estimated LULUCF targeted values in relation to the available lands (agriculture plus forest areas). A significant gap to the LULUCF targets by 2030 is assumed here if higher than 50 tonnes of CO<sub>2</sub> equivalent per square kilometre of available land (agriculture plus forest land. Source: Eurostat "land use overview by NUTS 2 regions" dataset).

<sup>66</sup> [Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050 \(europa.eu\)](#). The EU-level emissions of this median pathway were then distributed across Member States according to the country's share of EU emissions in the core policy scenario supporting the initiatives delivering the European Green Deal.

**Table 6:** GHG emission dashboard indicators (projected data)<sup>67</sup>

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<sup>67</sup> Note to table: (4) GHG emission projections submitted in 2023 by Member States under Art. 18 of the Governance Regulation considering additional measures (WAM). EU Population in 2050 is based on the latest Eurostat population projections. Agriculture and forest land are based on the Eurostat land use statistics. (5) The overshoot vs. a linear trajectory compares, for each Member State, the cumulative projected net GHG emissions (including LULUCF) between 2022 and 2050 with a linear trajectory starting from the 2021 emission level to zero by 2050. The overshoot against an indicative benchmark compares the cumulative projected GHG emissions (excluding LULUCF) with an indicative pathway to climate neutrality based on the scenarios proposed by the European Scientific Advisory Board on Climate Change, and then distributed across Member States according to the country's share of EU emissions in the core policy scenario supporting the initiatives delivering the European Green Deal. Target dates to achieve climate neutrality as for the NECP progress reports or, in grey, from other unofficial sources ([Net Zero Tracker](#)).

|                       | GHG emission projections and future challenges <sup>(4)</sup>              |                                                     |                                                                                  |                                                   |       |          |           |           |             |       |                                                                            |                                                                |                                                          |                                                                      |                                                                                                                                           |
|-----------------------|----------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------|-------|----------|-----------|-----------|-------------|-------|----------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                       | 2030 target                                                                |                                                     |                                                                                  | Projected contributions by sector (2030 vs. 2022) |       |          |           |           |             |       | Climate Neutrality <sup>(5)</sup>                                          |                                                                |                                                          |                                                                      |                                                                                                                                           |
|                       | MS projected net GHG by 2030<br>(tonnes of CO <sub>2</sub> eq. per capita) | EB target vs MS projections<br>(to 2030 level, ppt) | LULUCF target vs MS projections<br>(tCO <sub>2</sub> eq/km <sup>2</sup> of land) | Total emissions (excl. LULUCF)<br>(% change)      | Power | Industry | Transport | Buildings | Agriculture | Waste | MS projected net GHG by 2050<br>(tonnes of CO <sub>2</sub> eq. per capita) | Overshoot vs. linear trajectory<br>net GHG emissions 2022-2050 | Overshoot vs. Benchmark<br>Total GHG emissions 2022-2050 | Target year for climate neutrality<br>(NECPR, nLTS or other sources) | Legal Status of long term target<br>(based on <a href="https://ec.europa.eu/en/policies/2050">https://ec.europa.eu/en/policies/2050</a> ) |
|                       |                                                                            |                                                     |                                                                                  |                                                   |       |          |           |           |             |       |                                                                            |                                                                |                                                          |                                                                      |                                                                                                                                           |
| Austria               | 6.8                                                                        | -21                                                 | 6                                                                                | -7%                                               | -3%   | 1%       | -2%       | -2%       | -1%         | 0%    | 5.6                                                                        | 79%                                                            | 61%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Belgium               | 7.0                                                                        | -4                                                  | -4                                                                               | -22%                                              | -1%   | -5%      | -8%       | -5%       | -2%         | 0%    | 5.2                                                                        | 49%                                                            | 21%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Bulgaria              | 6.0                                                                        | -12                                                 | -3                                                                               | -15%                                              | -16%  | 2%       | -1%       | -1%       | 1%          | -1%   | 3.7                                                                        | 40%                                                            | 60%                                                      | 2050                                                                 | Proposed / in discussion                                                                                                                  |
| Croatia               | 5.0                                                                        | 0                                                   | -92                                                                              | -8%                                               | -2%   | -1%      | 0%        | -2%       | -1%         | -2%   | 3.4                                                                        | 83%                                                            | 64%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Cyprus                | 6.7                                                                        | -23                                                 | 41                                                                               | -20%                                              | -14%  | 0%       | -5%       | 1%        | 1%          | -3%   | 3.5                                                                        | 33%                                                            | 51%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Czechia               | 7.6                                                                        | -6                                                  | -32                                                                              | -31%                                              | -20%  | -1%      | -8%       | 0%        | 0%          | -1%   | 4.4                                                                        | 10%                                                            | 29%                                                      | 2050                                                                 | Proposed / in discussion                                                                                                                  |
| Denmark               | 4.9                                                                        | -10                                                 | 39                                                                               | -43%                                              | -20%  | -7%      | -5%       | -6%       | -4%         | -1%   | 3.7                                                                        | 26%                                                            | 3%                                                       | 2050                                                                 | In law                                                                                                                                    |
| Estonia               | 8.1                                                                        | -13                                                 | -108                                                                             | -36%                                              | -33%  | 0%       | -3%       | 1%        | 0%          | 0%    | 3.6                                                                        | 15%                                                            | 30%                                                      | 2050                                                                 | Declaration / pledge                                                                                                                      |
| Finland               | 0.9                                                                        | -4                                                  | 13                                                                               | -44%                                              | -25%  | -4%      | -8%       | -4%       | -2%         | -1%   | -2.4                                                                       | -98%                                                           | -10%                                                     | 2035                                                                 | In law                                                                                                                                    |
| France                | 4.7                                                                        | -14                                                 | -25                                                                              | -14%                                              | -3%   | -3%      | -6%       | -2%       | 1%          | 0%    | 3.7                                                                        | 56%                                                            | 57%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Germany               | 5.0                                                                        | -10                                                 | -35                                                                              | -41%                                              | -24%  | -6%      | -5%       | -6%       | -1%         | 0%    | 1.7                                                                        | -9%                                                            | -1%                                                      | 2045                                                                 | In law                                                                                                                                    |
| Greece                | 5.4                                                                        | 13                                                  | 5                                                                                | -21%                                              | -18%  | 0%       | -2%       | -2%       | 1%          | -1%   | 5.3                                                                        | 58%                                                            | 63%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Hungary               | 5.4                                                                        | -6                                                  | -27                                                                              | -7%                                               | -6%   | 9%       | -6%       | -3%       | 1%          | -1%   | 4.4                                                                        | 74%                                                            | 59%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Ireland               | 9.0                                                                        | -13                                                 | -70                                                                              | -30%                                              | -10%  | -1%      | -7%       | -5%       | -7%         | 0%    | 6.0                                                                        | 44%                                                            | 32%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Italy                 | 5.3                                                                        | -15                                                 | -4                                                                               | -16%                                              | -8%   | -2%      | -4%       | -1%       | 0%          | -1%   | 4.6                                                                        | 60%                                                            | 76%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Latvia                | 7.1                                                                        | -9                                                  | -61                                                                              | -5%                                               | 3%    | -2%      | 0%        | -2%       | -2%         | -1%   | 7.9                                                                        | 74%                                                            | 26%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Lithuania             | 3.4                                                                        | 0                                                   | 36                                                                               | -20%                                              | -1%   | -1%      | -12%      | -1%       | -4%         | -2%   | 3.5                                                                        | 29%                                                            | 32%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Luxembourg            | 7.3                                                                        | 8                                                   | 12                                                                               | -33%                                              | -1%   | 0%       | -24%      | -6%       | -2%         | 0%    | 1.3                                                                        | -12%                                                           | -2%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Malta                 | 4.3                                                                        | -65                                                 | -46                                                                              | 17%                                               | 12%   | 3%       | -1%       | 0%        | 0%          | 3%    | 4.4                                                                        | 155%                                                           | 100%                                                     | 2050                                                                 | In policy document                                                                                                                        |
| Netherlands           | 6.9                                                                        | -9                                                  | 37                                                                               | -22%                                              | -18%  | -2%      | -1%       | -1%       | 0%          | -1%   | 4.9                                                                        | 43%                                                            | 34%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Poland                | 9.2                                                                        | -11                                                 | -118                                                                             | -10%                                              | -5%   | -3%      | -1%       | -3%       | 1%          | 1%    | 8.1                                                                        | 68%                                                            | 71%                                                      | -                                                                    | -                                                                                                                                         |
| Portugal              | 2.9                                                                        | 13                                                  | 139                                                                              | -31%                                              | -9%   | -7%      | -11%      | 0%        | -1%         | -2%   | 0.3                                                                        | -13%                                                           | 20%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Romania               | 3.4                                                                        | -17                                                 | 62                                                                               | -7%                                               | -12%  | 0%       | 5%        | 1%        | 3%          | -4%   | 3.7                                                                        | 95%                                                            | 69%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Slovakia              | 5.2                                                                        | -11                                                 | -42                                                                              | -12%                                              | -8%   | -2%      | 2%        | -2%       | 0%          | -2%   | 3.8                                                                        | 63%                                                            | 56%                                                      | 2050                                                                 | In policy document                                                                                                                        |
| Slovenia              | 5.2                                                                        | -1                                                  | 117                                                                              | -17%                                              | -3%   | -3%      | -7%       | -4%       | 0%          | -1%   | 0.0                                                                        | 21%                                                            | 9%                                                       | 2050                                                                 | In policy document                                                                                                                        |
| Spain                 | 3.2                                                                        | 7                                                   | -15                                                                              | -34%                                              | -13%  | -4%      | -10%      | -4%       | -1%         | -1%   | 2.9                                                                        | 34%                                                            | 42%                                                      | 2050                                                                 | In law                                                                                                                                    |
| Sweden                | -1.1                                                                       | 12                                                  | -15                                                                              | -32%                                              | -2%   | -9%      | -17%      | -3%       | -1%         | 0%    | -2.0                                                                       | -582%                                                          | 13%                                                      | 2045                                                                 | In law                                                                                                                                    |
| EU27 (MS aggr. proj.) | 5.1                                                                        | -8                                                  | -16                                                                              | -24%                                              | -12%  | -3%      | -5%       | -3%       | 0%          | 0%    | 3.6                                                                        | 34%                                                            | 40%                                                      |                                                                      | In law                                                                                                                                    |

### 5.3 ADDITIONAL GREENHOUSE GASES INDICATORS

Since 2005, there has been a clear downward trend in net GHG emissions per capita and GHG intensity of GDP for all EU Member States, except Latvia (Figure 6).<sup>68</sup>

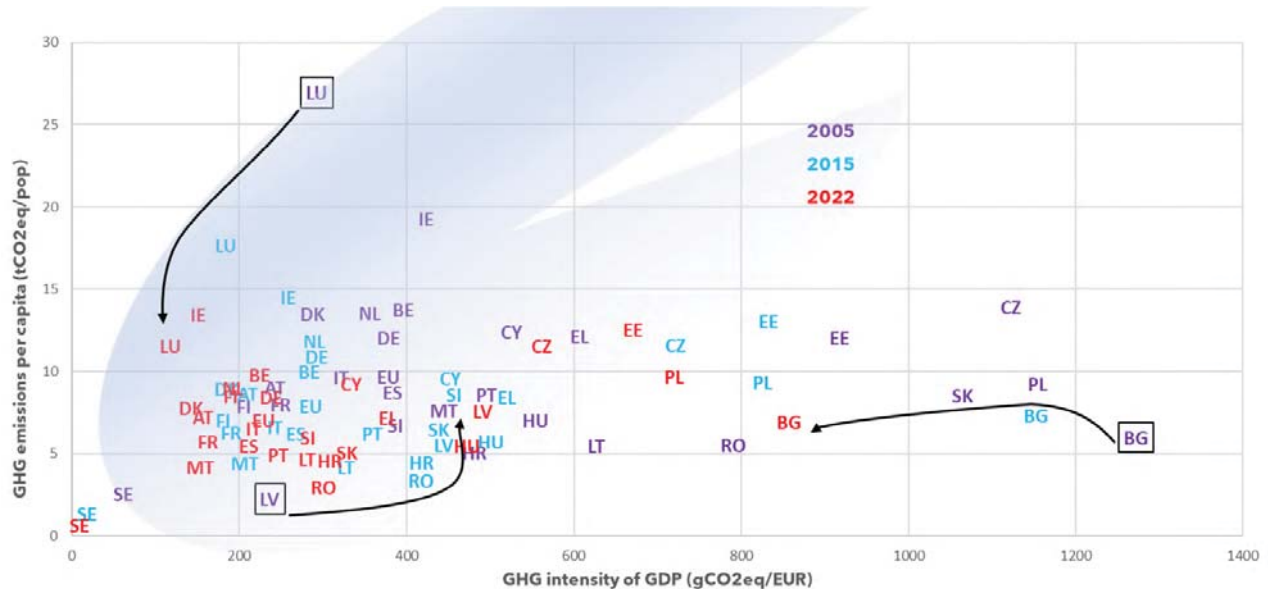
More rapid progress by countries with higher emission ratios (i.e. Bulgaria, Romania, Slovakia, Czechia, Luxembourg and Ireland) led to significant convergence towards the EU average. However, between 2015 and 2022, the downward converging trend seems to have halted for most Member States. In 2022, Latvia and Finland exceeded the 2015 levels for both indicators,<sup>69</sup> while GHG emissions per capita in Lithuania, Poland and Croatia were above the respective 2015 levels.

<sup>68</sup> Figures use net GHG emissions, including LULUCF and excluding international transport emissions.

<sup>69</sup> Due to a declining LULUCF sink.

Nonetheless, in 2022, Estonia, Cyprus, Czechia, and Poland ranked among the top five for the two indicators, while Bulgaria showed the highest GHG intensity of GDP (above 850 tonnes of CO<sub>2</sub> equivalent per Euro of GDP), and Ireland was the highest per capita emitter among the EU Member States (above 13 tonnes per capita).

**Figure 6: Greenhouse gas emissions intensity (i.e. the ratio between GHG emissions and GDP, g CO<sub>2</sub>-eq./ EUR2015) and greenhouse gas emissions per capita in the EU and its Member States 1990, 2005 and 2022.<sup>70</sup>**



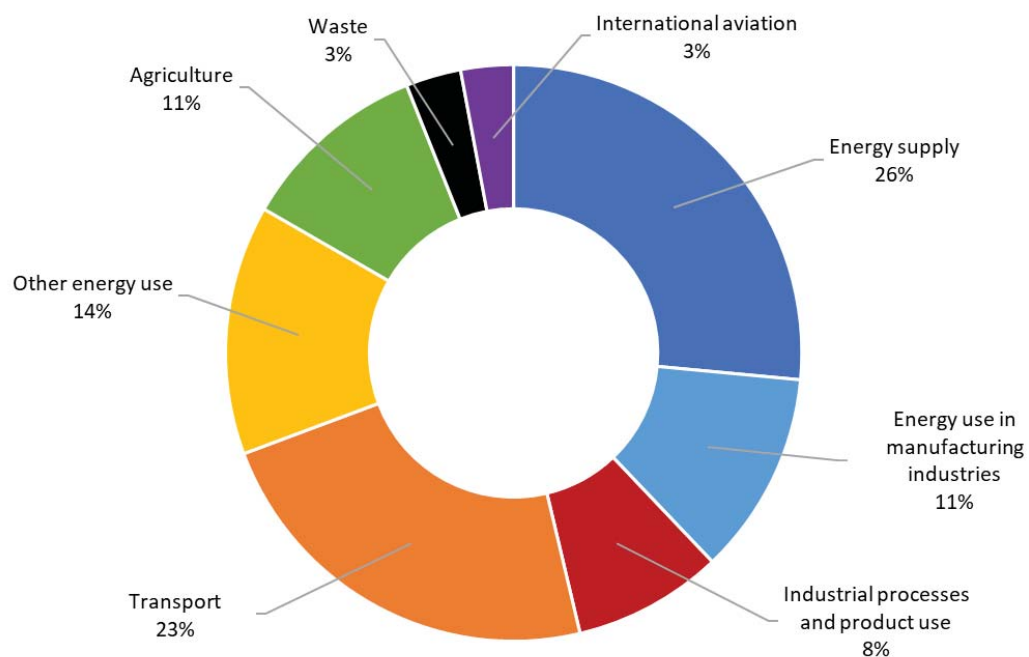
In terms of GHG emissions by sector, in 2022, energy supply was still the largest contributor to GHG emissions (26%), closely followed by the transport sector (23%) (Figure 7). With 11% and 14%, respectively, energy use in manufacturing industries and other energy use were also important contributors.

Among all the EU Member States, in 2021, GHG emissions from the power sector were highest in Estonia (56%), followed with some distance by Poland (43%) and Bulgaria (42%) (Figure 8). Emissions from industry were relatively high in Slovakia (41%) and Austria (36%). The transport sector's contribution to GHG emissions stood out in Luxembourg (53%). Ireland and Denmark had the highest shares of GHG emissions from agriculture among all Member States (37% and 28%, respectively), followed by Lithuania (22%) and Latvia (21%). For Sweden, and with some distance also for Romania, the LULUCF sink was significant in relation to the countries' respective GHG emissions.

**Figure 7: EU-27 greenhouse gas emissions by sector 2022 (in % of total emissions, excluding LULUCF)<sup>71</sup>**

<sup>70</sup> Sources: EU greenhouse gas inventory 1990-2021, EU approximated greenhouse gas inventory 2022 (EEA). Real GDP in 2015-prices, data from AMECO database (European Commission, DG ECFIN).

<sup>71</sup> The sectors used correspond to the following IPCC sectors: Energy supply: 1.A.1, 1.B and 1.C; Energy use in manufacturing industries: 1.A.2; Industrial processes and product use: 2; Transport (includes domestic aviation): 1.A.3; Other energy use: 1.A.4, 1.A.5 and 6, Agriculture: 3, Waste: 5, International aviation: 1.D.1.A.



**Figure 8: EU Member States greenhouse gas emissions by sector 2021 (in % of total emissions, excluding LULUCF)<sup>72</sup>**

<sup>72</sup> Industry includes both the Energy use in manufacturing industries: 1.A.2 and Industrial processes and product use: 2; Buildings includes CO<sub>2</sub> emissions in agriculture.



**Table 7: Total GHG emission per Member States (including and excluding LULUCF and international aviation)**

|             | Total GHG emissions, excl. LULUCF, excl. international aviation |      |      |      |           | Total net GHG emissions, incl. LULUCF, excl. international aviation |      |      |      |           | Total net GHG emissions, incl. LULUCF, incl. international aviation |      |      |      |           |
|-------------|-----------------------------------------------------------------|------|------|------|-----------|---------------------------------------------------------------------|------|------|------|-----------|---------------------------------------------------------------------|------|------|------|-----------|
|             | 1990                                                            | 2005 | 2015 | 2022 | 2022-1990 | 1990                                                                | 2005 | 2015 | 2022 | 2022-1990 | 1990                                                                | 2005 | 2015 | 2022 | 2022-1990 |
| Belgium     | 146                                                             | 145  | 119  | 106  | -27%      | 143                                                                 | 144  | 118  | 106  | -26%      | 146                                                                 | 147  | 123  | 111  | -24%      |
| Bulgaria    | 99                                                              | 62   | 60   | 57   | -43%      | 83                                                                  | 46   | 53   | 47   | -43%      | 83                                                                  | 47   | 53   | 48   | -42%      |
| Czechia     | 201                                                             | 150  | 129  | 116  | -42%      | 192                                                                 | 142  | 122  | 121  | -37%      | 193                                                                 | 143  | 123  | 122  | -37%      |
| Denmark     | 72                                                              | 68   | 50   | 43   | -39%      | 78                                                                  | 73   | 51   | 46   | -42%      | 80                                                                  | 76   | 53   | 48   | -40%      |
| Germany     | 1251                                                            | 985  | 897  | 746  | -40%      | 1287                                                                | 993  | 885  | 744  | -42%      | 1299                                                                | 1016 | 910  | 771  | -41%      |
| Estonia     | 40                                                              | 19   | 18   | 14   | -64%      | 37                                                                  | 16   | 17   | 17   | -53%      | 37                                                                  | 17   | 17   | 17   | -53%      |
| Ireland     | 56                                                              | 72   | 62   | 61   | 9%        | 62                                                                  | 79   | 68   | 68   | 10%       | 63                                                                  | 82   | 71   | 71   | 13%       |
| Greece      | 104                                                             | 137  | 96   | 77   | -26%      | 102                                                                 | 133  | 92   | 72   | -30%      | 104                                                                 | 136  | 95   | 75   | -28%      |
| Spain       | 288                                                             | 439  | 334  | 294  | 2%        | 254                                                                 | 394  | 289  | 249  | -2%       | 259                                                                 | 406  | 304  | 264  | 2%        |
| France      | 539                                                             | 550  | 454  | 404  | -25%      | 522                                                                 | 500  | 417  | 387  | -26%      | 531                                                                 | 516  | 435  | 399  | -25%      |
| Croatia     | 31                                                              | 30   | 25   | 23   | -25%      | 25                                                                  | 22   | 19   | 18   | -30%      | 26                                                                  | 22   | 19   | 18   | -30%      |
| Italy       | 521                                                             | 594  | 446  | 418  | -20%      | 518                                                                 | 559  | 402  | 387  | -25%      | 522                                                                 | 567  | 411  | 396  | -24%      |
| Cyprus      | 6                                                               | 9    | 8    | 9    | 54%       | 5                                                                   | 9    | 8    | 8    | 54%       | 6                                                                   | 10   | 9    | 9    | 45%       |
| Latvia      | 26                                                              | 11   | 11   | 10   | -61%      | 14                                                                  | 5    | 11   | 14   | 4%        | 14                                                                  | 5    | 11   | 15   | 6%        |
| Lithuania   | 48                                                              | 22   | 20   | 19   | -60%      | 43                                                                  | 18   | 12   | 13   | -69%      | 43                                                                  | 18   | 12   | 13   | -69%      |
| Luxembourg  | 13                                                              | 13   | 10   | 8    | -35%      | 13                                                                  | 12   | 10   | 7    | -41%      | 13                                                                  | 14   | 11   | 9    | -28%      |
| Hungary     | 95                                                              | 77   | 62   | 60   | -37%      | 92                                                                  | 71   | 57   | 53   | -42%      | 92                                                                  | 72   | 57   | 54   | -41%      |
| Malta       | 3                                                               | 3    | 2    | 2    | -17%      | 3                                                                   | 3    | 2    | 2    | -17%      | 3                                                                   | 3    | 2    | 3    | -9%       |
| Netherlands | 223                                                             | 215  | 194  | 154  | -31%      | 229                                                                 | 221  | 200  | 158  | -31%      | 234                                                                 | 232  | 211  | 168  | -28%      |
| Austria     | 79                                                              | 93   | 79   | 73   | -8%       | 67                                                                  | 74   | 72   | 62   | -7%       | 68                                                                  | 76   | 74   | 63   | -6%       |
| Poland      | 475                                                             | 401  | 384  | 385  | -19%      | 446                                                                 | 353  | 355  | 365  | -18%      | 447                                                                 | 354  | 357  | 366  | -18%      |
| Portugal    | 60                                                              | 87   | 68   | 57   | -4%       | 67                                                                  | 90   | 65   | 51   | -24%      | 68                                                                  | 92   | 68   | 55   | -20%      |
| Romania     | 257                                                             | 151  | 117  | 107  | -58%      | 229                                                                 | 118  | 67   | 57   | -75%      | 229                                                                 | 118  | 68   | 57   | -75%      |
| Slovenia    | 19                                                              | 21   | 17   | 16   | -15%      | 14                                                                  | 13   | 18   | 13   | -8%       | 14                                                                  | 13   | 18   | 13   | -8%       |
| Slovakia    | 74                                                              | 51   | 41   | 38   | -49%      | 64                                                                  | 46   | 35   | 30   | -54%      | 65                                                                  | 46   | 35   | 30   | -53%      |
| Finland     | 71                                                              | 70   | 55   | 46   | -36%      | 45                                                                  | 41   | 38   | 45   | -1%       | 46                                                                  | 43   | 40   | 46   | 0%        |
| Sweden      | 71                                                              | 67   | 54   | 45   | -37%      | 25                                                                  | 23   | 7    | 4    | -86%      | 26                                                                  | 25   | 9    | 5    | -80%      |
| EU-27       | 4867                                                            | 4542 | 3812 | 3389 | -30%      | 4658                                                                | 4200 | 3490 | 3145 | -32%      | 4712                                                                | 4296 | 3599 | 3247 | -31%      |

## 6 EU ETS EMISSIONS

**Table 8:** EU ETS verified emissions from power and industry installations and from aircraft operators since 2019.

|                                                                                     | 2019         | 2020          | 2021         | 2022         |
|-------------------------------------------------------------------------------------|--------------|---------------|--------------|--------------|
| <b>Verified emissions from power and industry installations<sup>73</sup></b>        | <b>1 530</b> | <b>1 356</b>  | <b>1 337</b> | <b>1 313</b> |
| <b>Change year-on- year</b>                                                         | <b>-9.1%</b> | <b>-11.4%</b> | <b>6.6%</b>  | <b>-1.8%</b> |
| Verified emissions from electricity and heat generation <sup>74</sup>               | 822          | 696           | 708          | 725          |
| Change year-on- year                                                                | -14.7%       | -15.3%        | 8.4%         | 2.4%         |
| Verified emissions from industrial production <sup>75</sup>                         | 708          | 660           | 629          | 588          |
| Change year-on- year                                                                | -1.6%        | -6.9%         | 4.6%         | -6.5%        |
| <b>Verified emissions from aircraft operators (million tonnes CO<sub>2</sub>eq)</b> | <b>68.2</b>  | <b>25.2</b>   | <b>27.9</b>  | <b>49.1</b>  |
| <b>Change year-on- year<sup>76</sup></b>                                            | <b>1%</b>    | <b>-63%</b>   | <b>30%</b>   | <b>75%</b>   |

<sup>73</sup> From 2021, the EU ETS no longer includes emissions from the UK, only emissions from electricity generators in Northern Ireland are included. 2021 emissions are compared with an adjusted value of 2020 emissions – without the UK data, only Northern Ireland from electricity generation.

<sup>74</sup> From 2021, the EU ETS no longer includes emissions from the UK, only emissions from electricity generators in Northern Ireland are included. 2021 emissions are compared with an adjusted value of 2020 emissions – without the UK data, only Northern Ireland from electricity generation.

<sup>75</sup> From 2021, the EU ETS no longer includes emissions from the UK. 2021 emissions are compared with an adjusted value of 2020 emissions – without the UK data.

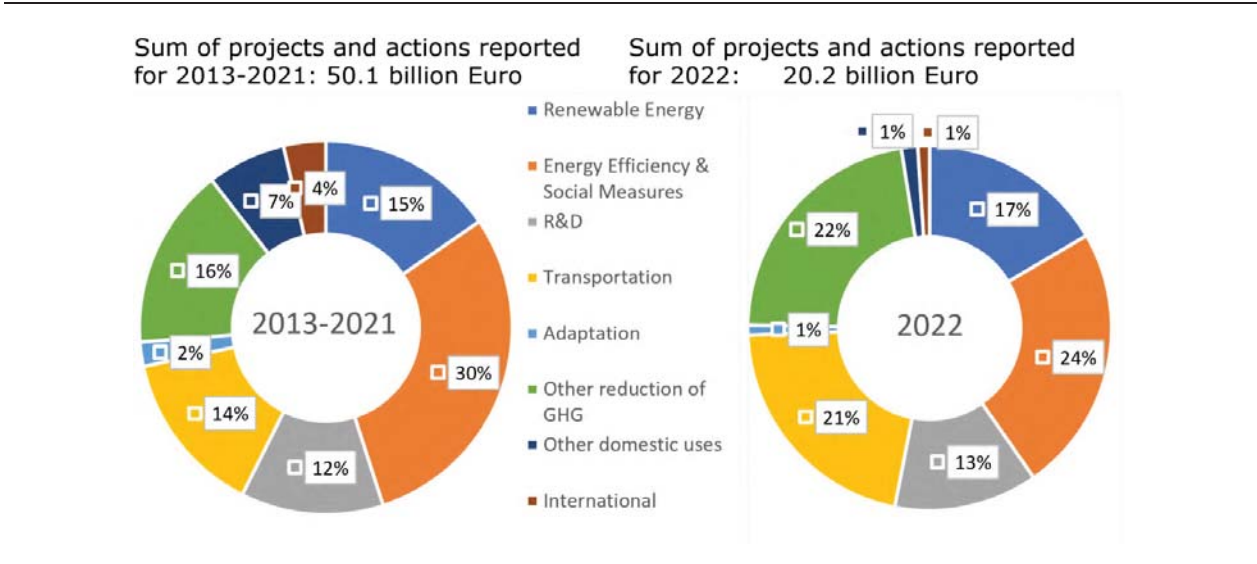
<sup>76</sup> Considering the updated EU ETS aviation scope (without the flights incoming from the UK). Switzerland is included in 2020, 2021 and 2022 data only.

## 7 USE OF REVENUES FROM AUCTIONING OF ETS ALLOWANCES

The vast majority of revenue from auctioning ETS allowances accrue to Member States, who should spend at least 50% on climate and energy purposes.

Figure 9 shows the primary<sup>77</sup> type of purpose reported for spending of 2013-2021 and 2022 auction revenues and indicates that renewables support, decarbonisation of transport and other GHG reduction were the areas where most of the revenues were spent. Compared to previous years, the increasing share of “other” spending appears partly linked to new national measures using ETS revenues to compensate for rising energy prices and mitigate their social impacts.<sup>78</sup>

*Figure 9: Reported spending of auction revenues, categorised, 2013-2021 and 2022, EU-27*



Auctions of EU ETS emission allowances for both stationary installations and aircraft operators have provided the EU-27 countries with revenues listed in the Table 9.<sup>79</sup> Member States report annually on the use of auctioning revenues for climate change and energy purposes.<sup>80</sup> It should be noted that annual reporting does not necessarily cover how the revenues of that year are spent, but the spending of revenues during that year, i.e. it can include revenues from earlier years. Member States only report on spending for the purposes of addressing climate change and energy, but this does not mean that the amount not covered in the report is necessarily spent for other purposes: it

<sup>77</sup> In their reports, Member States can indicate multiple types, in such case the first category is used for this figure.

<sup>78</sup> For instance, between late-2021 and mid-2022, Spain, Italy, Greece, Germany and Estonia announced the direct or indirect use of ETS revenues for such purposes.

<sup>79</sup> The table lists annual total revenues of the auctioned allowances on the [EEX](#) platform.

<sup>80</sup> Article 5 of Implementing Regulation (EU) No 2020/1208.

is also possible that revenues are spent later, or used to fund many projects/purposes of which only parts are linked to climate change and energy, or that a certain amount has been set aside for climate and energy purposes but not all of it has yet been formally attributed to specific projects.

In the latter case, and when Member States have reported having a national minimum set aside for climate and energy, this has been reflected in the *% spent on climate and energy* row.<sup>81</sup> Additionally, several Member States do not earmark their auction revenues for a specific purpose, but instead attribute part or all of their revenues to a broad budget such as the general budget, that is funded by more than just auctioning revenues, and can be spent on both climate change and energy and many other purposes. Often, in such cases example projects funded by the broad budget are reported, but a direct link to auctioning revenues cannot be made. Such country specific contexts are described below. Reported spending can also be higher than the revenues of that year, if either it includes spending of previous years' revenues or if the reported projects were co-funded with other funds.<sup>82</sup>

**Table 9: Member States' revenues from auctioning of ETS allowances (EUR million), amounts spent on climate and energy purposes (EUR million) and share of the revenues spent on climate and energy purposes (%), 2013-2022.**<sup>83</sup>

| <b>Austria</b>                                                                                                                                                                                                                                                                               | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Revenues from auctioning                                                                                                                                                                                                                                                                     | 247.5            | 79.4        | 210.4       | 183.8       | 184.2       | 311.0       | 381.7       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                            | 231.4            | 79.2        | 0           | 0           | 986.4       | 311.0       | 381.7       |
| % spent on climate and energy                                                                                                                                                                                                                                                                | >100%            | >100%       | >100%       | >100%       | >100%       | >100%       | >100%       |
| Revenues are not earmarked. National spending on climate and energy purposes is >100% of auctioning revenues. In several years, climate and energy projects financed from the national budget were reported, even though their funding cannot be directly linked to the auctioning revenues. |                  |             |             |             |             |             |             |
| <b>Belgium</b>                                                                                                                                                                                                                                                                               | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                     | 461.6            | 144.3       | 381.5       | 356.8       | 356.1       | 533.2       | 657.7       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                            | 37.5             | 133.1       | 213.7       | 357.8       | 162.6       | 76.1        | 103.0       |
| % spent on climate and energy                                                                                                                                                                                                                                                                | 8%               | 92%         | 56%         | 99%         | 46%         | 14%         | 16%         |
| The policy is that 100% of auction revenues are spent on energy and climate purposes and on the compensation of indirect carbon costs. For 2021 onwards the direct spending of auction revenues is on hold pending a legal                                                                   |                  |             |             |             |             |             |             |

<sup>81</sup> Where relevant, the amount resulting from the *% spent on climate and energy* row that is not covered in the row *Reported as spent on climate etc.* has been included in Figure 9 of the Climate Action Progress Report as *Used for climate change and energy, (unspecified)*.

<sup>82</sup> For the purposes of Figure 9 of the Climate Action Progress Report and the estimated shares spent on climate and energy, the annual shares have been capped at 100% in order to avoid distortion of the figures.

<sup>83</sup> Data in this table is based on the annual reporting by the Member States with some modifications made to ensure consistency across all Member States and over the reporting period. In 2020-2022 the harmonisation, methodology and analysis were conducted by SQ Consult in a study for the European Commission. Proposed modifications have been discussed with the Member States as part of the quality checks. Notes: "N/A" = Not available, "\*" = Member States that do not earmark auction revenues, "(\*)" = Member States that partially earmark auction revenues.

|                                                                                                                                                                                                                                                                     |                  |             |             |             |             |             |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| decision on the regions and federal shares, revenues are carried over to future years. The amount reported as spent in 2022 cover only direct revenue spent, Belgium also mentioned from the general budget to support climate- and energy-related actions in 2022. |                  |             |             |             |             |             |             |
| <b>Bulgaria</b>                                                                                                                                                                                                                                                     | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                            | 296.1            | 130.4       | 368.2       | 440.3       | 448.6       | 832.9       | 1094.2      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                   | 285.1            | 138.2       | 368.2       | 440.3       | 448.6       | 832.9       | 1094.2      |
| % spent on climate and energy                                                                                                                                                                                                                                       | 96%              | >100%       | 100%        | 100%        | 100%        | 100%        | 100%        |
| All auction revenues are earmarked for climate and energy purposes. Unspent revenues are carried over to later years, therefore in some years spending is higher than the revenues.                                                                                 |                  |             |             |             |             |             |             |
| <b>Croatia</b>                                                                                                                                                                                                                                                      | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                            | 107.2            | 27.2        | 71.5        | 72.7        | 72.2        | 112.2       | 143.4       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                   | 123.6            | 18.9        | 29          | 13.4        | 44          | 12.3        | 193.9       |
| % spent on climate and energy                                                                                                                                                                                                                                       | >100%            | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| According to the law, 100% of the auctioning revenues are spent on climate and energy purposes. This table lists the amount spent during the same year as the revenue earned. The remainder is carried over to the next years.                                      |                  |             |             |             |             |             |             |
| <b>Cyprus(*)</b>                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                            | 2.8              | 6.6         | 26          | 26.1        | 40.1        | 78.4        | 102.9       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                   | 5.7              | 0.8         | 6.4         | 57.5        | 57.6        | 75.3        | 160.1       |
| % spent on climate and energy                                                                                                                                                                                                                                       | >100%            | 100%        | 100%        | >100%       | >100%       | >100%       | >100%       |
| The auctioning revenues go to a fund, which different ministries can use for climate and energy purposes. This fund also receives money from the general budget, so in practice a higher amount than 100% of revenues is spent on climate and energy overall.       |                  |             |             |             |             |             |             |
| <b>Czechia *</b>                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                            | 365.9            | 199.8       | 584.4       | 630.4       | 719.4       | 604.0       | 673.6       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                   | 329.6            | 199.8       | 367.3       | 408.4       | 309.7       | 208.6       | 181.9       |
| % spent on climate and energy                                                                                                                                                                                                                                       | 90%              | 100%        | 63%         | 65%         | 43%         | 35%         | 27%         |
| Revenues are not earmarked. Reported spending represents the amounts committed for climate change and energy purposes in the general state budget of each year. The remaining revenues go to the general budget.                                                    |                  |             |             |             |             |             |             |
| <b>Denmark *</b>                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |

|                                                                                                                                                                                                                                                                                                                                                                                                               |                  |             |             |             |             |             |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                      | 229.2            | 71.7        | 189.8       | 166.1       | 166.5       | 292.9       | 362.2       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                             | 229.1            | 71.7        | 189.8       | 166.1       | 166.5       | 292.9       | 362.2       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                 | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| Revenues are not earmarked, example projects have been reported up to 100% of revenues each year.                                                                                                                                                                                                                                                                                                             |                  |             |             |             |             |             |             |
| <b>Estonia (*)</b>                                                                                                                                                                                                                                                                                                                                                                                            | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                      | 70.4             | 39.4        | 140         | 142.8       | 142.4       | 248.6       | 334.0       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                             | 34.3             | 15.9        | 53.3        | 64.5        | 30          | 43.6        | 307.7       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                 | 49%              | 40%         | 38%         | 45%         | ≥50%        | ≥50%        | ≥50%        |
| 50% of the auctioning revenues are earmarked and directed through the four-year State Budget Strategy and spent on climate and energy purposes, which may take multiple years. Unspent revenues are carried over to later years and always used for climate and energy projects. The remaining 50% goes to the general budget, which, among others, covers climate and energy investment (not included here). |                  |             |             |             |             |             |             |
| <b>Finland *</b>                                                                                                                                                                                                                                                                                                                                                                                              | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                      | 295.5            | 95.3        | 251.8       | 219.9       | 220.6       | 409.0       | 511.1       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                             | 198.1            | 9.5         | 251.8       | 219.9       | 220.6       | 409.0       | 511.1       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                 | 67%              | 10%         | 100%        | 100%        | 100%        | 100%        | 100%        |
| Revenues are not earmarked. National spending on climate and energy is >100% of auctioning revenues. Only a part of actual spending has been reported, in some years covering specific projects, in other years up to 100% of revenues, even though this funding cannot be directly linked to the auctioning revenues.                                                                                        |                  |             |             |             |             |             |             |
| <b>France (*)</b>                                                                                                                                                                                                                                                                                                                                                                                             | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                      | 981.3            | 313.4       | 829.6       | 726.5       | 728.1       | 1469.1      | 1868.3      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                             | 981.3            | 313.4       | 550         | 420         | 728.1       | 1469.1      | 1854.1      |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                 | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 99%         |
| The auctioning revenues co-fund energy efficiency improvements of low-income housing, up to a ceiling of EUR 420 million per year. The remainder is not earmarked but goes to the general budget, which, among others, covers climate and energy investments.                                                                                                                                                 |                  |             |             |             |             |             |             |
| <b>Germany</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                      | 3501.9           | 1146.8      | 2581.7      | 3164        | 2662.4      | 5306.2      | 6812.6      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                             | 3496.7           | 1130.8      | 2563        | 3147.2      | 2662.4      | 5306.2      | 6812.6      |

|                                                                                                                                                                                                                                                                                                                                                                                                            |                  |             |             |             |             |             |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                              | 100%             | 99%         | 99%         | 99%         | 100%        | 100%        | 100%        |
| 100% of revenues is spent on energy and climate projects. All revenues go to a fund for climate and energy projects, which is additionally co-funded from the general budget.                                                                                                                                                                                                                              |                  |             |             |             |             |             |             |
| <b>Greece</b>                                                                                                                                                                                                                                                                                                                                                                                              | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                   | 622              | 198         | 523.5       | 509.5       | 506.7       | 1014.6      | 1329.5      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                          | 622              | 198         | 523.5       | 509.5       | 506.7       | 1014.6      | 1329.5      |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                              | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| Revenues are earmarked and fully spent on domestic climate change and energy purposes.                                                                                                                                                                                                                                                                                                                     |                  |             |             |             |             |             |             |
| <b>Hungary (*)</b>                                                                                                                                                                                                                                                                                                                                                                                         | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                   | 238.1            | 85.2        | 225.4       | 228         | 226.3       | 288.2       | 464.9       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                          | 81.7             | 68.7        | 65.9        | 74          | 71.8        | 232.9       | 233.5       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                              | 34%              | 81%         | 50%         | 50%         | 50%         | 81%         | 50%         |
| 50% of the revenues are spent on climate and energy (any revenues not spent are carried over to future years) and the remainder goes to the national general budget. Amounts included in the latter can be spent on climate change and energy are not covered here.                                                                                                                                        |                  |             |             |             |             |             |             |
| <b>Ireland *</b>                                                                                                                                                                                                                                                                                                                                                                                           | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                   | 171.3            | 53.6        | 142.1       | 124.3       | 124.5       | 149.2       | 215.7       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                          | 171.3            | 53.6        | 142.1       | 124.3       | 124.5       | 149.2       | 215.7       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                              | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| While ETS auction revenues are not earmarked for specific purposes, amounts spent are equivalent to 100% of these revenue (less ETS administration costs for the Environmental Protection Agency) and are attributed to emission reduction activities in line with the purposes specified in the ETS Directive.                                                                                            |                  |             |             |             |             |             |             |
| <b>Italy (*)</b>                                                                                                                                                                                                                                                                                                                                                                                           | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                   | 1706.1           | 549.7       | 1453.3      | 1289        | 1290.5      | 2520.9      | 3202.7      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                          | 548.6            | 383.7       | 148.4       | 148.1       | 506.6       | 1260.5      | 1601.3      |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                              | 32%              | 70%         | 50%         | 50%         | 50%         | 50%         | 50%         |
| Italian law guarantees that 50% of the revenues are used for climate and energy purposes but only after the year has ended, which can cause underreported spending. The remaining 50% was initially used to compensate for the depleted phase 2 of the New Entrants Reserve, and later it was allocated to the general budget, which funds, among others, climate and energy projects (not included here). |                  |             |             |             |             |             |             |

| <b>Latvia</b>                                                                                                                                                                                                             | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Revenues from auctioning                                                                                                                                                                                                  | 47.8             | 15.4        | 40.7        | 42.6        | 42.3        | 62.4        | 84.2        |
| Reported as spent on climate etc.                                                                                                                                                                                         | 7.6              | 3.8         | 12.3        | 11.4        | 5.8         | 62.4        | 84.2        |
| % spent on climate and energy                                                                                                                                                                                             | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| 100% of revenues go to the EAAI, a national green investment scheme aimed at tackling global climate change. Reported spending shows actually disbursed amounts per year, all leftovers are carried over to future years. |                  |             |             |             |             |             |             |
| <b>Lithuania</b>                                                                                                                                                                                                          | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                  | 86.5             | 31.5        | 80.4        | 84          | 86.6        | 86.2        | 103.7       |
| Reported as spent on climate etc.                                                                                                                                                                                         | 86.5             | 31.5        | 80.4        | 83.7        | 86.6        | 86.2        | 110.0       |
| % spent on climate and energy                                                                                                                                                                                             | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | >100%       |
| Revenues are put in a Climate Change fund that is only funded by auctioning revenues, and spent on climate and energy purposes.                                                                                           |                  |             |             |             |             |             |             |
| <b>Luxembourg *</b>                                                                                                                                                                                                       | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                  | 22.1             | 6.9         | 18.3        | 17.1        | 17          | 8.1         | 30.7        |
| Reported as spent on climate etc.                                                                                                                                                                                         | 11.5             | 3.5         | 9.2         | 17.1        | 17          | 8.1         | 5.7         |
| % spent on climate and energy                                                                                                                                                                                             | 52%              | 50%         | 51%         | 100%        | 100%        | 100%        | 19%         |
| Revenues are not earmarked, example projects have been reported up to 100% of revenues each year.                                                                                                                         |                  |             |             |             |             |             |             |
| <b>Malta *</b>                                                                                                                                                                                                            | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                  | 19.1             | 6           | 15.7        | 15.9        | 15.8        | 30.7        | 40.1        |
| Reported as spent on climate etc.                                                                                                                                                                                         | 30.3             | 6.9         | 4.9         | 9.1         | 47.2        | 30.7        | 40.1        |
| % spent on climate and energy                                                                                                                                                                                             | >100%            | >100%       | 100%        | 100%        | >100%       | 100%        | 100%        |
| All revenues go to a fund for climate and energy projects, which is additionally co-funded from the general budget.                                                                                                       |                  |             |             |             |             |             |             |
| <b>Netherlands *</b>                                                                                                                                                                                                      | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                  | 595.2            | 190.7       | 504.2       | 440.1       | 441.4       | 894.0       | 1135.9      |
| Reported as spent on climate etc.                                                                                                                                                                                         | 595.2            | 190.7       | 504.2       | 440.1       | 441.4       | 0.0         | 0.0         |
| % spent on climate and energy                                                                                                                                                                                             | >100%            | >100%       | >100%       | >100%       | >100%       | >100%       | >100%       |

|                                                                                                                                                                                                                                                                                                                    |                  |             |             |             |             |             |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Auctioning revenues go to the national general budget which is used to, among others, finance climate and energy purposes. Amounts spent are higher than 100% of revenues, but it is not possible to link auctioning revenues to specific projects funded.                                                         |                  |             |             |             |             |             |             |
| <b>Poland*</b>                                                                                                                                                                                                                                                                                                     | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                           | 590.9            | 506         | 1211.6      | 2548.8      | 3157.6      | 5593.6      | 4976.0      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                  | 304.3            | 290.4       | 609.9       | 1274.4      | 1564        | 2768.3      | 2550.2      |
| % spent on climate and energy                                                                                                                                                                                                                                                                                      | 51%              | 57%         | 50%         | 50%         | 50%         | 49%         | 51%         |
| Revenues are not earmarked, example projects have been reported for around 50% of revenues each year.                                                                                                                                                                                                              |                  |             |             |             |             |             |             |
| <b>Portugal</b>                                                                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                           | 314.2            | 100.3       | 265.6       | 257.1       | 255.8       | 513.9       | 673.2       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                  | 292.7            | 95.1        | 201.2       | 235.3       | 251.3       | 513.9       | 673.2       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                      | 93%              | 95%         | 76%         | 92%         | 98%         | 100%        | 100%        |
| All revenues from auctioning are channelled to the Environment Fund (alongside other revenues) which is financing environmental projects that may or may not be directly related to climate objectives. The amounts reported as spent represent climate change and energy projects paid by the Environmental Fund. |                  |             |             |             |             |             |             |
| <b>Romania (*)</b>                                                                                                                                                                                                                                                                                                 | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                           | 609.8            | 260.8       | 719.1       | 749.8       | 803.1       | 483.9       | 488.0       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                  | 578.3            | 0           | 160         | 42.7        | 165.9       | 226.6       | 277.7       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                      | 95%              | 0%          | 22%         | 6%          | 17%         | 47%         | 57%         |
| 50% of revenues is earmarked for climate change and energy purposes and an additional 6% is earmarked for GHG reduction projects (and 15% goes to indirect carbon cost compensation and 29% to the general budget). Part of unspent revenues are carried over to later years.                                      |                  |             |             |             |             |             |             |
| <b>Slovakia</b>                                                                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                           | 268.8            | 87.1        | 229.9       | 244.7       | 242.1       | 276.2       | 342.9       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                  | 80.8             | 40.9        | 55.6        | 44.6        | 27.4        | 50.9        | 54.5        |
| % spent on climate and energy                                                                                                                                                                                                                                                                                      | 30%              | 47%         | 24%         | 18%         | 11%         | 18%         | 16%         |
| All auctioning revenues are earmarked and go to the Environmental Fund, which also receives money from other sources. The values reported as spent represent the funding of climate change and energy projects known at the time of reporting. Part of unspent revenues are carried over to later years.           |                  |             |             |             |             |             |             |
| <b>Slovenia</b>                                                                                                                                                                                                                                                                                                    | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |             |             |             |             |             |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 77.4             | 25.1        | 66.3        | 65.3        | 65.0        | 130.1       | 170.8       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 46.4             | 5.4         | 14.2        | 40.8        | 40.4        | 79.9        | 182.3       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 100%             | 100%        | 100%        | 100%        | 100%        | 100%        | 100%        |
| 100% of the auctioning revenues are used for climate and energy projects. Some projects receive funding later than in the year in which the auctioning revenues were generated. About EUR 174 million in already received auction revenues will still be spent on climate and energy.                                                                                                                                                                                                                                                             |                  |             |             |             |             |             |             |
| <b>Spain (*)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1535.2           | 493.6       | 1306        | 1245.2      | 1240.3      | 2482.9      | 3231.2      |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1494.9           | 445.5       | 788.6       | 1054.1      | 1081.5      | 2035.0      | 2019.7      |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 97%              | 90%         | 60%         | 85%         | 87%         | 82%         | 63%         |
| Estimated revenues are earmarked for energy and climate purposes ahead of each year, so actual revenues may differ from the allocated estimate. All estimated revenues that don't go to indirect cost compensation (maximum of 25%, 5.6% in 2022, not included as spent here) are used for climate and energy purposes. Current legislation includes a minimum 450 M€ for renewable energy production support plus a maximum of 30% for energy transition. Revenues higher than estimated go to the general budget, without a predefined purpose. |                  |             |             |             |             |             |             |
| <b>Sweden *</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>2013-2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
| Revenues from auctioning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 161.1            | 51.5        | 136.3       | 128.5       | 127.9       | 222.2       | 283.1       |
| Reported as spent on climate etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 128.7            | 28.8        | 76.5        | 73.9        | 65          | 222.2       | 283.1       |
| % spent on climate and energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 80%              | 56%         | 56%         | 58%         | 51%         | 100%        | 100%        |
| Revenues are not earmarked, example projects have been reported for at least the minimum required spending on energy and climate purposes.                                                                                                                                                                                                                                                                                                                                                                                                        |                  |             |             |             |             |             |             |

## 8 EMISSIONS COVERED BY THE EFFORT SHARING LEGISLATION

By 30 June 2023, Member States had to report their draft updated integrated National Energy and Climate Plans (NECPs) to the Commission.<sup>84</sup> The draft NECPs should contain the policies and measures that a Member State envisages to meet their climate and energy targets. The draft NECPs are currently being assessed by the Commission, which will address recommendations to the Member States by the end of the year. Member States are encouraged to take these recommendations into account in their final updated NECPs which are to be submitted by 30 June 2024. The Commission already notes that some Member States have planned higher ambition for their ESR emissions in their draft NECPs. Therefore, a more complete overview will be available in the Commission's assessment of draft NECPs due by the end of this year. After the submission of the final updated NECPs by Member States, the Commission will come back to the assessment of whether Member States are making sufficient progress.

*Table 10: Member States targets, historical and projected emissions under the effort-sharing legislation and distance to targets in percentage change from 2005 base year emissions.*<sup>85</sup>

| Member State                          | 2021 | 2022 | 2030<br>(projections<br>WEM) | 2030<br>(projections<br>WAM) |
|---------------------------------------|------|------|------------------------------|------------------------------|
| <b>Austria</b>                        |      |      |                              |                              |
| Target                                | -14% | -17% | -48%                         | -48%                         |
| Emissions                             | -14% | -19% | -27%                         | -27%                         |
| Distance to target (percentage point) | 0%   | 3%   | -21%                         | -21%                         |
| <b>Belgium</b>                        |      |      |                              |                              |
| Target                                | -13% | -15% | -47%                         | -47%                         |
| Emissions                             | -15% | -18% | -22%                         | -43%                         |
| Distance to target (pp)               | 2%   | 3%   | -25%                         | -4%                          |
| <b>Bulgaria</b>                       |      |      |                              |                              |

<sup>84</sup> By 6 October 2023, 16 Member States have submitted their draft updated NECPs. 6 Member States foresee a higher ambition in their draft NECPs compared to their reported projections in Table 10, i.e. Croatia reports a WAM projection of -17.1%, Cyprus reports a WAM projection of -23.1%, Hungary reports an improved WEM of -15.1% and WAM of -23.8%, Italy reports a WAM projection in the range of -35.3% to -37.1%, Slovakia reports a WAM projection of -20%, Slovenia reports a WAM projection of -28.8%.

<sup>85</sup> 2021 emissions are based on the final inventory reports, 2022 emissions are based on approximated inventory reports and EEA's calculation of ESR emissions. This includes ETS emissions taken from EEA's [EU Emissions Trading System \(ETS\) data viewer — European Environment Agency \(europa.eu\)](#) to ensure consistency between Member States. The approximated emissions can therefore deviate from Member States' reported emissions. ESR base year emissions and targets are in GWP AR5. Positive values indicate projected overachievement while negative values indicate projected underachievement. WEM = with existing measures, WAM = with additional measures. Targets for 2030 are based on Member States' estimated AEAs for 2030. Any apparent miscalculations for percentage point distance to targets is due to rounding of the percentage targets and emissions (e.g. distance to target (pp) for CY and CZ).

|                         |      |      |      |      |
|-------------------------|------|------|------|------|
| Target                  | 21%  | 13%  | -10% | -10% |
| Emissions               | 12%  | 2%   | 4%   | 2%   |
| Distance to target (pp) | 9%   | 11%  | -14% | -12% |
| <b>Croatia</b>          |      |      |      |      |
| Target                  | -2%  | -8%  | -17% | -17% |
| Emissions               | -3%  | -6%  | -11% | -17% |
| Distance to target (pp) | 1%   | -2%  | -6%  | 0%   |
| <b>Cyprus</b>           |      |      |      |      |
| Target                  | -5%  | -7%  | -32% | -32% |
| Emissions               | 4%   | 2%   | -9%  | -9%  |
| Distance to target (pp) | -8%  | -9%  | -23% | -23% |
| <b>Czechia</b>          |      |      |      |      |
| Target                  | 2%   | -6%  | -26% | -26% |
| Emissions               | -6%  | -9%  | -16% | -20% |
| Distance to target (pp) | 7%   | 3%   | -10% | -6%  |
| <b>Denmark</b>          |      |      |      |      |
| Target                  | -20% | -22% | -50% | -50% |
| Emissions               | -20% | -21% | -40% | -40% |
| Distance to target (pp) | 0%   | -2%  | -10% | -10% |
| <b>Estonia</b>          |      |      |      |      |
| Target                  | 0%   | -3%  | -24% | -24% |
| Emissions               | -7%  | -4%  | -10% | -11% |
| Distance to target (pp) | 7%   | 1%   | -14% | -13% |
| <b>Finland</b>          |      |      |      |      |
| Target                  | -16% | -19% | -50% | -50% |
| Emissions               | -20% | -23% | -44% | -46% |
| Distance to target (pp) | 4%   | 4%   | -6%  | -4%  |
| <b>France</b>           |      |      |      |      |
| Target                  | -16% | -19% | -47% | -47% |
| Emissions               | -19% | -22% | -34% | -34% |
| Distance to target (pp) | 3%   | 3%   | -14% | -14% |
| <b>Germany</b>          |      |      |      |      |
| Target                  | -12% | -15% | -50% | -50% |
| Emissions               | -17% | -19% | -35% | -40% |
| Distance to target (pp) | 5%   | 5%   | -15% | -10% |
| <b>Greece</b>           |      |      |      |      |

|                         |      |      |      |      |
|-------------------------|------|------|------|------|
| Target                  | -27% | -25% | -23% | -23% |
| Emissions               | -30% | -29% | -36% | -36% |
| Distance to target (pp) | 4%   | 3%   | 13%  | 13%  |
| <b>Hungary</b>          |      |      |      |      |
| Target                  | 4%   | -9%  | -19% | -19% |
| Emissions               | -3%  | -8%  | -12% | -12% |
| Distance to target (pp) | 7%   | -2%  | -6%  | -6%  |
| <b>Ireland</b>          |      |      |      |      |
| Target                  | -9%  | -11% | -42% | -42% |
| Emissions               | -2%  | -3%  | -10% | -29% |
| Distance to target (pp) | -7%  | -8%  | -32% | -13% |
| <b>Italy</b>            |      |      |      |      |
| Target                  | -20% | -22% | -43% | -43% |
| Emissions               | -17% | -18% | -28% | -28% |
| Distance to target (pp) | -3%  | -3%  | -15% | -15% |
| <b>Latvia</b>           |      |      |      |      |
| Target                  | 24%  | 3%   | -17% | -17% |
| Emissions               | 1%   | -3%  | -7%  | -8%  |
| Distance to target (pp) | 23%  | 6%   | -10% | -9%  |
| <b>Lithuania</b>        |      |      |      |      |
| Target                  | 23%  | 5%   | -21% | -21% |
| Emissions               | 10%  | 9%   | -15% | -21% |
| Distance to target (pp) | 14%  | -4%  | -6%  | 0%   |
| <b>Luxembourg</b>       |      |      |      |      |
| Target                  | -17% | -19% | -50% | -50% |
| Emissions               | -20% | -30% | -35% | -58% |
| Distance to target (pp) | 3%   | 11%  | -15% | 8%   |
| <b>Malta</b>            |      |      |      |      |
| Target                  | 102% | 21%  | -19% | -19% |
| Emissions               | 33%  | 35%  | 46%  | 46%  |
| Distance to target (pp) | 69%  | -14% | -65% | -65% |
| <b>Netherlands</b>      |      |      |      |      |
| Target                  | -23% | -25% | -48% | -48% |
| Emissions               | -27% | -33% | -38% | -39% |
| Distance to target (pp) | 4%   | 9%   | -10% | -9%  |
| <b>Poland</b>           |      |      |      |      |

|                         |      |      |      |      |
|-------------------------|------|------|------|------|
| Target                  | 12%  | 6%   | -18% | -18% |
| Emissions               | 8%   | 4%   | 4%   | -7%  |
| Distance to target (pp) | 4%   | 2%   | -22% | -11% |
| <b>Portugal</b>         |      |      |      |      |
| Target                  | -13% | -16% | -29% | -29% |
| Emissions               | -17% | -17% | -39% | -42% |
| Distance to target (pp) | 5%   | 1%   | 10%  | 13%  |
| <b>Romania</b>          |      |      |      |      |
| Target                  | 12%  | -2%  | -13% | -13% |
| Emissions               | 6%   | 1%   | 7%   | 4%   |
| Distance to target (pp) | 6%   | -3%  | -20% | -17% |
| <b>Slovakia</b>         |      |      |      |      |
| Target                  | 1%   | -9%  | -23% | -23% |
| Emissions               | -12% | -12% | -1%  | -12% |
| Distance to target (pp) | 13%  | 4%   | -21% | -11% |
| <b>Slovenia</b>         |      |      |      |      |
| Target                  | -4%  | -6%  | -26% | -26% |
| Emissions               | -12% | -6%  | -9%  | -26% |
| Distance to target (pp) | 8%   | 0%   | -17% | -1%  |
| <b>Spain</b>            |      |      |      |      |
| Target                  | -17% | -18% | -37% | -37% |
| Emissions               | -19% | -20% | -29% | -45% |
| Distance to target (pp) | 2%   | 2%   | -8%  | 7%   |
| <b>Sweden</b>           |      |      |      |      |
| Target                  | -28% | -29% | -50% | -50% |
| Emissions               | -33% | -36% | -62% | -62% |
| Distance to target (pp) | 5%   | 8%   | 12%  | 12%  |
| <b>EU 27</b>            |      |      |      |      |
| Target                  | -12% | -15% | -40% | -40% |
| Emissions               | -14% | -17% | -27% | -32% |
| Distance to target (pp) | 3%   | 2%   | -13% | -8%  |
| <b>Iceland</b>          |      |      |      |      |
| Target                  | -7%  | -10% | -29% | -29% |
| Emissions               | -10% | -10% | -24% | -26% |
| Distance to target (pp) | 3%   | 0%   | -4%  | -3%  |
| <b>Norway</b>           |      |      |      |      |

|                         |      |      |      |      |
|-------------------------|------|------|------|------|
| Target                  | -13% | -16% | -40% | -40% |
| Emissions               | -13% | -12% | -32% | -32% |
| Distance to target (pp) | 0%   | -4%  | -8%  | -8%  |

**Table 11: Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation (Mt. CO<sub>2</sub>-eq.) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.<sup>86</sup>**

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026  | 2027  | 2028  | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|-------|-------|-------|-------|-------|
| Austria                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 48,8                                                                                                                                                                                                                                                                                                                                 | 47,4                | 45,2 | 43,0 | 40,7 | 40,9  | 38,1  | 35,3  | 32,5  | 29,6  |
| Emissions                  |                            | 57,0                                                                                                                                                     | 48,8                                                                                                                                                                                                                                                                                                                                 | 45,9                | 47,2 | 46,8 | 46,0 | 45,3  | 44,5  | 43,5  | 42,6  | 41,7  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 0,0                                                                                                                                                                                                                                                                                                                                  | 1,5                 | -2,0 | -3,8 | -5,2 | -4,4  | -6,4  | -8,2  | -10,1 | -12,0 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,0                                                                                                                                                                                                                                                                                                                                  | 1,5                 | -0,6 | -4,4 | -9,6 | -14,0 | -20,4 | -28,6 | -38,7 | -50,8 |
| ETS flexibility            | 11,4                       |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |       |       |       |       |       |
| Maximum LULUCF flexibility | 2,5                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |       |       |       |       |       |
| Belgium                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 71,1                                                                                                                                                                                                                                                                                                                                 | 69,1                | 65,9 | 62,7 | 59,4 | 58,8  | 54,9  | 51,0  | 47,1  | 43,3  |
| Emissions                  |                            | 81,6                                                                                                                                                     | 69,5                                                                                                                                                                                                                                                                                                                                 | 66,8                | 66,1 | 64,4 | 62,7 | 59,6  | 56,4  | 53,2  | 50,0  | 46,8  |

<sup>86</sup> AEAs for the years 2021-2025 are established in Implementing Decision (EU) 2020/2126. AEAs for the years 2026-2030 are estimated based on the trajectory defined in Article 4 ESR and adjusted as provided for under Article 10(1)c ESR. To estimate the trajectory for 2026-2030, the estimated ESR emissions for the years 2021 to 2023 are used, after a reduction by the Article 10(1)c ESR adjustment included in the AEAs for 2021-2023. The trajectory values are adjusted based on Article 10(1)c on the basis of the assumption that the methodology applied to the AEAs for 2021 to 2025 is continued unchanged for the years 2026-2030, and no further adjustments for changes to EU ETS are required. The final AEAs for these years will be established after the comprehensive review in 2025 pursuant to Article 38(1a) of Regulation (EU) 2018/1999. The values of 'cumulative surplus of AEAs' are the cumulative annual distances to target and do not take into account cancellations and transfers. 2021 emissions are based on the final inventory reports, 2022 emissions are based on approximated inventory reports and EEA's calculation of ESR emissions. This includes ETS emissions taken from EEA's [EU Emissions Trading System \(ETS\)](#) data viewer — [European Environment Agency \(europa.eu\)](#) to ensure consistency between Member States. 2023 – 2030 emissions are based on the most recent WAM emissions projections reports, or in the absence of WAM projections the WEM projections. First compliance check will take place in 2027.

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Distance to target         |                            |                                                                                                                                                          | 1,6                                                                                                                                                                                                                                                                                                                                  | 2,4                 | -0,2 | -1,8 | -3,3 | -0,8 | -1,5 | -2,2 | -2,9 | -3,6  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 1,6                                                                                                                                                                                                                                                                                                                                  | 4,0                 | 3,7  | 1,9  | -1,4 | -2,2 | -3,7 | -5,8 | -8,7 | -12,3 |
| ETS flexibility            | 15,4                       |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |       |
| Maximum LULUCF flexibility | 3,8                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |       |
| Bulgaria                   |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 27,1                                                                                                                                                                                                                                                                                                                                 | 25,2                | 24,5 | 23,9 | 23,3 | 22,5 | 21,9 | 21,3 | 20,7 | 20,1  |
| Emissions                  |                            | 22,3                                                                                                                                                     | 25,0                                                                                                                                                                                                                                                                                                                                 | 22,7                | 23,6 | 23,6 | 23,6 | 23,4 | 23,3 | 23,1 | 23,0 | 22,8  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Distance to target         |                            |                                                                                                                                                          | 2,1                                                                                                                                                                                                                                                                                                                                  | 2,4                 | 1,0  | 0,3  | -0,3 | -1,0 | -1,4 | -1,8 | -2,3 | -2,7  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 2,1                                                                                                                                                                                                                                                                                                                                  | 4,5                 | 5,4  | 5,8  | 5,5  | 4,5  | 3,1  | 1,3  | -1,0 | -3,7  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |       |
| Maximum LULUCF flexibility | 4,1                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |       |
| Croatia                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 17,7                                                                                                                                                                                                                                                                                                                                 | 16,5                | 16,4 | 16,2 | 16,0 | 16,2 | 15,9 | 15,6 | 15,3 | 15,0  |
| Emissions                  |                            | 18,1                                                                                                                                                     | 17,4                                                                                                                                                                                                                                                                                                                                 | 17,0                | 16,2 | 16,1 | 15,9 | 15,8 | 15,6 | 15,4 | 15,2 | 15,0  |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | 0,2                                                                                                                                                                                                                                                                                                                                  | -0,4                | 0,2  | 0,1  | 0,0  | 0,4  | 0,3  | 0,2  | 0,1  | 0,0  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,2                                                                                                                                                                                                                                                                                                                                  | -0,2                | 0,0  | 0,1  | 0,1  | 0,6  | 0,9  | 1,1  | 1,3  | 1,3  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 0,9                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Cyprus                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 4,1                                                                                                                                                                                                                                                                                                                                  | 4,0                 | 3,8  | 3,7  | 3,6  | 3,8  | 3,6  | 3,4  | 3,1  | 2,9  |
| Emissions                  |                            | 4,3                                                                                                                                                      | 4,4                                                                                                                                                                                                                                                                                                                                  | 4,4                 | 4,3  | 4,3  | 4,3  | 4,3  | 4,2  | 4,1  | 4,0  | 3,9  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | -0,4                                                                                                                                                                                                                                                                                                                                 | -0,4                | -0,5 | -0,6 | -0,7 | -0,5 | -0,6 | -0,8 | -0,9 | -1,0 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | -0,4                                                                                                                                                                                                                                                                                                                                 | -0,7                | -1,2 | -1,8 | -2,6 | -3,0 | -3,7 | -4,4 | -5,3 | -6,3 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 0,6                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Czechia                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 66,0                                                                                                                                                                                                                                                                                                                                 | 60,9                | 59,3 | 57,7 | 56,1 | 55,1 | 53,3 | 51,6 | 49,8 | 48,1 |
| Emissions                  |                            | 65,0                                                                                                                                                     | 61,2                                                                                                                                                                                                                                                                                                                                 | 59,2                | 56,7 | 56,7 | 56,6 | 55,7 | 54,7 | 53,8 | 52,8 | 51,9 |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. | 4,8                                                                                                                                                                                                                                                                                                                                  | 1,7                 | 2,6  | 1,0  | -0,5 | -0,6 | -1,4 | -2,2 | -3,0  | -3,8  |
| Distance to target         |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 4,8                                                                                                                                                                                                                                                                                                                                  | 6,5                 | 9,1  | 10,2 | 9,6  | 9,0  | 7,6  | 5,4  | 2,4   | -1,4  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |       |       |
| Maximum LULUCF flexibility | 2,6                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |       |       |
| Denmark                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 32,1                                                                                                                                                                                                                                                                                                                                 | 31,3                | 29,9 | 28,5 | 27,1 | 27,5 | 25,7 | 23,8 | 22,0  | 20,2  |
| Emissions                  |                            | 40,4                                                                                                                                                     | 32,1                                                                                                                                                                                                                                                                                                                                 | 32,0                | 30,8 | 29,7 | 28,8 | 28,1 | 27,1 | 26,2 | 25,3  | 24,4  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Distance to target         |                            |                                                                                                                                                          | 0,0                                                                                                                                                                                                                                                                                                                                  | -0,7                | -0,9 | -1,2 | -1,6 | -0,6 | -1,4 | -2,3 | -3,3  | -4,2  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,0                                                                                                                                                                                                                                                                                                                                  | -0,7                | -1,6 | -2,7 | -4,4 | -4,9 | -6,4 | -8,7 | -12,0 | -16,2 |
| ETS flexibility            | 8,1                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |       |       |
| Maximum LULUCF flexibility | 14,6                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |       |       |
| Estonia                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 6,2                                                                                                                                                                                                                                                                                                                                  | 6,0                 | 5,8  | 5,7  | 5,5  | 5,4  | 5,3  | 5,1  | 4,9   | 4,7   |
| Emissions                  |                            | 6,2                                                                                                                                                      | 5,8                                                                                                                                                                                                                                                                                                                                  | 6,0                 | 5,8  | 5,8  | 5,8  | 5,8  | 5,7  | 5,7  | 5,6   | 5,5   |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 0,5                                                                                                                                                                                                                                                                                                                                  | 0,0                 | 0,0   | -0,2  | -0,3  | -0,3  | -0,5  | -0,6  | -0,7  | -0,8  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,5                                                                                                                                                                                                                                                                                                                                  | 0,5                 | 0,5   | 0,4   | 0,1   | -0,3  | -0,8  | -1,4  | -2,1  | -2,9  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 0,9                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| Finland                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 28,8                                                                                                                                                                                                                                                                                                                                 | 28,0                | 26,6  | 25,3  | 23,9  | 23,2  | 21,7  | 20,2  | 18,7  | 17,2  |
| Emissions                  |                            | 34,4                                                                                                                                                     | 27,5                                                                                                                                                                                                                                                                                                                                 | 26,7                | 25,5  | 23,1  | 22,2  | 21,6  | 20,8  | 20,0  | 19,3  | 18,5  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 1,4                                                                                                                                                                                                                                                                                                                                  | 1,3                 | 1,2   | 2,2   | 1,7   | 1,6   | 0,9   | 0,2   | -0,6  | -1,2  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 1,4                                                                                                                                                                                                                                                                                                                                  | 2,7                 | 3,8   | 6,0   | 7,8   | 9,4   | 10,2  | 10,4  | 9,9   | 8,6   |
| ETS flexibility            | 6,9                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 4,5                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| France                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 335,7                                                                                                                                                                                                                                                                                                                                | 326,5               | 312,0 | 297,5 | 283,0 | 276,4 | 259,9 | 243,5 | 227,1 | 210,6 |
| Emissions                  |                            | 401,1                                                                                                                                                    | 323,4                                                                                                                                                                                                                                                                                                                                | 314,6               | 302,1 | 299,6 | 297,1 | 291,0 | 285,0 | 278,9 | 272,8 | 266,7 |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029   | 2030   |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|--------|--------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. | 12,3                                                                                                                                                                                                                                                                                                                                 | 12,0                | 9,9   | -2,1  | -14,1 | -14,7 | -25,0 | -35,4 | -45,7  | -56,1  |
| Distance to target         |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |        |        |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 12,3                                                                                                                                                                                                                                                                                                                                 | 24,3                | 34,1  | 32,0  | 18,0  | 3,3   | -21,7 | -57,1 | -102,8 | -158,9 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |        |        |
| Maximum LULUCF flexibility | 58,2                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |        |        |
| Germany                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |        |        |
| Estimated AEAs             |                            |                                                                                                                                                          | 427,3                                                                                                                                                                                                                                                                                                                                | 413,2               | 391,9 | 370,5 | 349,2 | 340,3 | 315,8 | 291,3 | 266,9  | 242,4  |
| Emissions                  |                            | 484,7                                                                                                                                                    | 404,5                                                                                                                                                                                                                                                                                                                                | 390,5               | 391,0 | 384,2 | 369,8 | 357,4 | 343,3 | 326,4 | 309,5  | 290,5  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |        |        |
| Distance to target         |                            |                                                                                                                                                          | 22,8                                                                                                                                                                                                                                                                                                                                 | 22,7                | 0,9   | -13,7 | -20,7 | -17,1 | -27,5 | -35,1 | -42,6  | -48,1  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 22,8                                                                                                                                                                                                                                                                                                                                 | 45,5                | 46,3  | 32,6  | 11,9  | -5,2  | -32,6 | -67,7 | -110,3 | -158,5 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |        |        |
| Maximum LULUCF flexibility | 22,3                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |        |        |
| Greece                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |        |        |
| Estimated AEAs             |                            |                                                                                                                                                          | 46,2                                                                                                                                                                                                                                                                                                                                 | 47,0                | 47,2  | 47,4  | 47,6  | 45,7  | 46,4  | 47,2  | 47,9   | 48,7   |
| Emissions                  |                            | 63,0                                                                                                                                                     | 43,9                                                                                                                                                                                                                                                                                                                                 | 45,0                | 43,1  | 43,1  | 43,0  | 42,5  | 42,0  | 41,6  | 41,1   | 40,6   |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Distance to target         |                            |                                                                                                                                                          | 2,3                                                                                                                                                                                                                                                                                                                                  |                     | 2,0  | 4,1  | 4,3  | 4,6  | 3,2  | 4,4  | 5,6  | 8,1   |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 2,3                                                                                                                                                                                                                                                                                                                                  |                     | 4,3  | 8,4  | 12,7 | 17,4 | 20,5 | 25,0 | 30,6 | 45,5  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |       |
| Maximum LULUCF flexibility | 6,7                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |       |
| Hungary                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 49,9                                                                                                                                                                                                                                                                                                                                 |                     | 43,3 | 42,8 | 42,2 | 41,7 | 42,7 | 41,7 | 40,8 | 38,9  |
| Emissions                  |                            | 47,8                                                                                                                                                     | 46,6                                                                                                                                                                                                                                                                                                                                 |                     | 44,2 | 43,5 | 43,5 | 43,4 | 43,1 | 42,8 | 42,5 | 41,9  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Distance to target         |                            |                                                                                                                                                          | 3,3                                                                                                                                                                                                                                                                                                                                  |                     | -0,9 | -0,7 | -1,2 | -1,8 | -0,5 | -1,1 | -1,7 | -3,0  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 3,3                                                                                                                                                                                                                                                                                                                                  |                     | 2,4  | 1,7  | 0,5  | -1,3 | -1,8 | -2,9 | -4,6 | -10,0 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |       |
| Maximum LULUCF flexibility | 2,1                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |       |
| Ireland                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 43,5                                                                                                                                                                                                                                                                                                                                 |                     | 42,4 | 40,5 | 38,7 | 36,8 | 39,1 | 36,2 | 33,4 | 27,7  |
| Emissions                  |                            | 47,7                                                                                                                                                     | 46,8                                                                                                                                                                                                                                                                                                                                 |                     | 46,1 | 43,8 | 43,2 | 42,1 | 40,8 | 39,3 | 37,8 | 36,1  |
|                            |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      | 33,9  |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023  | 2024  | 2025  | 2026  | 2027  | 2028   | 2029   | 2030   |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|--------|--------|--------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |        |        |        |
| Distance to target         |                            |                                                                                                                                                          | -3,3                                                                                                                                                                                                                                                                                                                                 | -3,7                | -3,3  | -4,5  | -5,3  | -1,7  | -3,1  | -4,4   | -5,6   | -6,2   |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | -3,3                                                                                                                                                                                                                                                                                                                                 | -7,0                | -10,3 | -14,8 | -20,0 | -21,7 | -24,8 | -29,2  | -34,7  | -40,9  |
| ETS flexibility            | 19,1                       |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |        |        |        |
| Maximum LULUCF flexibility | 26,8                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |        |        |        |
| Italy                      |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |        |        |        |
| Estimated AEAs             |                            |                                                                                                                                                          | 273,5                                                                                                                                                                                                                                                                                                                                | 268,8               | 259,4 | 250,1 | 240,7 | 248,2 | 234,6 | 221,0  | 207,5  | 193,9  |
| Emissions                  |                            | 343,1                                                                                                                                                    | 284,4                                                                                                                                                                                                                                                                                                                                | 279,6               | 272,3 | 266,2 | 260,1 | 257,3 | 254,4 | 251,6  | 248,8  | 246,0  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |        |        |        |
| Distance to target         |                            |                                                                                                                                                          | -10,9                                                                                                                                                                                                                                                                                                                                | -10,9               | -12,8 | -16,1 | -19,4 | -9,1  | -19,8 | -30,6  | -41,3  | -52,1  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | -10,9                                                                                                                                                                                                                                                                                                                                | -21,8               | -34,6 | -50,7 | -70,1 | -79,2 | -99,0 | -129,6 | -170,9 | -223,0 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |        |        |        |
| Maximum LULUCF flexibility | 11,5                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |        |        |        |
| Latvia                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |        |        |        |
| Estimated AEAs             |                            |                                                                                                                                                          | 10,6                                                                                                                                                                                                                                                                                                                                 | 8,9                 | 8,6   | 8,4   | 8,2   | 8,0   | 7,8   | 7,6    | 7,4    | 7,1    |
| Emissions                  |                            | 8,6                                                                                                                                                      | 8,7                                                                                                                                                                                                                                                                                                                                  | 8,4                 | 8,6   | 8,6   | 8,4   | 8,4   | 8,3   | 8,3    | 8,1    | 7,9    |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | 2,0                                                                                                                                                                                                                                                                                                                                  | 0,5                 | 0,0  | -0,2 | -0,2 | -0,3 | -0,5 | -0,7 | -0,8 | -0,7 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 2,0                                                                                                                                                                                                                                                                                                                                  | 2,5                 | 2,5  | 2,3  | 2,1  | 1,8  | 1,3  | 0,6  | -0,2 | -0,9 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 3,1                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Lithuania                  |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 16,1                                                                                                                                                                                                                                                                                                                                 | 13,7                | 13,3 | 12,9 | 12,4 | 12,9 | 12,2 | 11,6 | 11,0 | 10,3 |
| Emissions                  |                            | 13,1                                                                                                                                                     | 14,3                                                                                                                                                                                                                                                                                                                                 | 14,2                | 14,4 | 13,9 | 13,4 | 12,8 | 12,1 | 11,5 | 10,9 | 10,3 |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | 1,8                                                                                                                                                                                                                                                                                                                                  | -0,5                | -1,1 | -1,0 | -0,9 | 0,1  | 0,2  | 0,1  | 0,0  | 0,0  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 1,8                                                                                                                                                                                                                                                                                                                                  | 1,3                 | 0,2  | -0,9 | -1,8 | -1,7 | -1,5 | -1,4 | -1,4 | -1,4 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 6,5                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Luxembourg                 |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 8,4                                                                                                                                                                                                                                                                                                                                  | 8,1                 | 7,8  | 7,4  | 7,0  | 6,6  | 6,2  | 5,8  | 5,5  | 5,1  |
| Emissions                  |                            | 10,1                                                                                                                                                     | 8,1                                                                                                                                                                                                                                                                                                                                  | 7,1                 | 7,4  | 7,2  | 6,8  | 6,3  | 5,7  | 5,2  | 4,7  | 4,3  |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|------|------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | 0,3                                                                                                                                                                                                                                                                                                                                  | 1,1                 | 0,3  | 0,2  | 0,2  | 0,4  | 0,6  | 0,7  | 0,7  | 0,8  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,3                                                                                                                                                                                                                                                                                                                                  | 1,4                 | 1,7  | 1,9  | 2,1  | 2,5  | 3,0  | 3,7  | 4,4  | 5,2  |
| ETS flexibility            | 4,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 0,3                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Malta                      |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 2,1                                                                                                                                                                                                                                                                                                                                  | 1,2                 | 1,2  | 1,1  | 1,1  | 1,2  | 1,1  | 1,0  | 0,9  | 0,8  |
| Emissions                  |                            | 1,0                                                                                                                                                      | 1,4                                                                                                                                                                                                                                                                                                                                  | 1,4                 | 1,5  | 1,5  | 1,5  | 1,5  | 1,5  | 1,5  | 1,5  | 1,5  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Distance to target         |                            |                                                                                                                                                          | 0,7                                                                                                                                                                                                                                                                                                                                  | -0,1                | -0,3 | -0,3 | -0,4 | -0,3 | -0,4 | -0,5 | -0,6 | -0,7 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 0,7                                                                                                                                                                                                                                                                                                                                  | 0,6                 | 0,3  | 0,0  | -0,4 | -0,7 | -1,0 | -1,5 | -2,1 | -2,7 |
| ETS flexibility            | 0,2                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |      |      |
| Maximum LULUCF flexibility | 0,0                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |      |      |
| Netherlands                |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |      |      |
| Estimated AEAs             |                            |                                                                                                                                                          | 98,5                                                                                                                                                                                                                                                                                                                                 | 96,7                | 92,9 | 89,2 | 85,4 | 81,2 | 77,5 | 73,9 | 70,3 | 66,6 |
| Emissions                  |                            | 128,1                                                                                                                                                    | 93,5                                                                                                                                                                                                                                                                                                                                 | 85,5                | 89,1 | 88,3 | 87,6 | 85,8 | 84,0 | 82,2 | 80,4 | 78,6 |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. | 5,0                                                                                                                                                                                                                                                                                                                                  | 11,2                | 3,8   | 0,8   | -2,2  | -4,6  | -6,4  | -8,3  | -10,1 | -12,0 |
| Distance to target         |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 5,0                                                                                                                                                                                                                                                                                                                                  | 16,2                | 20,0  | 20,9  | 18,7  | 14,1  | 7,7   | -0,6  | -10,8 | -22,7 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 13,4                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| Poland                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 215,0                                                                                                                                                                                                                                                                                                                                | 204,4               | 198,6 | 192,9 | 187,1 | 185,9 | 179,0 | 172,2 | 165,3 | 158,4 |
| Emissions                  |                            | 192,5                                                                                                                                                    | 207,9                                                                                                                                                                                                                                                                                                                                | 200,6               | 195,7 | 191,9 | 188,2 | 186,3 | 184,4 | 182,5 | 180,6 | 178,7 |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 7,2                                                                                                                                                                                                                                                                                                                                  | 3,8                 | 2,9   | 1,0   | -1,0  | -0,4  | -5,3  | -10,3 | -15,3 | -20,3 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 7,2                                                                                                                                                                                                                                                                                                                                  | 10,9                | 13,9  | 14,9  | 13,8  | 13,5  | 8,1   | -2,2  | -17,5 | -37,8 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 21,7                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| Portugal                   |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 42,5                                                                                                                                                                                                                                                                                                                                 | 40,8                | 40,1  | 39,3  | 38,5  | 37,6  | 36,9  | 36,2  | 35,4  | 34,7  |
| Emissions                  |                            | 48,6                                                                                                                                                     | 40,1                                                                                                                                                                                                                                                                                                                                 | 40,5                | 37,1  | 36,9  | 36,6  | 34,9  | 33,3  | 31,6  | 29,9  | 28,2  |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|-------|-------|-------|-------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 2,4                                                                                                                                                                                                                                                                                                                                  | 0,3                 | 2,9  | 2,4  | 1,9   | 2,7   | 3,6   | 4,6   | 5,6   | 6,5   |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 2,4                                                                                                                                                                                                                                                                                                                                  | 2,7                 | 5,7  | 8,1  | 10,0  | 12,7  | 16,3  | 20,9  | 26,5  | 33,0  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 5,2                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |       |       |       |       |       |       |
| Romania                    |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 87,9                                                                                                                                                                                                                                                                                                                                 | 76,9                | 75,8 | 74,8 | 73,7  | 76,2  | 74,3  | 72,3  | 70,3  | 68,3  |
| Emissions                  |                            | 78,2                                                                                                                                                     | 83,0                                                                                                                                                                                                                                                                                                                                 | 79,0                | 80,2 | 80,4 | 80,7  | 80,9  | 81,1  | 81,3  | 81,5  | 81,7  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 4,9                                                                                                                                                                                                                                                                                                                                  | -2,1                | -4,3 | -5,7 | -7,0  | -4,6  | -6,8  | -9,0  | -11,2 | -13,4 |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 4,9                                                                                                                                                                                                                                                                                                                                  | 2,8                 | -1,5 | -7,1 | -14,1 | -18,8 | -25,6 | -34,6 | -45,8 | -59,2 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 13,2                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |       |       |       |       |       |       |
| Slovakia                   |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 23,4                                                                                                                                                                                                                                                                                                                                 | 21,2                | 20,7 | 20,3 | 19,9  | 19,6  | 19,1  | 18,7  | 18,3  | 17,9  |
| Emissions                  |                            | 23,1                                                                                                                                                     | 20,4                                                                                                                                                                                                                                                                                                                                 | 20,3                | 20,8 | 20,7 | 20,2  | 20,4  | 20,5  | 20,6  | 20,4  | 20,5  |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. | 3,0                                                                                                                                                                                                                                                                                                                                  | 0,8                 | -0,1  | -0,4  | -0,3  | -0,8  | -1,3  | -1,8  | -2,1  | -2,6  |
| Distance to target         |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 3,0                                                                                                                                                                                                                                                                                                                                  | 3,9                 | 3,8   | 3,4   | 3,2   | 2,3   | 1,0   | -0,8  | -3,0  | -5,5  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 1,2                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| Slovenia                   |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 11,4                                                                                                                                                                                                                                                                                                                                 | 11,1                | 10,8  | 10,5  | 10,2  | 9,9   | 9,6   | 9,3   | 9,0   | 8,7   |
| Emissions                  |                            | 11,8                                                                                                                                                     | 10,4                                                                                                                                                                                                                                                                                                                                 | 11,1                | 10,4  | 10,2  | 10,1  | 9,9   | 9,6   | 9,4   | 9,1   | 8,8   |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Distance to target         |                            |                                                                                                                                                          | 1,0                                                                                                                                                                                                                                                                                                                                  | 0,0                 | 0,4   | 0,3   | 0,1   | 0,1   | 0,0   | 0,0   | -0,1  | -0,1  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 1,0                                                                                                                                                                                                                                                                                                                                  | 1,0                 | 1,4   | 1,7   | 1,8   | 1,9   | 1,9   | 1,8   | 1,8   | 1,7   |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |       |       |       |       |       |       |       |       |
| Maximum LULUCF flexibility | 1,3                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |       |       |       |       |       |       |       |       |
| Spain                      |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |       |       |       |       |       |       |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 201,0                                                                                                                                                                                                                                                                                                                                | 198,7               | 192,8 | 186,9 | 181,0 | 176,2 | 170,1 | 163,9 | 157,7 | 151,5 |
| Emissions                  |                            | 242,0                                                                                                                                                    | 195,0                                                                                                                                                                                                                                                                                                                                | 194,4               | 181,3 | 175,9 | 171,0 | 163,6 | 156,2 | 148,7 | 141,2 | 133,8 |

| Member State               | ETS and LULUCF flexibility | 2005 base year emissions                                                                                                                                 | 2021 (final inventory)                                                                                                                                                                                                                                                                                                               | 2022 (approximated) | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029  | 2030  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|------|------|-------|-------|
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Distance to target         |                            |                                                                                                                                                          | 6,0                                                                                                                                                                                                                                                                                                                                  | 4,3                 | 11,5 | 11,0 | 10,0 | 12,6 | 13,9 | 15,1 | 16,4  | 17,7  |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 6,0                                                                                                                                                                                                                                                                                                                                  | 10,3                | 21,8 | 32,7 | 42,7 | 55,4 | 69,3 | 84,4 | 100,9 | 118,6 |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |       |       |
| Maximum LULUCF flexibility | 29,1                       |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |       |       |
| Sweden                     |                            |                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Estimated AEAs             |                            |                                                                                                                                                          | 31,3                                                                                                                                                                                                                                                                                                                                 | 30,7                | 29,6 | 28,5 | 27,3 | 25,3 | 24,4 | 23,5 | 22,5  | 21,6  |
| Emissions                  |                            | 43,2                                                                                                                                                     | 29,2                                                                                                                                                                                                                                                                                                                                 | 27,5                | 25,6 | 24,4 | 23,2 | 21,8 | 20,5 | 19,1 | 17,8  | 16,5  |
| LULUCF debit (2021-2025)   |                            | Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See chapter 4 of the main report. |                                                                                                                                                                                                                                                                                                                                      |                     |      |      |      |      |      |      |       |       |
| Distance to target         |                            |                                                                                                                                                          | 2,2                                                                                                                                                                                                                                                                                                                                  | 3,3                 | 4,0  | 4,1  | 4,2  | 3,5  | 3,9  | 4,3  | 4,7   | 5,2   |
| Cumulative balance of AEAs |                            |                                                                                                                                                          | 2,2                                                                                                                                                                                                                                                                                                                                  | 5,4                 | 9,4  | 13,5 | 17,6 | 21,1 | 25,1 | 29,4 | 34,1  | 39,3  |
| ETS flexibility            | 0,0                        |                                                                                                                                                          | Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.                                                                                                                                                                                                         |                     |      |      |      |      |      |      |       |       |
| Maximum LULUCF flexibility | 4,9                        |                                                                                                                                                          | The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030. |                     |      |      |      |      |      |      |       |       |

**Table 12:** Annual emissions allocations, historical emissions, and distance to targets under the Effort Sharing Decision (Mt. CO<sub>2</sub>-eq.) covering the period 2013 - 2020.<sup>87</sup>

| Member State              | 2005 base year emissions | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------------------|--------------------------|------|------|------|------|------|------|------|------|
| <b>Austria</b>            |                          |      |      |      |      |      |      |      |      |
| AEA                       |                          | 52.6 | 52.1 | 51.5 | 51.0 | 49.5 | 48.9 | 48.3 | 47.8 |
| Emissions                 | 56.8                     | 50.1 | 48.2 | 49.3 | 50.6 | 51.7 | 50.3 | 50.2 | 46.5 |
| Distance to target        |                          | 2.5  | 3.9  | 2.2  | 0.4  | -2.1 | -1.4 | -1.9 | 1.2  |
| Cumulative surplus of AEs |                          | 2.5  | 6.4  | 8.7  | 9.0  | 6.9  | 5.5  | 3.6  | 4.8  |
| <b>Belgium</b>            |                          |      |      |      |      |      |      |      |      |
| AEA                       |                          | 78.4 | 76.9 | 75.3 | 73.8 | 72.5 | 71.1 | 69.7 | 68.2 |
| Emissions                 | 80.3                     | 74.3 | 70.1 | 72.7 | 74.1 | 70.8 | 74.3 | 72.0 | 64.9 |
| Distance to target        |                          | 4.1  | 6.8  | 2.6  | -0.3 | 1.7  | -3.2 | -2.4 | 1.7  |
| Cumulative surplus of AEs |                          | 4.1  | 10.9 | 13.5 | 13.2 | 14.9 | 11.7 | 9.4  | 11.1 |
| <b>Bulgaria</b>           |                          |      |      |      |      |      |      |      |      |
| AEA                       |                          | 26.9 | 27.2 | 27.5 | 27.7 | 25.9 | 26.1 | 26.3 | 26.5 |
| Emissions                 | 22.1                     | 22.2 | 22.9 | 25.4 | 25.6 | 26.5 | 26.3 | 25.8 | 25.7 |
| Distance to target        |                          | 4.7  | 4.3  | 2.1  | 2.1  | -0.6 | -0.2 | 0.5  | 0.8  |
| Cumulative surplus of AEs |                          | 4.7  | 9.0  | 11.1 | 13.3 | 12.6 | 12.4 | 12.9 | 13.7 |
| <b>Croatia</b>            |                          |      |      |      |      |      |      |      |      |
| AEA                       |                          | 19.6 | 19.8 | 20.0 | 20.2 | 18.7 | 18.9 | 19.1 | 19.3 |
| Emissions                 | 17.4                     | 15.1 | 14.7 | 15.6 | 16.0 | 16.7 | 16.2 | 16.1 | 16.5 |
| Distance to target        |                          | 4.5  | 5.1  | 4.4  | 4.2  | 2.0  | 2.7  | 3.0  | 2.8  |
| Cumulative surplus of AEs |                          | 4.5  | 9.6  | 14.1 | 18.2 | 20.3 | 22.9 | 26.0 | 28.8 |
| <b>Cyprus</b>             |                          |      |      |      |      |      |      |      |      |

<sup>87</sup> Positive values indicate overachievement, negative values indicate underachievement. AEs for the years 2017-2020 were revised in 2017 for all Member States to reflect updates in methodologies for reporting of GHG inventories. This recalculation ensures maintaining the originally intended effort of each Member State (in % of 2005 emissions). The values of 'cumulative surplus of AEs' are the cumulative annual distances to target and do not take into account cancellations and transfers. 2020 ESD emissions are based on the 'Final Review Reports' from the 2022 annual ESD review. The UK's 2020 Final Review Report was corrected in 2023. For compliance in 2019, Germany used the flexibility to carry forward part of the AEs allocated for 2020. As a result, Germany's AEs available for compliance in 2020 are below the allocation set by the legislation.

|                           |       |       |       |       |       |       |       |       |       |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| AEA                       |       | 5.9   | 5.9   | 5.9   | 5.9   | 4.2   | 4.1   | 4.0   | 4.0   |
| Emissions                 | 4.2   | 3.9   | 3.9   | 4.1   | 4.1   | 4.3   | 4.2   | 4.4   | 4.2   |
| Distance to target        |       | 2.0   | 2.0   | 1.9   | 1.8   | -0.1  | 0.0   | -0.3  | -0.3  |
| Cumulative surplus of AEs |       | 2.0   | 4.0   | 5.8   | 7.7   | 7.6   | 7.5   | 7.2   | 7.0   |
| <b>Czechia</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 62.5  | 63.2  | 64.0  | 64.7  | 65.2  | 65.9  | 66.5  | 67.2  |
| Emissions                 | 61.7  | 61.5  | 57.6  | 61.3  | 62.8  | 62.4  | 60.6  | 60.5  | 58.7  |
| Distance to target        |       | 1.0   | 5.6   | 2.7   | 1.9   | 2.8   | 5.3   | 6.0   | 8.6   |
| Cumulative surplus of AEs |       | 1.0   | 6.6   | 9.3   | 11.2  | 14.0  | 19.2  | 25.2  | 33.8  |
| <b>Denmark</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 36.8  | 35.9  | 35.0  | 34.1  | 34.8  | 33.9  | 33.0  | 32.1  |
| Emissions                 | 40.1  | 33.7  | 32.6  | 32.5  | 33.1  | 32.7  | 33.1  | 32.1  | 30.8  |
| Distance to target        |       | 3.1   | 3.3   | 2.5   | 1.0   | 2.1   | 0.7   | 0.9   | 1.2   |
| Cumulative surplus of AEs |       | 3.1   | 6.4   | 8.9   | 9.9   | 12.0  | 12.7  | 13.6  | 14.9  |
| <b>Estonia</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 6.3   | 6.3   | 6.3   | 6.4   | 5.9   | 6.0   | 6.0   | 6.0   |
| Emissions                 | 5.4   | 5.8   | 6.1   | 6.1   | 6.2   | 6.2   | 6.1   | 6.2   | 5.9   |
| Distance to target        |       | 0.5   | 0.2   | 0.2   | 0.2   | -0.3  | -0.2  | -0.2  | 0.1   |
| Cumulative surplus of AEs |       | 0.5   | 0.8   | 1.0   | 1.1   | 0.9   | 0.7   | 0.5   | 0.6   |
| <b>Finland</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 31.8  | 31.3  | 30.8  | 30.3  | 30.2  | 29.6  | 29.1  | 28.5  |
| Emissions                 | 33.9  | 31.6  | 30.1  | 29.9  | 31.4  | 30.1  | 29.9  | 29.6  | 28.1  |
| Distance to target        |       | 0.2   | 1.1   | 0.9   | -1.0  | 0.1   | -0.3  | -0.6  | 0.4   |
| Cumulative surplus of AEs |       | 0.2   | 1.3   | 2.2   | 1.2   | 1.3   | 1.0   | 0.4   | 0.8   |
| <b>France</b>             |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 394.1 | 389.5 | 384.4 | 379.4 | 358.2 | 352.9 | 347.7 | 342.5 |
| Emissions                 | 398.2 | 366.1 | 353.5 | 353.0 | 351.9 | 352.8 | 342.2 | 336.4 | 307.8 |
| Distance to target        |       | 28.0  | 35.9  | 31.4  | 27.5  | 5.4   | 10.7  | 11.4  | 34.7  |

|                           |       |       |       |       |       |       |       |       |       |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Cumulative surplus of AEs |       | 28.0  | 63.9  | 95.3  | 122.8 | 128.2 | 138.9 | 150.3 | 185.0 |
| <b>Germany</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 472.5 | 465.8 | 459.1 | 452.4 | 432.3 | 425.2 | 432.9 | 396.0 |
| Emissions                 | 477.8 | 460.2 | 436.8 | 444.1 | 454.2 | 466.9 | 434.0 | 444.3 | 407.4 |
| Distance to target        |       | 12.3  | 29.0  | 15.1  | -1.7  | -34.5 | -8.8  | -11.3 | -11.4 |
| Cumulative surplus of AEs |       | 12.3  | 41.4  | 56.4  | 54.7  | 20.2  | 11.3  | 0.0   | -11.4 |
| <b>Greece</b>             |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 59.0  | 59.3  | 59.6  | 59.9  | 59.1  | 59.4  | 59.7  | 60.0  |
| Emissions                 | 62.6  | 44.2  | 44.4  | 45.4  | 44.9  | 45.4  | 44.7  | 44.7  | 42.9  |
| Distance to target        |       | 14.8  | 14.9  | 14.2  | 15.0  | 13.7  | 14.7  | 15.0  | 17.2  |
| Cumulative surplus of AEs |       | 14.8  | 29.6  | 43.8  | 58.8  | 72.5  | 87.3  | 102.3 | 119.4 |
| <b>Hungary</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 50.4  | 51.5  | 52.6  | 53.8  | 50.1  | 51.0  | 51.9  | 52.8  |
| Emissions                 | 48    | 38.4  | 38.4  | 41.4  | 42.1  | 43.1  | 43.2  | 44.9  | 43.9  |
| Distance to target        |       | 12.0  | 13.1  | 11.2  | 11.7  | 6.9   | 7.7   | 7.0   | 8.9   |
| Cumulative surplus of AEs |       | 12.0  | 25.1  | 36.3  | 47.9  | 54.9  | 62.6  | 69.6  | 78.5  |
| <b>Ireland</b>            |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 46.9  | 45.8  | 44.6  | 43.5  | 40.9  | 39.8  | 38.7  | 37.7  |
| Emissions                 | 47.1  | 42.2  | 41.7  | 43.0  | 43.8  | 43.8  | 45.4  | 45.6  | 44.7  |
| Distance to target        |       | 4.7   | 4.1   | 1.6   | -0.3  | -2.9  | -5.6  | -6.9  | -7.1  |
| Cumulative surplus of AEs |       | 4.7   | 8.8   | 10.4  | 10.1  | 7.1   | 1.6   | -5.3  | -12.4 |
| <b>Italy</b>              |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 308.2 | 306.2 | 304.2 | 302.3 | 298.3 | 295.8 | 293.4 | 291.0 |
| Emissions                 | 334.5 | 273.3 | 265.3 | 273.3 | 270.7 | 270.1 | 278.7 | 274.9 | 254.0 |
| Distance to target        |       | 34.8  | 40.9  | 31.0  | 31.6  | 28.1  | 17.1  | 18.5  | 37.0  |
| Cumulative surplus of AEs |       | 34.8  | 75.7  | 106.7 | 138.3 | 166.4 | 183.5 | 202.0 | 239.0 |
| <b>Latvia</b>             |       |       |       |       |       |       |       |       |       |
| AEA                       |       | 9.3   | 9.4   | 9.4   | 9.5   | 9.7   | 9.8   | 9.9   | 10.0  |
| Emissions                 | 8.5   | 8.8   | 9.0   | 9.0   | 9.1   | 9.2   | 9.1   | 8.7   | 8.4   |

|                            |       |       |       |       |       |       |       |       |       |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance to target         |       | 0.5   | 0.3   | 0.4   | 0.4   | 0.5   | 0.7   | 1.3   | 1.6   |
| Cumulative surplus of AEAs |       | 0.5   | 0.8   | 1.3   | 1.7   | 2.2   | 2.9   | 4.1   | 5.7   |
| <b>Lithuania</b>           |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 12.9  | 13.3  | 13.7  | 14.0  | 14.1  | 14.5  | 14.9  | 15.2  |
| Emissions                  | 13.3  | 12.4  | 12.9  | 13.3  | 13.9  | 14.1  | 14.3  | 14.3  | 14.0  |
| Distance to target         |       | 0.5   | 0.4   | 0.4   | 0.1   | 0.0   | 0.2   | 0.6   | 1.2   |
| Cumulative surplus of AEAs |       | 0.5   | 0.9   | 1.3   | 1.4   | 1.4   | 1.6   | 2.1   | 3.3   |
| <b>Luxembourg</b>          |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 9.5   | 9.3   | 9.1   | 8.9   | 8.7   | 8.5   | 8.3   | 8.1   |
| Emissions                  | 10.1  | 9.4   | 8.9   | 8.6   | 8.5   | 8.7   | 9.1   | 9.2   | 7.7   |
| Distance to target         |       | 0.2   | 0.5   | 0.5   | 0.4   | 0.0   | -0.5  | -0.9  | 0.4   |
| Cumulative surplus of AEAs |       | 0.2   | 0.7   | 1.2   | 1.6   | 1.6   | 1.1   | 0.1   | 0.6   |
| <b>Malta</b>               |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 1.2   | 1.2   | 1.2   | 1.2   | 1.2   | 1.2   | 1.2   | 1.2   |
| Emissions                  | 1.1   | 1.3   | 1.3   | 1.3   | 1.3   | 1.4   | 1.4   | 1.4   | 1.3   |
| Distance to target         |       | -0.1  | -0.1  | -0.1  | -0.2  | -0.3  | -0.2  | -0.3  | -0.1  |
| Cumulative surplus of AEAs |       | -0.1  | -0.2  | -0.3  | -0.5  | -0.8  | -1.0  | -1.2  | -1.4  |
| <b>Netherlands</b>         |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 122.9 | 120.7 | 118.4 | 116.1 | 114.1 | 111.8 | 109.6 | 107.4 |
| Emissions                  | 127.8 | 108.3 | 97.9  | 101.1 | 101.3 | 102.3 | 99.7  | 97.1  | 90.2  |
| Distance to target         |       | 14.7  | 22.8  | 17.3  | 14.8  | 11.7  | 12.1  | 12.5  | 17.2  |
| Cumulative surplus of AEAs |       | 14.7  | 37.5  | 54.8  | 69.6  | 81.3  | 93.4  | 105.9 | 123.0 |
| <b>Poland</b>              |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 193.6 | 194.9 | 196.1 | 197.4 | 200.0 | 201.7 | 203.4 | 205.2 |
| Emissions                  | 180   | 186.1 | 181.5 | 186.8 | 198.7 | 211.5 | 213.0 | 209.1 | 205.1 |
| Distance to target         |       | 7.5   | 13.3  | 9.4   | -1.3  | -11.5 | -11.3 | -5.6  | 0.1   |
| Cumulative surplus of AEAs |       | 7.5   | 20.9  | 30.2  | 29.0  | 17.4  | 6.1   | 0.5   | 0.5   |

| Portugal                  |      |       |       |       |       |       |       |       |       |
|---------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| AEA                       |      | 49.3  | 49.6  | 49.9  | 50.1  | 47.9  | 48.3  | 48.7  | 49.1  |
| Emissions                 | 48.6 | 38.6  | 38.8  | 40.6  | 41.6  | 40.2  | 40.6  | 41.5  | 38.5  |
| Distance to target        |      | 10.7  | 10.8  | 9.2   | 8.6   | 7.7   | 7.7   | 7.2   | 10.5  |
| Cumulative surplus of AEs |      | 10.7  | 21.5  | 30.7  | 39.3  | 47.0  | 54.7  | 61.9  | 72.4  |
| Romania                   |      |       |       |       |       |       |       |       |       |
| AEA                       |      | 75.6  | 77.5  | 79.3  | 81.1  | 84.1  | 86.0  | 87.9  | 89.8  |
| Emissions                 | 75.5 | 72.7  | 72.5  | 74.6  | 73.1  | 75.4  | 77.6  | 75.2  | 77.1  |
| Distance to target        |      | 2.9   | 4.9   | 4.7   | 8.0   | 8.7   | 8.3   | 12.7  | 12.7  |
| Cumulative surplus of AEs |      | 2.9   | 7.8   | 12.5  | 20.5  | 29.2  | 37.5  | 50.2  | 62.9  |
| Slovakia                  |      |       |       |       |       |       |       |       |       |
| AEA                       |      | 24.0  | 24.4  | 24.7  | 25.1  | 25.0  | 25.3  | 25.6  | 25.9  |
| Emissions                 | 23   | 21.1  | 19.8  | 20.1  | 19.8  | 21.2  | 21.1  | 20.1  | 18.9  |
| Distance to target        |      | 2.9   | 4.6   | 4.7   | 5.3   | 3.8   | 4.3   | 5.6   | 7.1   |
| Cumulative surplus of AEs |      | 2.9   | 7.5   | 12.2  | 17.5  | 21.3  | 25.6  | 31.2  | 38.2  |
| Slovenia                  |      |       |       |       |       |       |       |       |       |
| AEA                       |      | 12.3  | 12.4  | 12.4  | 12.4  | 12.2  | 12.2  | 12.3  | 12.3  |
| Emissions                 | 11.8 | 10.9  | 10.5  | 10.7  | 11.2  | 10.9  | 11.0  | 10.8  | 9.8   |
| Distance to target        |      | 1.4   | 1.9   | 1.7   | 1.2   | 1.3   | 1.2   | 1.5   | 2.6   |
| Cumulative surplus of AEs |      | 1.4   | 3.3   | 4.9   | 6.1   | 7.4   | 8.6   | 10.1  | 12.7  |
| Spain                     |      |       |       |       |       |       |       |       |       |
| AEA                       |      | 227.6 | 225.6 | 223.7 | 221.8 | 218.3 | 216.3 | 214.3 | 212.4 |
| Emissions                 | 236  | 200.3 | 199.8 | 196.2 | 198.5 | 201.1 | 203.0 | 201.9 | 184.2 |
| Distance to target        |      | 27.3  | 25.9  | 27.6  | 23.3  | 17.2  | 13.3  | 12.5  | 28.2  |
| Cumulative surplus of AEs |      | 27.3  | 53.2  | 80.8  | 104.1 | 121.3 | 134.5 | 147.0 | 175.2 |
| Sweden                    |      |       |       |       |       |       |       |       |       |
| AEA                       |      | 41.7  | 41.0  | 40.4  | 39.8  | 37.8  | 37.2  | 36.7  | 36.1  |
| Emissions                 | 43.5 | 35.3  | 34.5  | 33.9  | 32.6  | 32.5  | 31.4  | 31.7  | 29.4  |
| Distance to target        |      | 6.4   | 6.5   | 6.5   | 7.2   | 5.3   | 5.8   | 5.0   | 6.7   |

|                            |       |       |       |       |       |       |       |       |       |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Cumulative surplus of AEAs |       | 6.4   | 12.9  | 19.4  | 26.6  | 31.9  | 37.7  | 42.7  | 49.4  |
| <b>United Kingdom</b>      |       |       |       |       |       |       |       |       |       |
| AEA                        |       | 358.7 | 354.2 | 349.7 | 345.2 | 360.4 | 357.2 | 354.1 | 350.9 |
| Emissions                  | 417.8 | 339.5 | 324.4 | 326.0 | 333.9 | 332.1 | 329.9 | 329.1 | 296.1 |
| Distance to target         |       | 19.3  | 29.8  | 23.7  | 11.3  | 28.4  | 27.4  | 25.0  | 54.8  |
| Cumulative surplus of AEAs |       | 19.3  | 49.1  | 72.7  | 84.0  | 112.4 | 139.7 | 164.7 | 219.5 |

## 9 LULUCF

Table 13 shows the accounted emissions and removals for the land use, land use and change, and forest (LULUCF) sector in 2021 for EU total and for each Member State. Computation of the accounts per land category, applying the standardised rules in the regulation.<sup>88</sup>

**Table 13:** LULUCF Accounted emissions and removals in 2021 (2023 submission per Member State and land category)<sup>89</sup>

| Member State    | Accounted Land category | Accounted emissions and removals (KtCO <sub>2</sub> -eq) |
|-----------------|-------------------------|----------------------------------------------------------|
| <b>Austria</b>  | Deforested Land         | 1244                                                     |
|                 | Afforested Land         | -1437                                                    |
|                 | Managed Cropland        | 393                                                      |
|                 | Managed Grassland       | -296                                                     |
|                 | Managed Wetland         |                                                          |
|                 | Managed Forest Land     | -6295                                                    |
|                 | Sum annual              | -2863                                                    |
| <b>Belgium</b>  | Deforested Land         | 753                                                      |
|                 | Afforested Land         | -302                                                     |
|                 | Managed Cropland        | 173                                                      |
|                 | Managed Grassland       | -87                                                      |
|                 | Managed Wetland         |                                                          |
|                 | Managed Forest Land     | -208                                                     |
|                 | Sum annual              | 329                                                      |
| <b>Bulgaria</b> | Deforested Land         | 84                                                       |
|                 | Afforested Land         | -173                                                     |
|                 | Managed Cropland        | 735                                                      |
|                 | Managed Grassland       | 1236                                                     |
|                 | Managed Wetland         |                                                          |

<sup>88</sup> One year (2021) of reported data is used, all Harvested Wood Products (HWP) reporting is included under managed forest, not all land use conversions are yet identified in the GHG inventories, indirect non-CO<sub>2</sub> emissions are sometimes not disaggregated by land category in the GHG inventories, Forest Reference Level (FRL) cap (Art 8(2)) has been manually applied to the following Member States: Austria, Bulgaria, Croatia, Hungary, Latvia, Lithuania and Sweden, possible technical corrections to the forest reference level have not been applied. Possible application of flexibilities and mechanisms on natural disturbances has not been applied.

<sup>89</sup> Computation of the accounting status for each Member State and the EU. The method continued the approach applied under the Kyoto Protocol period (2013 to 2020). However, the accounting approach for the period 2021 to 2025 is new and differs from the Kyoto exercise. The accounting follows the specifications laid out in Regulation 2018/841: Article 2, 4, 5, 6, 7 8 and 9. The input data for this analysis has been extracted from the *EU Greenhouse Gas Inventory Report 2023 for 1990-2021 based on final MS' inventory submissions under the EU Governance Regulation (GHGI)*. The computation of accounting results combines the relevant data from the final GHGI in accordance with the rules laid out in the above articles (Reported data for the years 2005 to 2009 and 2021, from Section 4 of the GHGI). This analysis provides an approximate estimate of the status of a Member State's trend towards compliance with its article 4(1) commitment. It also provides a collective status of achievement of the article 4 commitment, an element that is needed to determine if the flexibility through article 13 of the regulation is available (See Regulation 2018/841 Art 13(2)(b)). Numbers in table rounded up. Calculations cover emissions and removals of the greenhouse gases listed in Section A of Annex I to Regulation 2018/841.

|                       |                     |        |
|-----------------------|---------------------|--------|
|                       | Managed Forest Land | -4283  |
|                       | Sum annual          | -2098  |
| <b>Croatia</b>        | Deforested Land     | 22     |
|                       | Afforested Land     | -266   |
|                       | Managed Cropland    | -1,478 |
|                       | Managed Grassland   | -147   |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | -1941  |
|                       | Sum annual          | -1493  |
| <b>Cyprus</b>         | Deforested Land     | 8      |
|                       | Afforested Land     | -17    |
|                       | Managed Cropland    | -4     |
|                       | Managed Grassland   | 7      |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | 72     |
|                       | Sum annual          | 66     |
| <b>Czech Republic</b> | Deforested Land     | 285    |
|                       | Afforested Land     | -586   |
|                       | Managed Cropland    | -25    |
|                       | Managed Grassland   | -148   |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | 15201  |
|                       | Sum annual          | 14727  |
| <b>Denmark</b>        | Deforested Land     | 153    |
|                       | Afforested Land     | -1174  |
|                       | Managed Cropland    | -1230  |
|                       | Managed Grassland   | 411    |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | -2708  |
|                       | Sum annual          | -4547  |
| <b>Estonia</b>        | Deforested Land     | 397    |
|                       | Afforested Land     | -324   |
|                       | Managed Cropland    | 588    |
|                       | Managed Grassland   | 81     |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | 2208   |
|                       | Sum annual          | 2950   |
| <b>Finland</b>        | Deforested Land     | 2979   |
|                       | Afforested Land     | -180   |
|                       | Managed Cropland    | 905    |
|                       | Managed Grassland   | -101   |
|                       | Managed Wetland     |        |
|                       | Managed Forest Land | 15146  |

|                |                     |          |
|----------------|---------------------|----------|
|                | Sum annual          | 18749    |
| <b>France</b>  | Deforested Land     | 11379    |
|                | Afforested Land     | -10418   |
|                | Managed Cropland    | -7079    |
|                | Managed Grassland   | 146      |
|                | Managed Wetland     |          |
|                | Managed Forest Land | 35688    |
|                | Sum annual          | 29717    |
| <b>Germany</b> | Deforested Land     | 1735     |
|                | Afforested Land     | 153      |
|                | Managed Cropland    | 171      |
|                | Managed Grassland   | 1474     |
|                | Managed Wetland     | 48       |
|                | Managed Forest Land | -16308   |
|                | Sum annual          | -12728   |
| <b>Greece</b>  | Deforested Land     | 44       |
|                | Afforested Land     | 4        |
|                | Managed Cropland    | -555     |
|                | Managed Grassland   | -1613    |
|                | Managed Wetland     |          |
|                | Managed Forest Land | -181     |
|                | Sum annual          | -2303    |
| <b>Hungary</b> | Deforested Land     | 380      |
|                | Afforested Land     | -1148    |
|                | Managed Cropland    | 362      |
|                | Managed Grassland   | 173      |
|                | Managed Wetland     |          |
|                | Managed Forest Land | -6412    |
|                | Sum annual          | -4096    |
| <b>Ireland</b> | Deforested Land     | 64       |
|                | Afforested Land     | -3021    |
|                | Managed Cropland    | -210     |
|                | Managed Grassland   | 235      |
|                | Managed Wetland     | -183     |
|                | Managed Forest Land | 747      |
|                | Sum annual          | -2367    |
| <b>Italy</b>   | Deforested Land     | 1961     |
|                | Afforested Land     | -4430    |
|                | Managed Cropland    | 408,13   |
|                | Managed Grassland   | 1390,004 |
|                | Managed Wetland     |          |
|                | Managed Forest Land | -5715    |
|                | Sum annual          | -6385    |

|                    |                     |       |
|--------------------|---------------------|-------|
| <b>Latvia</b>      | Deforested Land     | 1084  |
|                    | Afforested Land     | -182  |
|                    | Managed Cropland    | 27    |
|                    | Managed Grassland   | -488  |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | -1936 |
|                    | Sum annual          | -471  |
| <b>Lithuania</b>   | Deforested Land     | 143   |
|                    | Afforested Land     | -1183 |
|                    | Managed Cropland    | -2439 |
|                    | Managed Grassland   | 1014  |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | -1755 |
|                    | Sum annual          | -4152 |
| <b>Luxembourg</b>  | Deforested Land     | 45    |
|                    | Afforested Land     | -13   |
|                    | Managed Cropland    | -36   |
|                    | Managed Grassland   | 30    |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | -217  |
|                    | Sum annual          | -191  |
| <b>Malta</b>       | Deforested Land     | -0,4  |
|                    | Afforested Land     | -0,3  |
|                    | Managed Cropland    | -8    |
|                    | Managed Grassland   | 5     |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | 0,0   |
|                    | Sum annual          | -4    |
| <b>Netherlands</b> | Deforested Land     | 777   |
|                    | Afforested Land     | -493  |
|                    | Managed Cropland    | -811  |
|                    | Managed Grassland   | -873  |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | 84    |
|                    | Sum annual          | -1316 |
| <b>Poland</b>      | Deforested Land     | 336   |
|                    | Afforested Land     | -1803 |
|                    | Managed Cropland    | 736   |
|                    | Managed Grassland   | -153  |
|                    | Managed Wetland     |       |
|                    | Managed Forest Land | 3085  |
|                    | Sum annual          | 2202  |
| <b>Portugal</b>    | Deforested Land     | 743   |

|                 |                     |        |
|-----------------|---------------------|--------|
|                 | Afforested Land     | -1670  |
|                 | Managed Cropland    | -817   |
|                 | Managed Grassland   | -801   |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | 7725   |
|                 | Sum annual          | 5180   |
| <b>Romania</b>  | Deforested Land     | 1143   |
|                 | Afforested Land     | -1582  |
|                 | Managed Cropland    | -12993 |
|                 | Managed Grassland   | -3920  |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | -6828  |
|                 | Sum annual          | -24180 |
| <b>Slovakia</b> | Deforested Land     | 60     |
|                 | Afforested Land     | -344   |
|                 | Managed Cropland    | -131   |
|                 | Managed Grassland   | 263    |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | -1516  |
|                 | Sum annual          | -1668  |
| <b>Slovenia</b> | Deforested Land     | 270    |
|                 | Afforested Land     | -177   |
|                 | Managed Cropland    | -30    |
|                 | Managed Grassland   | 194    |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | 309    |
|                 | Sum annual          | 566    |
| <b>Spain</b>    | Deforested Land     | 1366   |
|                 | Afforested Land     | -10008 |
|                 | Managed Cropland    | -3864  |
|                 | Managed Grassland   | 185    |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | 1244   |
|                 | Sum annual          | -11077 |
| <b>Sweden</b>   | Deforested Land     | 1780   |
|                 | Afforested Land     | -1099  |
|                 | Managed Cropland    | -845   |
|                 | Managed Grassland   | 343    |
|                 | Managed Wetland     |        |
|                 | Managed Forest Land | -6799  |
|                 | Sum annual          | -6620  |
| <b>EU total</b> | Sum annual          | -14073 |

**Table 14:** LULUCF total final accounted (2021), approximated accounted (2022), and projected accounted (2023-2025) emissions and removals, as reported by Member States, and average per year over the five year period (2021-2025) (ktCO<sub>2</sub>-eq)<sup>90</sup>

| Country     | Avg per year | Accounted | Approximated | Projection |          |           | Scenario |
|-------------|--------------|-----------|--------------|------------|----------|-----------|----------|
|             |              | 2021      | 2022         | 2023       | 2024     | 2025      |          |
| Austria     | -3591,68     | -2862,96  | -2862,96     | -4077,48   | -4077,48 | -4077,48  | WEM      |
| Belgium     | 125,68       | 329,33    | 329,33       | -10,0852   | -10,09   | -10,09    | WAM      |
| Bulgaria    | -1754,25     | -2098,08  | -2140,75     | -1510,82   | -1510,82 | -1510,82  | WEM      |
| Croatia     | -2507,10     | -1492,88  | -1492,88     | -3183,26   | -3183,26 | -3183,26  | WAM      |
| Cyprus      | 65,23        | 65,59     | 64,87        |            |          |           |          |
| Czechia     | 12259,88     | 14727,37  | 11501,13     | 11690,3    | 11690,30 | 11690,30  | WEM      |
| Denmark     | -3346,69     | -4546,77  | -4546,77     | -2546,63   | -2546,63 | -2546,63  | WEM      |
| Estonia     | 2342,85      | 2950,29   | 2945,04      | 1939,634   | 1939,63  | 1939,63   | WAM      |
| Finland     | 6551,58      | 18748,71  | 17298,99     | -1096,6    | -1096,60 | -1096,60  | WEM      |
| France      | 18121,45     | 29716,49  | 29852,80     | 10345,98   | 10345,98 | 10345,98  | WEM      |
| Germany     | -34744,99    | -12728,04 | -18542,61    | -47484,8   | -        | -47484,80 | WEM      |
| Greece      | -1530,51     | -2302,50  | -2148,95     | -1067,03   | -1067,03 | -1067,03  | WEM      |
| Hungary     | -3183,58     | -4870,69  | -4319,96     | -2242,42   | -2242,42 | -2242,42  | WEM      |
| Ireland     | -1537,66     | -2367,36  | -2400,55     | -973,463   | -973,46  | -973,46   | WAM      |
| Italy       | -15295,83    | -6384,88  | -10598,54    | -19831,9   | -        | -19831,90 | WEM      |
| Latvia      | -128,85      | -470,80   | 1324,64      | -499,36    | -499,36  | -499,36   | WAM      |
| Lithuania   | -2067,48     | -4152,13  | -4197,62     | -662,55    | -662,55  | -662,55   | WAM      |
| Luxembourg  | -389,40      | -190,66   | -331,92      | -474,81    | -474,81  | -474,81   | WAM      |
| Malta       | 1,66         | -3,72     | -3,74        | 5,25       | 5,25     | 5,25      | WEM      |
| Netherlands | -1154,88     | -1316,29  | -1244,81     | -1071,11   | -1071,11 | -1071,11  | WEM      |
| Poland      | -8944,32     | 2201,78   | 2011,04      | -16311,50  | -        | -16311,50 | WEM      |
| Portugal    | 4527,88      | 5180,34   | 4912,15      | 4182,30    | 4182,30  | 4182,30   | WEM      |
| Romania     | -27443,07    | -24180,13 | -25436,46    | -29199,60  | -        | -29199,60 | WEM      |
| Slovakia    | -727,92      | -1667,97  | -1883,41     | -29,41     | -29,41   | -29,41    | WAM      |
| Slovenia    | 1185,51      | 565,52    | 959,85       | 1467,40    | 1467,40  | 1467,40   | WAM      |
| Spain       | -8344,68     | -11076,96 | -11053,71    | -6530,90   | -6530,90 | -6530,90  | WAM      |
| Sweden      | -4397,58     | -6619,63  | -6623,85     | -2914,80   | -2914,80 | -2914,80  | WEM      |

<sup>90</sup> Values show total accounted cumulative emissions and removals (kt CO<sub>2</sub>-eq) (as reported under Annex XXV table 5b Governance Regulation), and the average per year over the five-year period (2021-2025). 2021 emissions/removals are based on the final accounted value calculated from inventory reports, 2022 emissions/removals are accounted values calculated from approximated inventory reports. For 2023-2025 emissions are based on the most recent WAM emissions projections reports, or in the absence of WAM projections the WEM projections are used. LULUCF Managed Forest land, including harvested wood products assuming instantaneous oxidation where available is used.

## 10 HORIZONTAL ASSESSMENT OF COLLECTIVE PROGRESS OF MEMBER STATES ON CLIMATE ADAPTATION<sup>91</sup>

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In recent year Europe has been confronted with severe climate hazards that have deeply impacted people, ecosystems, and economies. Adapting to the present, and preparing society for the future, climate hazards is of critical importance.

Achieving a climate resilient Europe with communities equipped to deal with the unavoidable impacts of climate change is at the heart of EU's climate policy and its European Climate Law. Article 5.1 of this law obliges the relevant Union institutions and the Member States to ensure continuous progress in enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change. Article 6.1.b requires the Commission to assess the collective progress made by all Member States on climate adaptation, which is the objective of this report. In this section, we assess the state of our collective efforts, delving into the specifics of the progress made by Member States and our trajectory towards a healthy, safe, and resilient future.

### 10.1 CLIMATE-RELATED HAZARDS, VULNERABILITIES, AND RISK

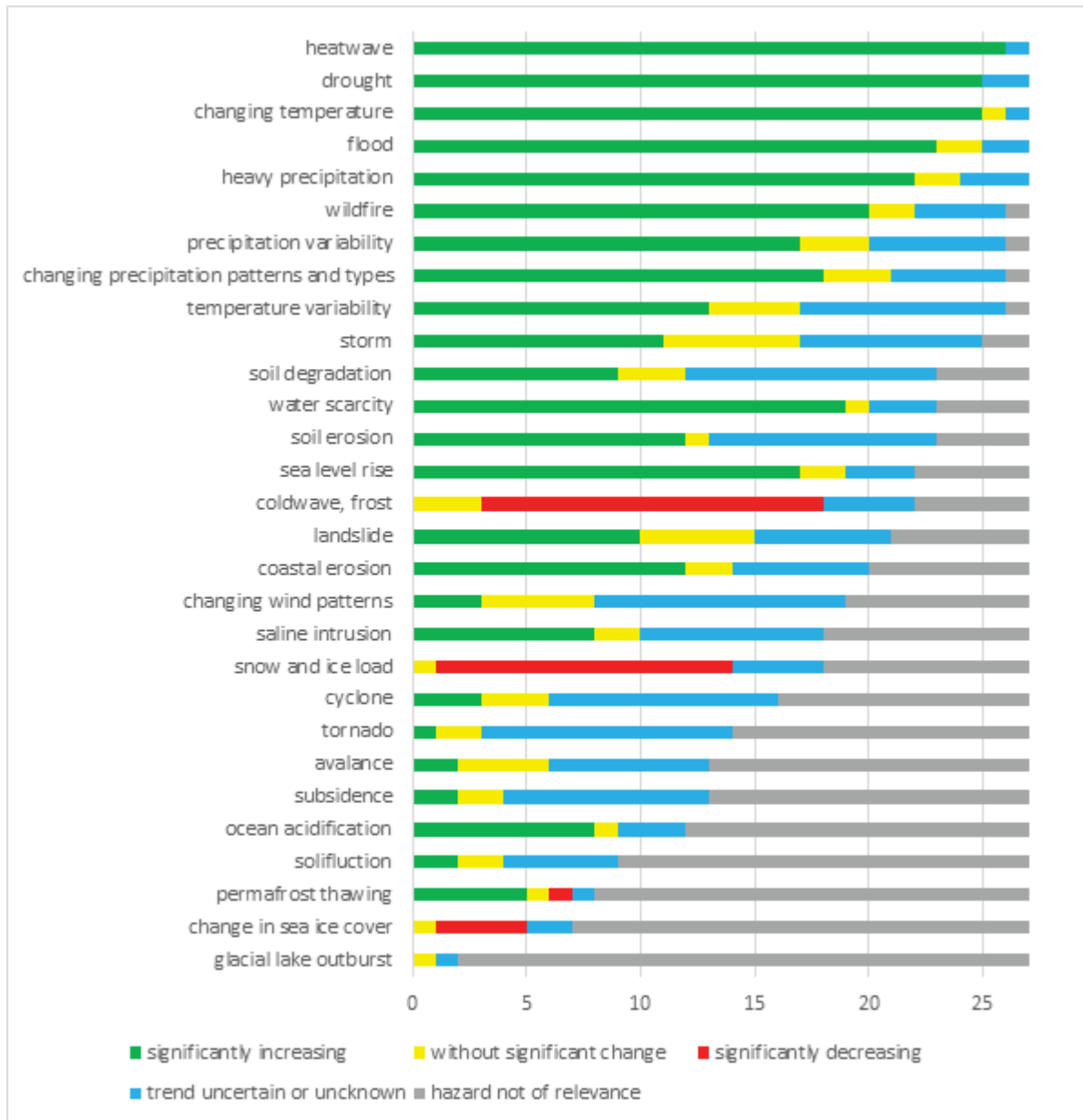
Member States reported heatwaves, droughts, floods, heavy precipitation, and wildfires as the most observed acute (i.e., sudden) climate hazards in Europe, while changing average temperatures and variability in temperature, precipitation and hydrology remain the most often reported observed chronic (i.e., persistent) climate hazards. With a few region-specific exceptions, there are no significant geographical differences in the reported hazards.

Expected future hazards mirror the current observations, with Member States' projections foreseeing a significant increase of heatwaves, droughts, floods, heavy precipitation, and wildfires among the acute hazards and changing temperature, water scarcity, changing precipitation patterns and types, sea level rise, and precipitation and hydrological variability among the chronic hazards. Member States reported that some hazards will be less frequent and/or intense in the future, such as cold spells, and change in snow and ice load. With a few exceptions, the hazards reported as expected future hazards are the same as the observed hazards. The biggest difference can be found for the chronic water-related hazard water scarcity, reported by seven more countries as a future key hazard compared to being an observed hazard.

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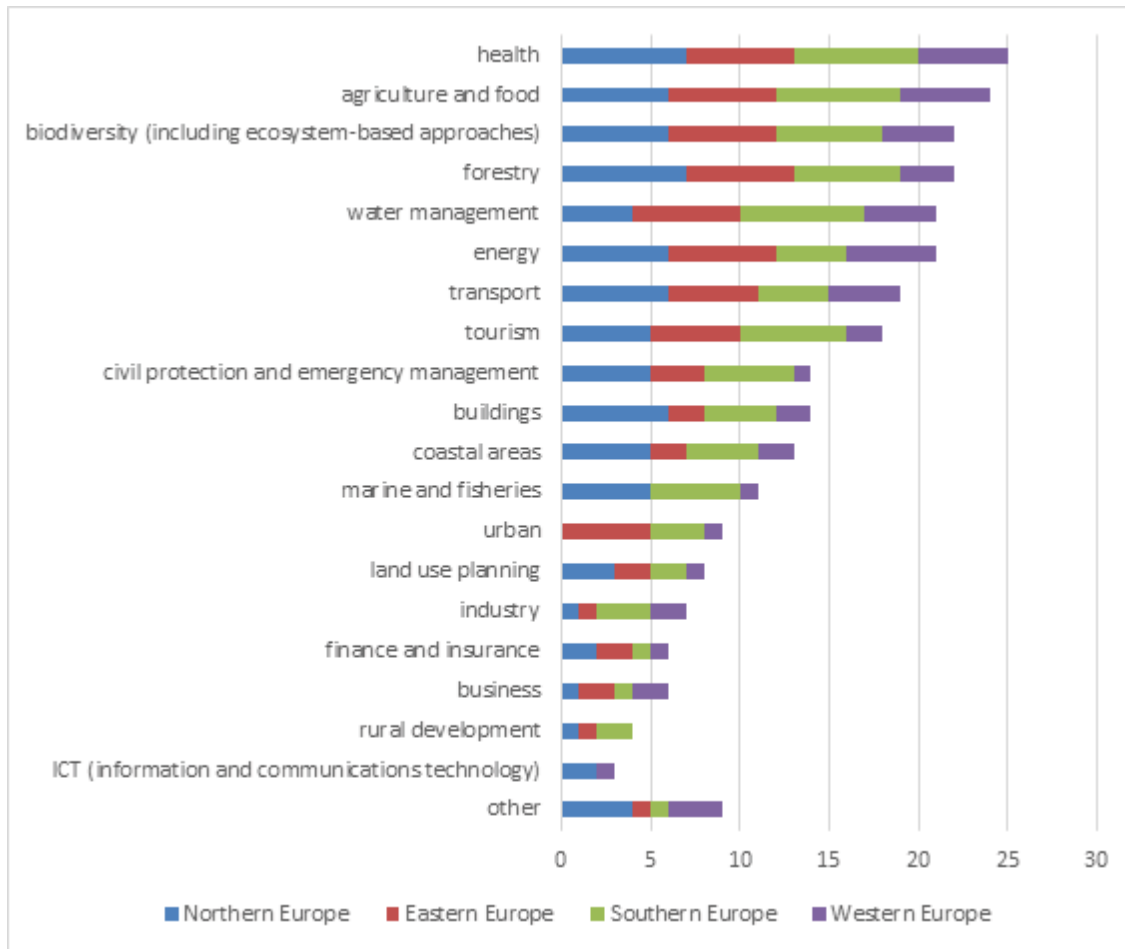
<sup>91</sup> This assessment is based on diverse sources, including the reporting of the Member States under art.17 and 19 on the Governance Regulation 2023, the EEA briefing "[National adaptation action in 2023 - is Europe on track towards climate resilience?](#)" and the ETC/CA technical report "[Is Europe on track with climate resilience? - Status of reported national adaptation actions in 2023](#)".

Figure 10. Key future hazards reported



source: [EEA Briefing 'National adaptation actions in 2023 - is Europe on track towards climate resilience?'](#)

**Figure 11.** Key affected sectors per geographical area



source: [EEA Briefing 'National adaptation actions in 2023 - is Europe on track towards climate resilience?'](#)

The sectors reported as being the most impacted by climate threats in Europe are health, agriculture, forestry, biodiversity, energy, and water management. In the future, Member States expect a high risk of being impacted by climate change for 45% of the key affected sectors, while for 31% of the sectors the future risk is expected as ‘medium’.

In the case of 21 Member States the identification and reporting of relevant vulnerabilities and risks is fully in line with those indicated in the INFORM climate change-tool<sup>92</sup>, while the correspondence is partial in the case of five Member States.

<sup>92</sup> Analyses based on the INFORM-tool at the Disaster Risk and Knowledge Management Centre of the European Joint Research Centre (JRC).

The hazards and affected key sectors reported by the Member States stemming from their climate vulnerability and risk assessments are overall in line with their reporting in the field of disaster risk management.<sup>93</sup>

## 10.2 CLIMATE RISK ASSESSMENTS

Member States reported further progress in assessing climate-related hazards, vulnerabilities<sup>94</sup> and risks, confirming that enhancement, expansion and deepening of the knowledge base on climate risks is a continuous process in many countries. From 2021 onwards a significant share of Member States (16) updated existing or conducted new climate risk and vulnerability assessments or obtained new climate risk-related information considered relevant for the national and sub-national policy-making perspective.

Different forms of climate risk assessments (CRA) or related knowledge products can be distinguished: national multi- or cross-sectoral climate risk assessments (or climate change assessments), thematic or sector-specific assessments at national scale, and sub-national climate risk assessments. From 2021 onwards, 14 of the Member States have conducted one or more of these forms of CRA.

The process of conducting CRA is recognized as time and resource-intensive, which might be a reason for the persistent disparities between countries that are advanced in CRA and those that are still lagging. Only 7 Member States have begun to tackle strategic knowledge gaps that are crucial to a more systemic adaptation (i.e., cross-border and international climate risks; cross-sectoral interactions; complex, compound, and cascading risks), however at rather low pace and to a limited extent.

Regarding governance, CRA and their periodic review have been increasingly institutionalized through new or enhanced legal requirements, often established under national climate laws. However, countries with legal commitments still represent a minority (see below).

Two thirds of the countries are either already engaged in ongoing work towards revising and updating their CRA or will report about respective plans soon.

Only two Member States indicated that they are working towards standardisation of their CRA, and in many countries, CRA and monitoring, reporting, and evaluation systems appear to be rather separate and parallel processes. Lack of data, knowledge, and information remain the most frequently reported barriers to progress in adaptation, including CRA. These gaps include inadequate identification of climate risks, limited capacity for systemic risk assessments, inadequate identification of climate risks and translation of climate risk information into practical

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<sup>93</sup> and the Member State's reports of summary information on national risk assessment under the Union Civil Protection Mechanism, article 6 Decision (EU) 1313/2013

<sup>94</sup> Vulnerability: the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (source: IPCC, Assessment Report 6, WG 2 report, Glossary).

solutions. It is recognized that these barriers hampering progress in CRA appear to stem from limitations in financial and human resources, further emphasizing the resource-intensive nature of CRA.

### **10.3 ADAPTATION POLICIES AND PRIORITIES**

Climate change adaptation policies in the European Union are constantly evolving, with five Member States having established new national adaptation strategies (NAS) and/or national adaptation plans (NAP) since 2021, and 12 Member States being in the process of updating their NAS and/or NAP or otherwise re-adjusting the respective policy setting. Compared to 2021, the adaptation priorities have not changed significantly. About half of the Member States reported their priorities in sectoral terms, the other half did so in terms of general objectives. As of 2023, the priority sectors most mentioned by Member States are health, biodiversity, water management, energy, agriculture and food and transport.

Increasingly, national policies are referring to European programs under the Multiannual Financial Framework 2021-2027, as well as the policies that constitute the Green Deal framework.

European legislation, such as the European Climate Law, is inspiring a growing number of countries to enact climate laws. At least eight Member States have climate laws that include provisions for adaptation, with six countries having newly introduced or amended them since 2021 while two countries are in the process of adopting one. The climate acts comprise of legal mandates for the NAS and/or NAP, obligatory climate risk assessments, review and revision cycles of policy documents and CRA, political and coordination policies, horizontal and vertical coordination bodies, scientific advisory bodies, and reporting requirements. Apart from the traditional NAS and NAP and climate laws, countries are also enacting additional legislative instruments that complement the adaptation policy framework.

Thirteen Member States were found to clearly link their adaptation plans and strategies to the climate vulnerabilities and risks they were facing, particularly in key affected sectors.

Two thirds of the Member States responded to new challenges by increasing efforts in their policies, 11 countries also at subnational level. Priorities for adapting to climate change reported by the countries are overall consistent with those reported in 2021, reflecting the long-term nature of adaptation policies. However, small shifts have been observed, notably the increased prioritization of the energy sector and coastal areas. The even distribution of priority areas reported among the four European geographic areas<sup>95</sup> as well as the listing of sectors, both in priority and as key affected sector are consistent with the previous reporting cycle. The health sector remains both a key affected sector and a priority across all reporting countries.

It is worth noting that the level and manner of integration of adaptation policies vary widely, reflecting differing national circumstances, governance structures, and institutional frameworks.

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<sup>95</sup> The geographical areas classification of countries encompasses the following: Northern = Denmark, Estonia, Finland, Ireland, Latvia, Lithuania and Sweden; Eastern = Bulgaria, Czechia, Hungary, Poland, Romania and Slovakia; Southern = Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia and Spain; and Western = Austria, Belgium, France, Germany, Luxembourg and the Netherlands.

There is a prevalence of soft policies and voluntary cooperation, but one can detect an increasing trend towards legally binding national climate laws.

Almost all Member States (23) reported challenges, gaps and barriers related to the governance of adaptation. Shortcomings in organizing and implementing coordination and collaboration across sectors, levels and actors are among the most prevalent identified issues and appear to hamper implementation progress considerably. Effective adaptation actions appear not only to be dependent on the existence of coordination bodies, cooperation structures and regulatory frameworks, but also on the existence of clear responsibilities, awareness, and high political saliency. Insufficient coordination is often a direct consequence of a lack of financial resources, institutional and administrative capacities, expertise, skills, and training.

In conclusion, the policy landscape is characterized by a combination of continuity in long-term priorities, increasing alignment with European frameworks, evolving legislative instruments, incremental shifts in policy focus, and grappling with the challenges, gaps, and barriers to the governance of adaptation.

## **10.4 ADAPTATION POLICY GOVERNANCE**

### **Institutional arrangements at national and subnational levels**

Diverse national coordination bodies and mechanisms for horizontal policy integration and multi-level (vertical) coordination have been further developed and are now in place in almost all Member States. At the same time, governance systems for climate adaptation display a large and dynamic diversity, both across and within countries, where developments have taken place since the 2021 reporting in two-thirds of the Member States.

Legal requirements to enforce horizontal policy integration and binding vertical governance frameworks are increasing, however, ‘soft’ and collaboration-based forms of government still prevail. In at least eight Member States legislation is in place that defines binding requirements for the planning, implementation, and governance of adaptation to climate change policy.

High-level inter-ministerial or inter-sectoral coordination bodies concerned with developing, steering, monitoring, and reviewing national adaptation policies are established in 25 Member States. However, the mandates and the operational efficiency of these bodies vary.

Subnational adaptation policymaking is further progressing in all countries. Two-thirds of Member States reported progress since 2021 about cooperation at the subnational level, and about half of Member States indicate progress in reviewing and updating subnational adaptation policies, strategies, and plans.

Only nine Member States legally oblige regional, and local governments to prepare adaptation strategies and/or plans. ‘Soft’, collaboration-based forms of vertical steering for subnational levels are still more common than top-down regulatory frameworks and obligation for adaptation policymaking at the subnational level.

All Member States have a supportive governance framework for subnational levels in place, comprising policy inputs, capacity building (knowledge generation and provision, advisory services, and training), cross-level dialogue, support for participation in networks, as well as funding and financing. The presence of this framework is independent from the type of vertical steering present, be it either collaboration-based or top-down regulatory frameworks.

### **Subnational**

The number of cities and municipalities with a local adaptation strategy and/or plan is increasing. A number of these local entities are signatories of the Covenant of Mayors, which offers active support in developing these strategies and plans. Countries also report the growing involvement of local and regional authorities in the EU Horizon Europe Mission on adaptation to climate change.

Regarding the implementation of adaptation, almost all countries reported substantial barriers, gaps and challenges, in terms of institutional, financial, technical, and human capacities. More than half of all countries report gaps in coordination, cooperation, and policy coherence, which are often connected to unclear division of responsibilities, lack of awareness and low political attention.

### **International and transnational cooperation**

In most countries, international and transnational cooperation on adaptation issues continues to advance with a large number and diversity of forms and modes. In Europe, three types of transnational/international cooperation can be distinguished: managing transboundary climate risks, managing shared cross-border resources (e.g., river basins, maritime and coastal environment, and biodiversity), and coordinating national adaptation policies and actions across borders. Progress has been made by 19 Member States on international and transnational cooperation.

Major international conventions and multilateral policy frameworks addressing climate adaptation (e.g., Paris Agreement, UN Sendai Framework, Sustainable Development Goals) continue to play a crucial role in all countries, facilitating the strengthening of links between climate adaptation, sustainable development, and disaster risk reduction. One-third of the Member States reported new synergies in this field since 2021.

EU funding schemes for transnational cooperation (e.g., EU Interreg Programmes) and research (e.g., Horizon Europe, LIFE) continue to be strong enablers of transnational adaptation efforts for most Member States. These programmes bolster national policy processes and stimulate the development and implementation of innovative climate resilience measures across borders. Several countries reported the involvement of regional and local governments in the EU Horizon Europe Mission on Adaptation to Climate Change. This Mission focuses on supporting EU regions, cities, and local authorities in their efforts to build resilience against the impacts of climate change. It experiments with innovative solutions and pays specific attention to supporting

transnational cooperation and citizens engagement. Over 300 regional and local authorities from 25 EU Member States have signed the Mission Charter.<sup>96</sup>

### **Stakeholder engagement**

The regular consideration of social justice and equity in adaptation measures is still nascent, highlighting a key area of focus in the future, to address the disproportionate impacts of climate change on vulnerable groups.

Progress in adaptation policy-related stakeholder engagement was found across 20 Member States. Examples of progress include the introduction of climate platforms, climate dialogues, and urban adaptation plans.

15 Member states are reporting an increase in attention to vulnerable populations, equality, and fairness, both at the national and the subnational level since 2021. With a quarter of the Member States reporting that they have made progress in this field since 2021, they are also stepping up their efforts to involve the private sector in the development and implementation of national adaptation policies. Various resources are provided to assist the private sector, such as online platforms, climate-related information seminars, and sector-specific risk assessment tools. Governments also finance adaptation projects to spur innovation in the private sector.

Seven Member States pointed to elements of new ‘good practices and lessons learnt’ such as Portugal’s National Vector Surveillance Network in the health sector or Austria’s peatland restoration projects.

## **10.5 IMPLEMENTATION AND FINANCING**

*Mainstreaming* – or integrating - climate adaptation into different sectoral policies and plans is a crucial element of climate adaptation policy, and a specific objective of the EU Adaptation Strategy.

Compared to the 2021 reporting cycle, the number of Member States that reported mainstreaming of climate change into sectors or sectoral policies and plans directly affected by climate change impacts have further increased to 16. Some Member States increased the number of sectors considered considerably, most commonly transport, infrastructure, health, forestry, and water management.

Significant progress has been made in integrating climate change impacts into national disaster risk management frameworks and sectoral planning, such as national disaster risk management plans, flood risk management plans, and river basin management plans.

Seven countries report NAP and sectorial adaptation plans as key policy instruments that support effective integration (mainstreaming) of adaptation into national and sectoral policies, strategies, and plans.

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<sup>96</sup> More information on the EU Mission on Adaptation to Climate Change, including the Mission Charter, can be found on <https://climate-adapt.eea.europa.eu/en/mission/>

The environmental impact assessment and especially the strategic environmental assessment are also instrumental in mainstreaming adaptation into sectoral policies and plans. Member states reported further progress in the availability of helping tools for the application of these instruments, such as online tools, checklists, and guidance.

More than half of Member States reported that since 2021 they have made progress with implementing adaptation measures. Regarding progress made in meeting adaptation priorities since 2021, more than half of Member States replied positively as well.

Efforts to boost adaptive capacity and reduce vulnerability have become more prevalent, with countries implementing a range of activities such as awareness-raising, capacity building, knowledge enhancement, and regional and local support. 16 Member States reported to have increased their adaptive capacity in 2023 compared to that in 2021. These efforts are further bolstered by sectoral programs and plans, the strengthening of local activities, like local adaptation strategies and plans and the alignment of research efforts with national adaptation priorities. As a result, more than half of Member States reported that since 2021 they have made progress towards reducing their climate impacts, vulnerabilities, and risks as well as increasing their adaptive capacity.

Assessing the investments made in different sectors to make it more resilient to climate threats remains a challenge for many Member States and is often only done partly (e.g., at national, regional level and/or sectoral level). Challenges are exacerbated by the absence of a common methodology to assess the investments costs made and to track financing of implementation of adaptation strategies and plans. Despite these difficulties, all Member States report an increase in investments made in sectors due to adaptation.

Most countries indicate that their NAS, NAP, sectoral adaptation plans, and regional adaptation plans do not have dedicated budgets or financing streams for their implementation. Also, the majority of countries report that dedicated adaptation funds for financing adaptation action are lacking, although the number of Member States that have these funds is on the rise.

## **10.6 MONITORING, REPORTING, AND EVALUATION**

For monitoring, 18 Member States reported that they were conducting activities while 5 Member States were developing these activities (remaining 6 Member States for which there was no clear indication of monitoring activities or was insufficient information available). For reporting, 17 Member States reported conducting activities and 4 developing them (remaining 8 with no clear indication or insufficient information). And for evaluation, 11 Member States reported activities and 10 reported being developing them (remaining 8 with no clear indication or insufficient information). Although more countries are conducting or planning evaluations, these are still less commonly reported than monitoring or reporting activities.

Many Member States have incorporated monitoring, reporting, and evaluation in their NAS and NAP. These activities also take place as part of regional adaptation strategies and plans on a regional and local scale. Overall, half of the Member States reported an increase in monitoring, reporting and evaluation activities since 2021, at the national, regional, and local level. However,

the scale and depth of monitoring, reporting and evaluation activities for adaptation at subnational level varies. Seven Member States indicate that the monitoring and evaluation of actions implemented on a subnational scale are conducted in conjunction with the NAP and NAS, while 13 other Member States state that municipalities and regions are responsible themselves for the implementation and evaluation of their respective strategy or measures at regional and local level. So, in most countries, the subnational monitoring and evaluation process is not formally linked to national level planning.

Over three-quarters of Member States have made progress in reviewing and updating national adaptation policies, strategies, plans and measures. In some cases, laws have been adopted to ensure NAS are regularly reviewed, often every five years.

Using various methodological approaches and combining quantitative and qualitative data are key to effective monitoring, reporting and evaluation. Several countries highlighted the important role of indicators and reported on the new development of criteria for monitoring reduction of climate impacts, vulnerabilities, and the implementation of adaptation measures. Some countries prioritize developing multi-purpose indicators, which benefit more than one sector. Also, the development of performing qualitative assessments and evaluations, in close cooperation with stakeholders, was reported. While most of the Member States have implemented changes to their climate monitoring and modelling framework since 2021, more progress can be expected in the upcoming years.

Monitoring, reporting, and evaluation occurring at national, regional, and local level has the potential to be a powerful instrument to influence decision-making throughout the adaptation policy cycle.

Still, few Member States explicitly report how monitoring, reporting and evaluation is supposed to feed back into the development of adaptation policies or how and by whom the activities are coordinated. When it comes to good practices, most Member States that reported progress imply that the role of a coordinating actor, such as a ministry, governmental agency, or an institute of environmental protection (or such) is often significant when both scaling up the adaptation actions or when evaluating their progress.

## **10.7 CONCLUSIONS**

Climate adaptation measures are almost always tailored towards the specific sector and the local conditions. However, the sum of all the activities defines the resilience of a territory or a country to the unavoidable impacts of climate change. Also, the threats and impacts of climate change are not restricted to national or regional borders; if a country or region does not take appropriate action, climate impacts may cascade to neighbouring areas. Through an analysis of the reporting of Member States of their progress in the field of climate adaptation, it has been possible to pinpoint areas of success, identify potential gaps and shortfalls, and determine the best practices to be adopted, replicated, and scaled across different regions.

Member States reported heatwaves, droughts, floods, heavy precipitation, and wildfires as the most observed acute climate hazards in Europe, while changing temperature, changing precipitation patterns, sea level rise and hydrological variability among the most often reported observed

chronic climate hazards. Anticipated future hazards are the same as the observed hazard, with exception for water scarcity, reported by seven more countries as a future key hazard compared to being an observed hazard.

Health, agriculture, forestry, biodiversity, energy, and water management are the sectors reported as being the most impacted by climate threats in Europe.

Almost all Member State have carried out climate risk assessments, 14 of these have been updated in recent years, and the rest are scheduled for updates soon.

All Member States have national adaptation strategies (NAS) and/or national adaptation plan (NAP) in place. A considerable part of these strategies and plans have recently been renewed or are under revision and will be renewed in the coming years. Also, more national sectoral adaptation plans have been adopted. The policy landscape is characterized by a combination of continuity in long-term priorities, increasing alignment with European frameworks, evolving legislative instruments, incremental shifts in policy focus, and grappling with challenges, gaps, and barriers to the governance of adaptation.

National and subnational governance structures and mechanisms for horizontal policy integration and multi-level (vertical) coordination have been further developed and are now predominantly in place, with regular review cycles. The mandates and operational features of these bodies vary greatly. Despite the growing number of Member States (specifically, 8 Member States) embedding vital elements of their adaptation policy systems in binding legal frameworks, soft and collaboration-based forms of vertical and horizontal governance still predominate. The variety in mandates and operational features is also caused by the difference in governance structures cooperation culture. Some countries have tasked dedicated adaptation working groups (as permanent bodies or temporary task force-type groups) of coordination at technical and operational level. In some countries, the development of NAS and NAP is steered by several thematic working groups, while in other countries this competence of the inter-ministerial working group.

On international and transnational cooperation, progress has been made in two-thirds of the countries. The regular consideration of social justice and equity in adaptation measures is still nascent, highlighting a key area of focus in the future, to address the disproportionate impacts of climate change on vulnerable groups. Progress in adaptation policy-related stakeholder engagement was found across two-thirds of the Member States.

Member States are progressing in the implementation of adaptation measures, including mainstreaming of adaptation in sectoral policies and plans. Significant progress has been made in integrating climate change impacts into national disaster risk management frameworks and sectoral planning. Assessing the costs of adaptation remains a challenge for many Member States and is often only done partially. NAP and NAS often do not have dedicated budgets or financing streams for their implementation, nor do most countries have dedicated adaptation funds for financing adaptation action.

Half of the Member States reported an increase in monitoring, reporting and evaluation activities since 2021, at the national, regional, and local level.

Understanding our progress towards the climate adaptation objective is not only a mechanic exercise of accountability, but also a critical step in designing a better future course of action. Together, as the Union and the Member States, we must continuously refine our approach to climate resilience, enhance cooperation and share good practices. Our path involves amplifying our use of existing solutions and infusing innovation to bolster systemic climate resilience. In doing so, we aim to protect our communities, safeguard the environment, and fortify the economic foundations that depend on them, especially in the face of escalating climate challenges.

**Figure 12.** Overview of progress made since 2021 for a set of adaptation policy indicators (summary view)



**Table 15 :** List of full questions examined for each indicator.

| Questions                                                                                                                                                                                           | Possible values                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <b>SECTION 1.1, 1.2: NATIONAL CIRCUMEMBER STATESTANCES RELEVANT TO ADAPTATION ACTIONS AND CLIMATE MONITORING AND MODELLING FRAMEWORK</b>                                                            |                                                                  |
| 1. Have there been any changes to the climate monitoring and modelling framework since 2021?                                                                                                        | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| <b>SECTION 1.3: ASSESSMENT OF CLIMATE IMPACTS, VULNERABILITY AND RISKS, INCLUDING ADAPTIVE CAPACITY</b>                                                                                             |                                                                  |
| 2. Has the Member State considered the following sectors as a key affected sector: agriculture and food, and water management?                                                                      | Yes – Fully, Yes – Partially, No, Unclear - No Submission<br>N/A |
| 3. Have there been any changes to the reported vulnerabilities and risks since 2021?                                                                                                                | Yes, No, Unclear - No Submission, N/A                            |
| 4. Based on the INFORM climate change tool, have all relevant vulnerabilities and risks been identified in their 2023 submission?                                                                   | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 4a. Are heatwaves identified as a future climate hazard by the Member State?                                                                                                                        | Yes, No, Unclear - No Submission, N/A                            |
| <b>SECTION 2: LEGAL AND POLICY FRAMEWORKS AND INSTITUTIONAL ARRANGEMENTS</b>                                                                                                                        |                                                                  |
| 5. Are there relevant national governance structures in place to support adaptation actions?                                                                                                        | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 6. Have there been any changes to the national governance structures since 2021?                                                                                                                    | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| <b>SECTION 3: ADAPTATION STRATEGIES, POLICIES, PLANS AND GOALS</b>                                                                                                                                  |                                                                  |
| 7. Are the adaptation priorities, strategies, policies, plans, and efforts taken by the Member State correlated with the vulnerabilities and risks identified? Are they well aimed to reduce these? | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 8. Is there a decrease in the 2023 reported challenges, gaps and barriers to adaptation compared to 2021?                                                                                           | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 9. Are there any new key efforts identified in national strategies, policies and plans? Are these new efforts in line with any new vulnerabilities and risks identified?                            | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 10. Are nature-based solutions and ecosystem-based adaptation promoted in national strategies, policies and plans?                                                                                  | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A   |
| 11. Has progress been made in integrating climate change adaptation into sectoral policies, plans and programs?                                                                                     | Positive, Neutral (no progress), Negative, Progress is unclear   |

|                                                                                                                                           |                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 12. Has progress been made engaging with stakeholders particularly vulnerable to climate change impacts in relation to adaptation policy? | Positive, Neutral (no progress), Negative, Progress is unclear |
| 13. Has progress been made engaging with private sector stakeholders in relation to adaptation policy?                                    | Positive, Neutral (no progress), Negative, Progress is unclear |
| <b>SECTION 4: MONITORING AND EVALUATION OF ADAPTATION ACTIONS AND PROCESSES</b>                                                           |                                                                |
| 14. Has progress been made in establishing and operationalising monitoring mechanism since 2021?                                          | Positive, Neutral (no progress), Negative, Progress is unclear |
| 15. Has progress been made in the implementation of adaptation measures?                                                                  | Positive, Neutral (no progress), Negative, Progress is unclear |
| 16. Has progress been made towards reducing climate impacts, vulnerabilities, and risks?                                                  | Positive, Neutral (no progress), Negative, Progress is unclear |
| 17. Has progress been made towards increasing adaptive capacity?                                                                          | Positive, Neutral (no progress), Negative, Progress is unclear |
| 18. Has progress been made in meeting adaptation priorities?                                                                              | Positive, Neutral (no progress), Negative, Progress is unclear |
| 19. Has progress been made in addressing barriers to adaptation?                                                                          | Positive, Neutral (no progress), Negative, Progress is unclear |
| 20. Has progress been made in reviewing and updating vulnerability and risk assessments?                                                  | Positive, Neutral (no progress), Negative, Progress is unclear |
| 21. Has progress been made in reviewing and updating national adaptation policies, strategies, plans, and measures?                       | Positive, Neutral (no progress), Negative, Progress is unclear |
| <b>SECTION 5: COOPERATION, GOOD PRACTICES, SYNERGIES, EXPERIENCE AND LESSONS LEARNED IN THE FIELD OF ADAPTATION</b>                       |                                                                |
| 22. Are there any new 'good practices and lessons learnt' compared to 2021?                                                               | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A |
| 23. Are there any new synergies identified with other international frameworks and/or conventions compared to 2021?                       | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A |
| 24. Has progress been made with regards to cooperation?                                                                                   | Positive, Neutral (no progress), Negative, Progress is unclear |
| <b>SECTION 6 - SUBNATIONAL LEVEL INFORMATION</b>                                                                                          |                                                                |
| 25. Are relevant subnational governance structures in place to support adaptation actions?                                                | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A |
| 26. Are there any new key efforts identified in subnational strategies, policies, plans and efforts?                                      | Yes – Fully, Yes – Partially, No, Unclear - No Submission, N/A |

|                                                                                                                        |                                                                |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 27. Has progress been made in engaging with stakeholders in relation to adaptation policy?                             | Positive, Neutral (no progress), Negative, Progress is unclear |
| 28. Has progress been made in reviewing and updating subnational adaptation policies, strategies, plans, and measures? | Positive, Neutral (no progress), Negative, Progress is unclear |
| 29. Has progress been made with regards to cooperation at a subnational level?                                         | Positive, Neutral (no progress), Negative, Progress is unclear |

## 11 OVERVIEW OF SUSTAINABLE FINANCE POLICIES

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Since 2018, the Commission has endeavoured with the **Sustainable Finance Action Plan** to put in place a comprehensive regulatory framework to enable the reorientation of private capital flows to finance the transition towards a sustainable economy<sup>97</sup>. Three core and interdependent objectives underpinned the actions set out in the Action Plan, namely: i) the reorientation of capital flows towards a more sustainable economy; ii) mainstreaming sustainability into risk management and; iii) fostering transparency and long termism (in investment decisions). In 2021, the Commission updated its strategy through the **Renewed Sustainable Finance Strategy**<sup>98</sup> with a view mainstream transition finance considerations into the current regulatory framework. In that context, the Commission published in June 2023 a non-binding recommendation on Transition Finance.<sup>99</sup> This document provides a strict definition of Transition Finance that is aligned with the 1.5°C target and some recommendations for a wide range of stakeholders including inter alia financiers, non-financial corporates and supervisors to highlight how the various components of the EU sustainable finance toolbox can be used to foster the raising of transition finance.

This regulatory framework notably centres around the **EU Taxonomy**, a dynamic tool defining activities that can be considered environmentally sustainable. Most importantly, by defining sustainability at the granular level of economic activities, the Taxonomy allows to monitor the shares of sustainable expenditures and turnover at company level. This in turn allows to compare the sustainability of different companies and of the portfolios exposed to such companies. The Taxonomy follows an iterative process with a first set of activities centring on the Climate Change mitigation and Adaptation objectives adopted in 2021 and a second set of activities contributing to the Water, Circular Economy, Pollution and Biodiversity Objectives adopted in 2023. Together with the Platform on Sustainable Finance, the Commission will keep working on the Taxonomy, to add new activities and to update existing criteria reflecting technological and regulatory changes.

Relatedly, the Commission put in place the first regulations in the world to require sustainability disclosures for corporates and financial market participants. These are respectively the **Corporate Sustainability Reporting Directive (CSRD)** - amending the existing Non-Financial Reporting Directive (NFRD), notably by extending the scope of companies required to disclose on their sustainability impacts and risks in accordance with the double materiality principle – and the **Sustainable Finance Disclosures Regulation (SFDR)**. Regarding the CSRD, the Commission adopted in July 2023 the **European Sustainability Reporting Standards (ESRS)**, a comprehensive set of corporate reporting standards covering 12 environmental, social and governance factors. This set of standards will be complemented in the future with sector-specific reporting standards as well as SME-specific ones. Reporting under this directive will be progressive, starting in 2025 for the 2024 financial year for the corporates already in the scope of the NFRD and rolling out until 2028. Similarly, regarding the SFDR, the Commission adopted in 2022 a set of reporting standards for financial market participants, requiring investors to explain their sustainability strategies, impacts and risks both at entity-level and at financial product-

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<sup>97</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0097>

<sup>98</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0390>

<sup>99</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023H1425>

level.<sup>100</sup> These standards are currently being revised, in part to make them consistent with the upcoming corporate reporting under the CSRD but also to improve their overall usability. Additionally, the Commission has begun a comprehensive review of the SFDR to assess whether and how this framework could be improved. A public consultation will be launched by end 2023.

Relatedly, in August 2022, new requirements on financial advisors and distributors entered into force, providing them to ask for the sustainability preferences of their clients using the Taxonomy.<sup>101</sup> This is an important new development which will only further underscore the existing demand for sustainable and ESG financial products by making the link from retail investors all the way to non-financial corporates through asset managers.

While the aforementioned pieces of legislation provide mostly soft incentives to enable the reorientation of capital flows, the Corporate Sustainability Due Diligence Directive (CSDDD)<sup>102</sup> currently still in the codecision process represents the hardening of sustainable finance policy. Indeed, while the CSRD only requires corporates to disclose on their material sustainability risks and impacts, the CSDDD shall require corporates to act on these risks and impacts by implementing adequate mitigation measures and due diligence. This would be a major step forward in sustainable finance policy and aside from a few isolate cases (e.g France's Loi sur le devoir de vigilance), a world's first, with the potential for the EU to export its environmental and social norms.

In 2023, the Commission adopted a proposal for an ESG Ratings Regulation<sup>103</sup>, aiming as its name suggests, to regulate ESG ratings agencies and ESG service providers. Notably, these will have to disclose on the methodologies used to rate entities, explaining what is rated (risks, impacts or both) and how. Credit ratings are not in the scope of the ESG Ratings Regulation. However, the Commission mandated the European Securities and Markets Authorities (ESMA) to provide its advice by end 2024 on whether and how credit ratings could incorporate sustainability factors.

Sustainable Finance policy also aims at making the financial sector more resilient to sustainability risks. For instance, as of 2023, banks are going to start publishing **sustainability disclosures**, including on their exposure to climate risks, any mitigating actions, and the degree to which their assets are aligned with the green Taxonomy. Furthermore, the proposed changes to the Capital Requirements Regulation shall task the European Banking Authority to consider whether ESG elements need to be factored in when computing **bank capital requirements** (e.g. the introduction of a green supporting factor or a brown penalizing factor). Finally, the European Commission asked in 2023 European **supervisory authorities** to analyze the resilience of the European financial sector against the EU's climate targets for 2030.

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<sup>100</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02022R1288-20230220>

<sup>101</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1253&from=EN>

<sup>102</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0071>

<sup>103</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0314>

## 12 COMMISSION'S ASSESSMENT OF LONG-TERM STRATEGIES

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Stable long-term strategies **are crucial to help achieve the economic transformation needed** and broader sustainable development goals, as well as move towards the long-term climate goals we committed to globally in the Paris Agreement and within the EU with the Climate Law **to reach net zero greenhouse gas emissions by 2050**. Long-term strategies improve the knowledge of the opportunities for transforming our economy, allow the national discussions to mature, build trust within our society and send clear signals to guide investors while raising awareness and ownership of the transformation needed.

The **Governance Regulation**<sup>104</sup> sets out a process for the Member States to prepare, by **1 January 2020**, their first long-term strategies with a perspective of at least 30 years, and new strategies by **1 January 2029** and every 10 years thereafter. Where necessary, Member States should update those strategies every five years.

In September 2022, in view of the substantial delay of **Bulgaria, Ireland, Poland and Romania** in notifying their long-term strategies, the Commission opened formal infringement proceedings and sent letters of formal notice to these countries.<sup>105</sup> The case has been closed for **Bulgaria**, which on 27 October 2022 submitted its strategy, but the other three infringement proceedings are ongoing. The Commission will consider the next steps according to further developments. Based on the replies to the Commission's letters, the remaining strategies are expected to be delivered in the course of 2023, or early 2024, at latest.

Since October 2021, one additional Member States, **Bulgaria**, has submitted its long-term strategy to the Commission. The strategy, presents alternative scenarios, including a pathway to approach climate neutrality by 2050, without defining a specific goal.

Overall, by October 2023, 24 Member States<sup>106</sup> have submitted their long-term strategies required by the Governance Regulation. Of these, 14 Member States<sup>107</sup> clearly expressed their aim to achieve climate neutrality or carbon neutrality<sup>108</sup> by 2050 or before.<sup>109</sup> Others aim to be largely

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<sup>104</sup> Article 15 of Regulation (EU) 2018/1999.

<sup>105</sup> On 22 September 2022, the Commission sent letters of formal notice to Bulgaria (INFR(2022)2086), Ireland (INFR(2022)2088), Poland (INFR(2022)2089) and Romania (INFR(2022)2090) for failing to notify their national long-term strategies under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action.

<sup>106</sup> BE, BG, CZ, DK, DE, EE, EL, ES, FR, HR, IT, CY LV, LT, LU, HU, MT, NL, AT, PT, SI, SK, FI, SE. LT and HU submitted an update of their initial strategies in July and September 2021, respectively.

<sup>107</sup> AT, DK, ES, FI, FR, HU, IT, LT, LV, LU, PT, SE, SI, SK.

<sup>108</sup> While neutrality means by definition that residual emissions are compensated by removals, not all Member States provided the respective share of emission reductions and removals and the level of ambition for actual reductions varies.

<sup>109</sup> FI by 2035 and SE by 2045.

climate neutral<sup>110</sup> or to achieve reductions of 80-95% by 2050. Only nine Member States, however, have reported legally binding goals or targets.<sup>111</sup> Two third of the strategies have been supported by quantitative projections based on different modelling scenarios. The associated emissions reductions may be consistent with the delivery of the specified goals, although this is not clearly stated in all cases. Likewise, where a target has been set, it is not always clear if it is legally binding.<sup>112</sup>

The national long-term strategies also provide useful information at sectoral level, which allow strengths and remaining challenges to be identified and recognised, although coverage varies significantly across Member States or lack details on the precise scope, notably the expected role of land use and removals (see Table 16). In this respect, it is worth mentioning that the current land use and forestry EU regulation provides that Member State may use the managed forest land flexibility only if their long-term strategy has included ongoing or planned specific measures to ensure the conservation or enhancement of forest sinks and reservoirs.<sup>113</sup>

**Table 16:** Summary of the national long-term strategies' main features submitted by the EU Member States

| Long-term strategies' main features   | AT | BE | BG | HR | CZ | DK | EE | FI | FR | DE | GR | HU | IT | CY | LV | LT | LU | MT | NL | PT | SK | SI | ES | SE |
|---------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Climate neutrality by 2050 or earlier | X  |    |    |    |    | X  |    | X  | X  |    |    | X  | X  |    | X  | X  | X  |    |    | X  | X  | X  | X  | X  |
| Modelling projections and scenarios   | X  |    | X  | X  | X  | X  | X  | X  | X  |    | X  | X  | X  | X  |    |    |    | X  |    | X  | X  | X  | X  | X  |
| Emission projections by sectors       | X  | X  | X  | X  |    | X  | X  | X  | X  |    |    | X  | X  | X  | X  | X  |    | X  |    | X  | X  | X  | X  | X  |
| Emission removals in LULUCF           | X  |    | X  |    |    | X  | X  | X  | X  |    |    |    | X  | X  |    |    |    |    |    | X  | X  | X  | X  | X  |
| Estimated share of renewable          | X  |    | X  | X  |    | X  |    | X  |    |    | X  | X  | X  | X  |    | X  | X  |    | X  | X  |    | X  | X  | X  |
| Estimated energy consumption          | X  |    | X  | X  |    | X  |    | X  |    |    | X  | X  | X  | X  | X  |    |    |    |    | X  |    | X  | X  |    |
| Estimated investment needs            |    |    | X  | X  | X  |    | X  | X  | X  |    | X  | X  |    |    | X  |    |    | X  |    | X  | X  | X  | X  | X  |
| Socio-economic impacts of transition  |    |    |    |    |    |    | X  | X  | X  |    | X  | X  | X  | X  | X  |    |    |    |    | X  | X  |    | X  | X  |
| Adaptation Policies and Measures      | X  | X  | X  | X  | X  | X  | X  |    | X  |    |    | X  | X  | X  |    | X  | X  | X  |    |    | X  |    | X  | X  |
| Legally binding long-term goal        |    |    |    | X  |    | X  | X  |    | X  |    |    | X  |    |    |    |    | X  | X  | X  |    |    |    | X  | X  |

Notes: in the case of DK and SK, emission projections by sector, the estimated share of renewable and energy consumption, end in 2040

The inclusion of the recommended contents<sup>114</sup> also varies across Member States, with gaps in needs for research, development and innovation, estimated long-term investments, CO<sub>2</sub> intensity of GDP and, to a lesser extent, on the expected contributions of renewable energy, energy efficiency, and agriculture-specific emission reductions (see Table 17 for more details). As for

<sup>110</sup> DE - it should be noted, however, that the German long-term strategy, as submitted to the Commission in January 2020, was prepared in 2016. According to the Climate Change Act, as amended in July 2021, Germany now aims at achieving climate neutrality by 2045.

<sup>111</sup> DK, EE, FR, HU, LU, MT, NL, ES, SE. Beside the information provided in the national long-term strategies, also Germany and Ireland have enshrined climate targets in legislation.

<sup>112</sup> Another limitation in the submitted national strategies concerns the scope of GHG covered by modelling results, scenarios and targets. The strategies submitted by 15 Member States (AT, BG, HR, EE, FI, FR, DE, HU, IT, LT, LU, MT, NL, ES, and SE) cover CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and F-gases. For the remaining Member States, the coverage of gases was not always clear.

<sup>113</sup> Article 13.2.(a) and 8.1 of the Regulation (EU) 2018/841.

<sup>114</sup> See Annex IV of Regulation (EU) 2018/1999.

their legal status, less than half of the long-term objectives have been enshrined into national law, according to the information submitted to the Commission.<sup>115</sup>

Whereas most of the national strategies received to date reflect the ambition to be climate neutral by 2050, they do not yet allow to conclude that the long-term strategies are adequate for the collective achievement of the objectives and targets of the Energy Union. A rough estimate based on the submitted national long-term strategies and, in case of missing data, on other available information,<sup>116</sup> points to a reduction of GHG emissions of around 85% by 2050 for the EU as a whole. This means that roughly 700 million tonnes of CO<sub>2</sub> equivalents still need to be cut or absorbed to achieve climate neutrality by 2050.<sup>117</sup> This amount appears to be above the CO<sub>2</sub> absorption capacity resulting from the different model-based analyses underpinning EU climate initiatives.<sup>118</sup> Providing more detailed information on any remaining collective gap would have required a more complete and detailed set of strategies.

Member States are therefore encouraged to consider updating and, where needed, to increase both the ambition and the quality of their national long-term strategies. This underlines the importance to continue developing policies to increase and meet ambition over time.

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<sup>115</sup> For a more detailed assessment of the long-term strategies submitted by Member States, please refer to the DG CLIMA dedicated website: [https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-long-term-strategies\\_en](https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-long-term-strategies_en)

<sup>116</sup> These estimates use, where possible, information from the national long-term strategies with a specific order: first the national targets or, when unavailable or unclear, scenario results (i.e. in case of range of values, the most ambitious scenario is considered). In case of national binding targets adopted after the submission of the strategy, updated values have been used (e.g. in the case of Germany). Where data could not be retrieved from their long-term strategies, we used information Member States submitted to the Commission under other reporting exercise (i.e. integrated National Energy and Climate Plans, 2021 GHG projections). Only when national information were not available, we used, as a last resort, data from the 2020 Reference Scenario [EU Reference Scenario 2020 \(europa.eu\)](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1). Overall, three quarter of the 2020 EU GHG emissions are covered by national sourced information. Unfortunately, the aggregated data and analyses are less meaningful when it comes to CO<sub>2</sub> removals and energy data, where lack of data in the national long-term strategies are significant.

<sup>117</sup> This does not include the international maritime and international aviation under the EU law.

<sup>118</sup> See, for example, Section 4.7.2 of the In depth Analysis in support of the Commission Communication “A Clean Planet for all”, or Figure 11 of SWD(2016)249. Moreover, these estimates do not include emissions from international maritime and aviation, which could partly be covered by the EU climate neutrality objective.

**Table 17:** Overview of the national long-term strategies submitted by the EU Member States

| Country<br>(date of submission) | Overall LTS goal<br>by 2050                      | Projected GHG<br>emission<br>reductions by<br>2050<br>(% change<br>compared to 1990) | all gases emissions | including LULUCF | incl. International maritime<br>and aviation | Share of<br>renewable<br>energy in<br>gross final<br>energy<br>consumption<br>by 2050 | Projected<br>final energy<br>consumption<br>by 2050<br>(% change<br>compared to<br>2005) | Highlights from investment needs,<br>enabling policies and socio-<br>economic impact                                           | Key reporting gaps                                                                                                  |
|---------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------|---------------------|------------------|----------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Austria</b><br>(27/12/2019)  | Climate neutrality                               | (-74%, -84%)                                                                         | yes                 | no               | yes                                          | (76%, 93%)                                                                            | (-52%, -38%)                                                                             | positive impact on GDP and jobs<br>natural and technical sinks needed to<br>reach carbon neutrality                            | CO <sub>2</sub> intensity of GDP of GDP<br>investment needs<br>socio-economic impact                                |
| <b>Belgium</b><br>(02/03/2020)  | Different regional<br>goals                      | (-85%, -87%)<br>(excluding ETS sector)                                               | ?                   | no               | no                                           | n.a.                                                                                  | n.a.                                                                                     | investment needs in buildings<br>climate change impact on agriculture<br>address energy poverty                                | information at national level<br>GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions for ETS and LULUCF |
| <b>Bulgaria</b><br>(27/10/2022) | Unspecified                                      | (-78%, -84%)                                                                         | yes                 | no               | no                                           | (61%, 70%)                                                                            | (79, 87 TWh)                                                                             | positive impact on jobs and wellbeing's<br>investment need < 15bn up to 2050<br>technical sinks to reach carbon neutrality     | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions by sub-sector<br>socio-economic impact              |
| <b>Croatia</b><br>(24/06/2021)  | Unspecified                                      | (-57%, -73%)                                                                         | yes                 | no               | ?                                            | (53.2%,<br>65.6%)                                                                     | (-25%, -37%)                                                                             | overall impact on GDP uncertain<br>around 40'000 new green jobs<br>additional investment above 1.5% of GDP                     | reductions and removals in LULUCF<br>socio-economic impact<br>emission reductions industrial sectors                |
| <b>Cyprus</b><br>(14/09/2022)   | Unspecified                                      | (-28%, -100%)                                                                        | yes                 | yes              | ?                                            | (51%, 95%)                                                                            | (1996, 1875<br>Ktoe)                                                                     | cost of the transition modest to low<br>gradual closure of thermal power plants<br>natural and tech. sinks to reach neutrality | GHG and CO <sub>2</sub> intensity of GDP<br>emission reduction in buildings<br>socio-economic impact                |
| <b>Czechia</b><br>(20/12/2019)  | Unspecified                                      | -80%                                                                                 | ?                   | no               | ?                                            | n.a.                                                                                  | n.a.                                                                                     | investment peak with expansion of CCS<br>strengthen energy taxation<br>Increase share of nuclear in energy mix                 | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions by sector<br>socio-economic impact                  |
| <b>Denmark</b><br>(20/12/2019)  | Climate neutrality                               | n.a.                                                                                 | yes                 | yes              | no                                           | n.a.                                                                                  | n.a.                                                                                     | targets enshrined in law<br>doubling organic farming<br>increase spending in green research                                    | public consultation<br>emission reductions power & buildings<br>socio-economic impact                               |
| <b>Estonia</b><br>(30/12/2019)  | quantitative GHG<br>emission<br>reduction target | -80%                                                                                 | yes                 | no               | no                                           | n.a.                                                                                  | n.a.                                                                                     | targets enshrined in law<br>large investment needed in RES<br>minor impact on GDP and jobs                                     | CO <sub>2</sub> intensity of GDP<br>emission reductions in buildings<br>RES, FEC/PEC targets                        |
| <b>Finland</b><br>(22/04/2020)  | Carbon neutrality<br>by 2035                     | (-87.5%, -90%)                                                                       | yes                 | no               | ?                                            | (64%, 80%)                                                                            | (-16%, -5%)                                                                              | slightly positive impact on GDP and jobs<br>employment sensitive to arable lands<br>annual investment -3% of GDP               | CO <sub>2</sub> intensity of GDP<br>emission reductions in buildings<br>strategies for related R&D&I                |

| Country<br>(date of submission)    | Overall LTS goal by 2050                   | Projected GHG emission reductions by 2050<br>(% change compared to 1990) | all gases emissions | including LULUCF | incl. international maritime and aviation | Share of renewable energy in gross final energy consumption by 2050 | Projected final energy consumption by 2050<br>(% change compared to 2005) | Highlights from investment needs, enabling policies and socio-economic impact                                                | Key reporting gaps                                                                                                 |
|------------------------------------|--------------------------------------------|--------------------------------------------------------------------------|---------------------|------------------|-------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>France</b><br>(12/05/2020)      | Carbon neutrality                          | -83%                                                                     | yes                 | no               | No                                        | n.a.                                                                | n.a.                                                                      | targets enshrined in law<br>positive impact on GDP<br>annual investment ~3.5% of GDP                                         | GHG and CO <sub>2</sub> intensity of GDP<br>reductions and removals in LULUCF<br>share of renewable energy in 2050 |
| <b>Germany</b><br>(02/01/2020)     | Largely climate neutral                    | (-80%, -95%)                                                             | yes                 | no               | No                                        | n.a.                                                                | n.a.                                                                      | document outdated compared to recent review of the country's target aimed at reaching climate neutrality by 2045             | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions by sector<br>investment & socio-economic impact    |
| <b>Greece</b><br>(08/01/2020)      | Unspecified                                | (-83%, -95%)                                                             | ?                   | ?                | ?                                         | (82%, 114%)                                                         | n.a.                                                                      | increase use of heat pumps (buildings) and biofuel (transport)<br>investment needs €0.1 to €1.1 bn per year                  | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions agriculture & waste<br>socio-economic impact       |
| <b>Hungary</b><br>(21/09/2021)     | Climate neutrality                         | -100%                                                                    | yes                 | yes              | no                                        | close to 90%                                                        | (-30%, -37.4%)<br>(compared to 2017)                                      | positive impact on GDP and jobs<br>annual investment ~4.8% of GDP<br>avoided damage and benefits > costs                     | reductions and removals in LULUCF<br>emission reductions in buildings                                              |
| <b>Italy</b><br>(11/02/2021)       | Climate neutrality                         | (-84%, -87%)                                                             | yes                 | no               | no                                        | (85%, 90%)                                                          | -49%                                                                      | slightly negative impact on GDP<br>boost sustainable finance<br>focus on adaptation strategies                               | emission reductions in waste<br>Investment needs<br>socio-economic impact                                          |
| <b>Latvia</b><br>(27/12/2019)      | Climate neutrality                         | -85%<br>(by 2040)                                                        | ?                   | yes              | ?                                         | n.a.                                                                | -37%<br>(primary energy consumption)                                      | positive impact on GDP<br>annual investment ~1.4% of GDP<br>creation of new (green) jobs                                     | CO <sub>2</sub> intensity of GDP<br>emission reductions in buildings<br>adaptation policies and measures           |
| <b>Lithuania</b><br>(23/07/2021)   | Climate neutrality                         | -100%<br>(20% reduction from LULUCF & CCS)                               | yes                 | yes              | yes                                       | 90%                                                                 | final & primary energy intensity 2.4 times lower than 2017                | positive impact on GDP and jobs<br>4% of GDP invested in R&D&I by 2040<br>focus on adaptation strategies                     | public consultation<br>GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions by sector                   |
| <b>Luxembourg</b><br>(04/11/2021)  | Climate neutrality                         | -100%<br>(including LULUCF)                                              | yes                 | yes              | no                                        | 100%                                                                | n.a.                                                                      | support sustainable finance<br>ensure a just transition for citizens and enterprises                                         | emission reductions in 2050 for all sectors<br>reductions and removals in LULUCF<br>estimated investment needs     |
| <b>Malta</b><br>(21/10/2021)       | Unspecified                                | -82%                                                                     | yes                 | no               | no                                        | n.a.                                                                | n.a.                                                                      | increased job opportunities<br>improved air quality and health<br>investment in renewables > €2bn to 2050                    | CO <sub>2</sub> intensity of GDP<br>LULUCF, RES, FEC/PEC targets                                                   |
| <b>Netherlands</b><br>(18/12/2019) | Quantitative GHG emission reduction target | -95%                                                                     | yes                 | yes              | no                                        | n.a.                                                                | n.a.                                                                      | net-zero requires large scale CO <sub>2</sub> capture by 2030, limited impact on GDP and jobs<br>increase income disparities | reductions and removals in LULUCF<br>emission reductions in all sectors by 2050<br>investment needs                |

| Country<br>(date of submission) | Overall LTS goal<br>by 2050                                        | Projected GHG<br>emission<br>reductions by<br>2050<br>(% change<br>compared to 1990) | all gases emissions | including LULUCF | incl. international maritime<br>and aviation | Share of<br>renewable<br>energy in<br>gross final<br>energy<br>consumption<br>by 2050 | Projected<br>final energy<br>consumption<br>by 2050<br>(% change<br>compared to<br>2005) | Highlights from investment needs,<br>enabling policies and socio-<br>economic impact                                | Key reporting gaps                                                                                                        |
|---------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------|------------------|----------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Portugal</b><br>(15/01/2020) | Carbon neutrality                                                  | (-85%, -90%)                                                                         | ?                   | no               | ?                                            | (86%, 88%)                                                                            | (-36%, -35%)                                                                             | positive impact on GDP and jobs<br>annual investment ~1.2% of GDP<br>better air quality                             | GHG and CO <sub>2</sub> intensity of GDP<br>strategies related to R&D&I<br>adaptation policies and measures               |
| <b>Slovakia</b><br>(11/03/2020) | Climate neutrality                                                 | -80%                                                                                 | ?                   | no               | ?                                            | n.a.                                                                                  | n.a.                                                                                     | positive impact on GDP<br>negative impact on jobs & wages<br>annual investment ~4.2% of GDP                         | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions in buildings<br>LULUCF, RES, FEC/PEC targets              |
| <b>Slovenia</b><br>(19/07/2021) | Climate neutrality                                                 | (-80%, -90%)                                                                         | ?                   | no               | no                                           | at least 60%                                                                          | at least -33%                                                                            | positive impact on GDP and jobs<br>additional investment from €66 to €72 bn<br>focus on a climate resilient society | GHG and CO <sub>2</sub> intensity of GDP<br>emission reductions industrial sectors                                        |
| <b>Spain</b><br>(11/12/2020)    | Climate neutrality                                                 | -90%                                                                                 | yes                 | no               | yes                                          | 97%                                                                                   | -44%                                                                                     | positive impact on GDP and jobs<br>negative impact on jobs & wages<br>annual investment ~1% of GDP                  | CO <sub>2</sub> intensity of GDP<br>emission reductions agriculture & waste<br>emission reductions for industrial sectors |
| <b>Sweden</b><br>(19/12/2019)   | Climate neutrality<br>by 2045 and negative<br>emissions thereafter | -85%<br>(by 2045)                                                                    | yes                 | no               | no                                           | n.a.                                                                                  | final energy<br>intensity 50%<br>lower than 2005                                         | limited impact on GDP and jobs<br>better air quality<br>focus on adaptation strategies                              | GHG and CO <sub>2</sub> intensity of GDP<br>share of renewable energy<br>investment & socio-economic impact               |

Notes: (1) An "unspecified" goal refers to cases where the goal was not expressed in clear terms (e.g. "to approach", "to move towards", etc.). (2) In the case of Germany, the long-term strategy, as submitted to the Commission in January 2020, reflects the goal of the Climate Action Plan 2050 adopted in November 2016. According to the Climate Change Act, as amended in July 2021, Germany now aims at achieving climate neutrality by 2045. (3) In April 2021, Denmark submitted an update of its LTS under Art. 18(1)(a) and Annex VI(b) of the Governance Regulation, to reflect the Danish Climate Act adopted in June 2020, which sets a near-term target of reducing Denmark's total greenhouse gas emissions by 70% by 2030 compared to the 1990 level and sets a long-term target of achieving climate neutrality by 2050 at the latest. (4) In July 2023, with the entry into force of the Climate Act, Netherlands has a legally binding target to achieve climate neutrality by 2050. (5) Projected GHG emission reductions are all expressed as percentage change compared to 1990 level (except for BE, PT and SI where reduction rates refer to 2005 GHG emission levels, MT to 2020 level and FR to 2015 level), as a target or as the extreme values of the projected range. In the case of Denmark, projections in the LTS refer to a scenario with existing measures, not in line with the goal, therefore they have not been reported in the table. (6) "?" means that the LTS does not provide enough or clear information on the exact scope of projected GHG emission reductions. In the case of Spain, only international maritime emissions were included in the projections. (7) Where feasible, final energy consumption has been expressed as percentage change compared to 2005 consumption level. (8) Annual investment needs are generally considered additional to a business as usual (BAU) or with existing measures (WEM) scenarios for the period 2020-2050. (8) Key reporting gaps are meant to provide only a general view of the completeness of the LTS and do not distinguish between mandatory and non-mandatory elements.

## 13 EXAMPLES OF FUNDING OF CLIMATE RELATED PROJECTS

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Indicative list of examples for boxes for the “communication version” of the report.

### **Example 1. Climate monitoring reports**

The monthly climate monitoring reports from the European Union’s Copernicus Climate Change Service, the US National Oceanic and Atmospheric Administration and NASA confirm the extraordinary pace of climate change because of heat-trapping greenhouse gases in the atmosphere.

Global ocean surface temperatures were the highest ever recorded and expected to further increase due to the El Nino event, leading to more marine heatwaves and devastating impacts on marine ecosystems, including coral bleaching. Sea ice also reached lowest coverage ever recorded in July 2023.

### **Example 2. Climate action campaign for low-income households**

To support consumers in the transition to a net-zero emission economy, the LIFE - Doppel Plus project encouraged changes in the everyday behaviour of low-income households in Austria. In the Austrian State of Tyrol, approximately 100 000 people are threatened by poverty and estimated 10 000 households are affected by energy poverty. Between 2016 and 2021, the LIFE project Doppel Plus trained 91 energy and climate coaches, who provided advising sessions to 806 Tyrolean low-income household (mainly single parents, asylum seekers, long-term unemployed, migrants and retirees). The target group received free advice on how to minimise energy costs and adopt a more climate-friendly approach to everyday life. Through individual coaching sessions on matters related to heating, cooling and ventilation, but also mobility and nutrition, and the distribution of “starter packages” (led lamps, aerators for taps and other practical items), each household was able to save an average of 2091 kWh of household energy per year, corresponding to a reduction of 667 kg CO<sub>2</sub>-eq and EUR 200 in savings. In addition, stakeholders such as electricity utility companies, transport companies and public bodies were addressed through lectures, workshops, and train-the-trainer programmes to build up a broad network and integrate the sustainability goals and offers of the project into various sectors. Today, the activities of Doppel Plus are being continued by the project partners with the support of the State of Tyrol as part of the *Tirol 2050 energie autonom* energy strategy.

### **Example 3. Reducing carbon emissions in the EU through sustainable diets**

In the EU, the food we produce, consume and waste has a significant impact on climate and environment, accounting for 30% of all EU GHG emissions and polluting land and water resources. Between 2018 and 2022, the project **LIFE-SU EATABLE**, coordinated by the Barilla Foundation, carried out a series of pilot engagement activities at university and company canteens in Italy and UK to promote the adoption of a sustainable and healthy diet. Combining educational and informative campaigns with a sustainable food offering and the use of a dedicated digital platform, the project involved 17 partners (companies, universities and caterers) and 6557 people, leading to an estimated saving of about 1.7 kg of CO<sub>2</sub>-eq. and 1,67 litres of water per person per

day, compared to the daily average impact of an EU citizen. Furthermore, SU-Eatable has encouraged the replication of its solutions through communication activities, scientific publications, implementation guidelines and replication toolkits.

#### **Example 4. European Hydrogen Bank**

Hydrogen is one of the key technologies of Europe's Net-Zero Industry Act. Hydrogen is a clean fuel that will play an important role in the EU's transition to climate neutrality by 2050, with high relevance for the decarbonization of the industrial sector. The European Hydrogen Strategy (COM/2020/30) set out the objective to produce 10 million tons of renewable hydrogen domestically in the EU, and the REPowerEU plan (COM(2022) 230) complemented this goal by facilitating additional 10 million tones in imports by 2030. In 2023, the setting up of the European Hydrogen Bank was announced, with the objective to close the infrastructure investment gap and connect future supply of renewable hydrogen with European demand. The Hydrogen Bank is organized in two parts, one directed to support domestic market creation, and another directed to promote imports into the EU. The production of renewable hydrogen in Europe will be supported by auctioning fixed green premiums on the unitary costs for producing hydrogen. The premiums will be provided by using funds from the ETS Innovation Fund. A first pilot auction, with a budget of 800 million euros, is planned to be held by the end of 2023. This approach will create a transparent and efficient risk sharing mechanism with the private sector. The auctioning system developed under the European Hydrogen Bank may be also offered to Member States as a service to allocate their own funds, and so create a one stop window at European level for hydrogen projects and reduce administrative burdens for applicants.

#### **Example 5. Collaborative Observatory for Assessment of the EU ETS**

**LIFE21-GIC-IT-LIFE COASE** As the international community struggles to put global greenhouse gas (GHG) emissions on a trajectory consistent with the main objective of the Paris Agreement, carbon markets represent valuable tools to successfully achieve climate mitigation targets. The growing role of carbon markets is testified by the number of jurisdictions that have adopted or consider adopting an emissions trading system (ETS) to meet their long-term goals. In this context, the EU ETS continues to be the centrepiece of EU climate policy as well as a fundamental element of the global carbon market and a reference model for many governments outside the EU. This crucial exchange model aims to achieve ambitious climate neutrality targets by 2050. The phasing-out of regulated emissions needs to be accomplished by minimising carbon leakage and safeguarding the international competitiveness of regulated industries, a process which should be perceived as fair by European citizens and involving a call for stronger climate action by other countries. All these expectations call for a solid and comprehensive system to monitor EU ETS functioning, including its environmental and economic effects, interactions with other policies and changes within the carbon market. A comprehensive monitoring of the system should also cover forward-looking analyses, taking into consideration any relevant developments outside the EU so to help policymakers to assess ex-ante the consequences of different policy/regulatory options and to exchange information with experts and representatives of other major carbon markets. To various degrees, activities of monitoring, assessment, and information exchange around the EU ETS are already ongoing, but there is a strong need for enhancing and implementing them on a more regular basis.

### **Example 6. Belgium Renovates for Energy Efficient Living**

The energy use of Belgian houses is 70% higher than the European average, showing the enormous potential for energy saving and greenhouse gas (GHG) emission reductions. The **LIFE BE REEL** project, started in 2018 under the coordination of the Flemish Energy and Climate Agency, is supporting the full implementation of the renovation strategies of the Flemish and Wallonia regions, targeting over 4.1 million homes and representing 14% of the total GHG-emissions for Belgium in 2015. BE REEL is developing and demonstrating structural measures to increase the renovation rates and improve the energy performance of buildings. The demonstration includes the design and implementation of innovative technical concepts and tools, along with financial instruments, communication activities and actions to build capacity and enhance cooperation among public administrations, citizens, NGOs, contractors, renovation professionals, federations and other relevant stakeholders. The pilot projects of BE REEL will lead to 8,585 renovated dwellings, generating over 18,600 tonnes of CO<sub>2</sub> emission reductions per year. The innovative solutions of BE REEL will create the conditions for the full implementation of the regional renovation strategies, which aim at renovating all existing housing and achieving a reduction of 75-80% of CO<sub>2</sub> emissions and energy use by 2050.

### **Example 7. Renewable bio-hydrogen production technologies from lignocellulosic waste and sewage sludge co-fermentation**

Vast amounts of rice straw are burned annually in the rice fields near Albufera Natural Park (Province of Valencia, Spain), emitting greenhouse gases and particulate matter, affecting the environment and the quality of life of surrounding populations. When techniques other than burning or burying are used, the management of this bio-waste is expensive for farmers. The **LIFE REPTES** project, started in 2022 under the coordination of *Depuración de Aguas del Mediterráneo* (DAM), will demonstrate a new circular model that will allow rice straw from fields to be disposed of, while also reducing greenhouse gas and particulate emissions. LIFE REPTES will design, build and implement a demonstration plant at the Pinedo wastewater treatment plant. Using an innovative dark fermentation process, the project will integrate the production of biohydrogen from pre-treated lignocellulosic crop by-products and the sludge produced in wastewater treatment plants. The resulting fermented liquid stream will be used as an anaerobic digestion co-substrate to produce biogas. In addition to reducing greenhouse gas emissions and improving air quality in the region, the project will provide local authorities with new tools to achieve a climate neutral economy by increasing the generation and use of renewable energy and improving energy efficiency.

### **Example 8. Reduction of Agricultural Greenhouse gases Emissions Through Innovative Cropping systems**

Significant potential exists in Europe to decrease the flux of carbon to the atmosphere from croplands, and for cropland management to sequester soil carbon, linked to the amount of carbon stored in cropland soils. The **LIFE AGRESTIC** project, implemented between 2019 and 2023 in Emilia Romagna, Tuscany and Puglia (Italy), focused on the inclusion of legumes and catch crops in the rotations of cereals and industrial crops (tomato and sunflower) in three demonstration sites in order to reduce greenhouse gas emissions, increase the carbon sequestration and the availability

of organic nitrogen. The project developed an innovative decision support tool for efficient management of the multi-year crop rotation system, rationalizing the use of external inputs (nitrogenous fertilizers, pesticides, etc.) and non-renewable resources (soil and fuels) and maintaining, or even increasing, quantity, quality and safety of the products. The project also developed a prototype for the automated and continuous monitoring of soil GHG fluxes, a quality label for products based on carbon footprint and schemes for the payment of Ecosystem Services.

#### **Example 9. Development and implementation of a result-based funding mechanism for carbon farming in EU mixed crop livestock systems**

The project **LIFE CARBON FARMING**, coordinated by *Institut de l'Elevage*, will bring together actors involved in agriculture and other economic sectors (public bodies, industrial companies and banks) to implement carbon finance mechanisms in six European countries. Between 2021 and 2027, the project will support Carbon Farming Projects in 700 farms in Belgium, France, Germany, Ireland, Italy, Spain to help farmers reduce the carbon footprint of their farms and measure the progress achieved. LIFE CARBON FARMING will develop and disseminate a harmonised sustainability assessment methodology and a common process for monitoring, reporting and verifying carbon removals. Moreover, the project will implement voluntary carbon markets that will provide EUR 6.34 million in estimated revenues from carbon credits. A European network of farmers and partners involved in Carbon Farming Projects will share knowledge and replicate the project results and tools. The farmers involved are expected to reduce the carbon footprint of agricultural products by 15% within six years, using result-based funding.

#### **Example 10. Achieving Resiliency by Triggering Implementation of nature-based Solutions for climate Adaptation at a National scale**

The **LIFE IP ARTISAN** project is providing support to the French strategy for climate change adaptation, reinforcing the resilience of the country to climate change. In particular, it aims at mainstreaming biodiversity into climate adaptation by developing and promoting the use of Nature based Solutions. The project, launched in 2019, is implementing ten pilot demonstration projects on Nature-Based Solutions and setting up a network of at least 200 local advisers and 13 regional networks cooperating on ecosystem-based adaptation. LIFE IP ARTISAN is creating a favourable framework for new local projects by building capacity, mainstreaming good practices and improving the coordination among climate change and biodiversity policies and funding parties. For example, the local advisors created an online database gathering information on public and private funding for climate adaptation activities that use Nature-Based Solutions. In particular, the project will also facilitate the coordinated use of EUR 3.8 billion of complementary funding from the European Regional Development Fund, the European Agricultural Fund for Rural Development and other national funds, especially from water agencies, to support nature-based adaptation solutions. Furthermore, the project team is involved in the development of the new French strategy on climate adaptation.

#### **Example 11. Team Europe Initiative on Adaptation and Resilience in Africa**

African countries have suffered unprecedented climate events. By 2050, climate impacts could cost \$50 billion annually. The EU-AU Summit in 2022 increased efforts on climate resilience through the EU-Africa Global Gateway Investment Package. This package supports a strong,

inclusive, green and digital recovery for Africa with investments of €150 billion from the EU, member States, financial institutions and the private sector.

At COP27, the EU and its Member States launched the Team Europe Initiative on Climate Change Adaptation and Resilience in Africa. It aims at providing a coordinated European response on adaptation, including to enhance access by African partners to climate adaptation finance. It brings together existing and new adaptation programmes of over EUR 1.4 billion from the Commission and several Member States (CZ, DE, DK, FR, and NL to date). There are four pillars of action:

- Reinforcing early warning systems at regional and national level
- Developing and implementing Climate and Disaster Risk Finance and Insurance (CDRFI) tools and mechanisms
- Increasing public sector readiness and supporting mechanisms to mobilise international climate finance on adaptation, including from the private sector.
- Supporting climate risk data collection and analysis to improve decision-making processes.

This Team Europe Initiative is part of the broader support to adaptation to climate change that the EU and EU Member States are delivering in Africa.

#### **Example 12. EU mission on adaptation to climate change: Large scale demonstrators of climate resilience creating cross-border value - RESIST and Regions4Climate projects**

The projects from the EU mission on adaptation to climate change are currently deploying large-scale demonstrations of scientifically sound innovative solutions (including social innovation) to increase climate resilience in 24 regions of Europe.

The RESIST<sup>119</sup> project, on the one hand, is testing adaptation solutions to five key climate challenges: floods, droughts, heatwaves, wildfires, and soil erosion, in four demonstrator regions (Southwest Finland, Central Denmark, Catalonia and Centro Portugal) and eight twinning regions across Europe (Normandy, East Macedonia, Blekinge, Zemgale, Puglia, Baixo Alentejo, Vesterålen and Extremadura). RESIST involves stakeholder collaboration in designing and testing more than 100 innovative solutions – adaptation products, regulations, policies and methods. It is also developing 12 Graphical Digital Twins through immersive technologies, to support decision-making.

On the other hand, the Regions4Climate<sup>120</sup> project aims to collaboratively develop and demonstrate a socially-just transition to climate resilience. The project will create and implement innovations combining sociocultural, technological, digital, business, governance, and environmental solutions to reduce the vulnerability of European regions to the impacts of climate change. It will develop a comprehensive Adaptation Framework including a Regional Climate Resilience Dashboard for each partner region, and will design, deploy and scale up solutions through a twinning approach, including 12 demonstration cases across Europe (Basque Country, South Aquitaine, Azores, Toscana, Koge Bay, Burgas, Uusimaa, Pärnumaa, Crete, Castilla y León, Nordic Archipelago, Cyprus).

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119 <https://cordis.europa.eu/project/id/101093873>

120 <https://cordis.europa.eu/project/id/101093873>

### **Example 13. Horizon 2020 CONSTRAIN project: Providing improved evidence base for effective adaptation and mitigation strategies**

Predicting how the climate will change over the next 20-50 years, as well as defining and implementing the emissions pathways that will put the world on track for keeping the warming in check, requires a better understanding of how several human and natural factors will affect the climate in coming decades. These include how atmospheric aerosols affect the Earth's carbon budget, and the roles of clouds and oceans in driving climate change. The EU-funded Horizon 2020 CONSTRAIN<sup>121</sup> project, a consortium of 14 European partners, is developing a better understanding of these variables, feeding them into climate models to reduce uncertainties, and creating improved climate projections for the next 20-50 years on regional as well as global scales. It is also supported the scientific efforts towards more effective translation of new physical science into an improved evidence base for policy decisions. CONSTRAIN results provided important contributions to the IPCC Sixth Assessment reports and the 2023 UNFCCC Global Stocktake, cementing EU's position as the world-leader in understanding climate sensitivity and climate variability.

### **Example 14. Horizon, Cluster 5 – Energy**

Project SYMBIOSYST<sup>122</sup> under Horizon Europe Cluster 5 started in January 2023 and will contribute to the decarbonisation of the energy sector by delivering standardised cost-effective solutions for agri-voltaics. This will involve developing PV modules, mounting structures, and operation and maintenance practices that meet the specific needs of different crops, climates, and landscapes. The project will ensure the solutions developed are aesthetically pleasing and harmoniously integrated with farming practices.

### **Example 15. Horizon, Cluster 5 – Mobility**

The Horizon Europe Cluster 5 project NextETRUCK<sup>123</sup> under the 2ZERO Partnership started in July 2022 and will help accelerate the transition towards zero tailpipe emission road mobility across Europe by demonstrating innovative and affordable zero-emission e-mobility concepts that are both competitive and synergistic. The project will also advance knowledge through innovations in e-powertrain components and architectures, intelligent charging infrastructure and management, improved thermal design of the cabin, and fleet management systems utilising IoT and digital tools.

### **Example 16. Horizon, Cluster 4 – Industry**

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<sup>121</sup> <https://cordis.europa.eu/project/id/820829>

<sup>122</sup> [Create a Symbiosis where PV and agriculture can have a mutually beneficial relationship | SYMBIOSYST | Project | Fact sheet | HORIZON | CORDIS | European Commission \(europa.eu\)](#)

<sup>123</sup> [Efficient and affordable Zero Emission logistics through NEXT generation Electric TRUCKs | NextETRUCK | Project | Fact sheet | HORIZON | CORDIS | European Commission \(europa.eu\)](#)

Project [Plastics2Olefins](#)<sup>124</sup> under the [Processes4Planet](#) Partnership in Horizon Europe Cluster 4 started in June 2022 and will demonstrate a novel plastics recycling process based on high-temperature pyrolysis, as the main product will be a gas stream instead of a liquid, so it will reduce the lifecycle GHG emissions by more than 70% compared to existing plastics recycling processes for unsorted plastic waste. The project will realise this in a two-step approach: first by adapting and testing a scaled pilot plant to optimise the components and process conditions and finally, a pioneering full-scale industrial demonstration plant at Repsol's petrochemical site.

### **Example 17. Horizon, Soils Mission – Carbon Farming**

Project [MRV4SOC](#)<sup>125</sup> under the EU Mission on Soil Health and Food started in June 2023 and aims to support the implementation of key actions of the European Commission Communication on Sustainable Carbon Cycles and carbon farming and the proposed regulatory framework on carbon removals certification by designing a comprehensive, robust, and cost-effective approach, accounting for changes in as many carbon pools as possible, to estimate GHG and full carbon budgets, coupling carbon and nitrogen cycles, quantify Soil Organic Carbon (SOC) accumulation, and assess the results of traditional management practices and carbon farming.

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<sup>124</sup> [Recycling plastic waste into high-value materials- Closing the Loop | Plastics2Olefins | Project | Fact sheet | HORIZON | CORDIS | European Commission \(europa.eu\)](#)

<sup>125</sup> [Monitoring, Reporting and Verification of Soil Organic Carbon and Greenhouse Gas Balance | MRV4SOC | Project | Fact sheet | HORIZON | CORDIS | European Commission \(europa.eu\)](#)