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**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE
COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE
COMMITTEE OF THE REGIONS**

State of the Energy Union Report 2023

**(pursuant to Regulation (EU) 2018/1999 on the Governance of the Energy Union and
Climate Action)**

{SWD(2023) 646 final}

INTRODUCTION AND HIGHLIGHTS

Last year, just as the world started to emerge from the economic crisis triggered by the global pandemic, the European Union (EU) faced one of its greatest challenges since its foundation, with war raging on our continent and the worst global energy crisis for decades. Ukraine came under an unjustified and unprovoked military attack and energy supplies were weaponised by Russia with the intent of disrupting fossil fuel supplies to Europe and therefore damaging our economy.

Action was needed to save energy, to diversify our energy supply and to accelerate the clean energy transition and thereby to become less dependent on Russian fossil fuel imports as soon as possible. The EU and its twenty-seven Member States took strong, decisive and united action. The Commission proposed the **REPowerEU plan**, which was accompanied over the course of the year by several **legislative emergency measures** that were adopted at high speed. Together as the EU, we managed to avoid energy supply disruption, we succeeded in easing pressure on energy markets and we boosted clean renewable energy supply. In May 2023, for the first time in history, the EU produced more electricity from wind and solar than from fossil fuels.

In short, **the EU has successfully managed to avoid the worst of the energy crisis.** At the same time, **we have used the crisis to strengthen our aim to accelerate the clean energy transition**, which is aimed at making Europe the first climate-neutral continent by 2050. The **European Green Deal**, the EU's '**answer to the call of history**¹' is now not only a climate imperative and Europe's growth strategy², but also a necessity in terms of the EU's energy security and autonomy. Indeed, the European Green Deal has become a centrepiece of our overall economic strategy and a key enabler for growth and competitiveness.

The worst effects of the crisis may now be behind us, but there is no room for complacency. Energy markets remain vulnerable, fossil fuel subsidies have increased during the crisis, the inflation is still high, our critical infrastructure needs to be protected, including from sabotages, and the impact of the crisis shows the risks of dependence on unreliable sources. For the longer term, the EU needs to continue to ensure affordable, reliable and accessible energy for households and to bolster the industrial and economic competitiveness of its industry and economy to remain a key global player. The energy crisis and the supply chain disruptions of the last two years demonstrate the importance of scaling up the manufacturing capacity of the EU's net-zero industry and strengthening its competitiveness. With the Net-Zero Industry Act³, the Commission proposed important reforms to increase manufacturing capacity inside the EU to be complemented by measures to better protect our industry against market distortions by non-EU countries. A strong European clean tech industry is crucial for the future of the EU.

The annual **State of the Energy Union report**, together with its accompanying reports, is an important instrument to **take stock of the EU's progress towards the objectives of the Energy Union**⁴ and the **clean energy transition** in line with the energy and climate targets. This year's report looks back at **how the EU**

¹ [2023 State of the Union Address by President von der Leyen](#)

² See Green Deal Investment Plan - COM(2020)21.

³ COM(2023) 161 final.

⁴ The Energy Union supports the clean energy transition as it unites all aspects of energy policy under a coherent, integrated approach. The Energy Union is based on five dimensions: (1) security, solidarity and trust; (2) a fully integrated internal energy market; (3) energy efficiency; (4) climate action and decarbonising the economy; and (5) research, innovation and competitiveness.

reacted towards unprecedented crises and challenges during the current Commission's mandate and **considers remaining challenges**.

The report is structured in three parts. The first part describes how the high climate and environmental ambitions under the European Green Deal provided the basis for the EU's crisis response strategy and a strategy for growth and competitiveness. The second part analyses the state of play in the implementation of the Energy Union in all its five dimensions based on the Commission's assessment of **Member State progress reports on their national energy and climate plans (NECPs)**. The last part points to future challenges for the EU energy system and energy policy.

Together with this report, a set of **accompanying reports** as set out below is published. They provide a more in-depth assessment of the progress of the Energy Union's initiatives across its five dimensions and the clean energy transition.

- **Assessment of progress towards the objectives of the Energy Union and Climate Action**⁵⁶
- **2023 competitiveness progress report**⁷
- Report on **bioenergy sustainability** under Regulation (EU) 2018/1999⁸
- Report on **renovation of the national stock of residential and non-residential buildings** and on nearly zero-energy buildings under Regulation (EU) 2018/1999⁹
- Report on the **implementation of the Electricity Directive** EU/2019/944¹⁰
- **2023 report on energy subsidies in Europe**¹¹
- **Climate action progress report**¹²
- Report on the **functioning of the carbon market in 2022**¹³
- Report on **the quality of petrol and diesel used for road transport**¹⁴
- Report on **implementation of Directive 2009/31/EC on the geological storage of carbon dioxide**¹⁵

⁵ Each Member State is to report to the Commission every 2 years on the implementation status of its national energy and climate plan by means of an integrated national energy and climate progress report covering all five dimensions of the Energy Union. Where possible, the reporting and assessment makes use of comparable energy statistics. As a result, the latest consolidated data in certain areas relate to 2021 or 2022. Data with a cut-off in 2021 do not reflect that many Member States have undertaken significant shifts away from fossil fuel imports from Russia since the start of Russia's war of aggression against Ukraine.

⁶ SWD(2023)646

⁷ COM(2023)652

⁸ Annex I to COM(2023) 650

⁹ Annex II to COM(2023) 650

¹⁰ Annex III to COM(2023) 650

¹¹ COM(2023) 651

¹² COM(2023) 653

¹³ COM(2023) 654 (which will be adopted on 31st October 2023)

¹⁴ COM(2023) 655

¹⁵ COM(2023) 657

State of the Energy Union – key achievements in 2023

- **The EU quickly diversified its energy imports away from Russia**, which ultimately guaranteed its energy security. The **EU Energy Platform** contributed to EU diversification goals via a **demand aggregation mechanism**. By October 2023, three tendering rounds were successfully implemented with an aggregated demand of 44,75 billion cubic metres (bcm) and for which the volume of supply bids is 52 bcm.
- **Total Russian gas imports fell to around 80 bcm in 2022 and to an estimated¹⁶ 40-45 bcm in 2023**, compared with an annual 155 bcm before the crisis.
- To make up for reduced imports from Russia, **the EU expanded its imports of natural gas and LNG from Norway and the US**. While imports of Russian liquified natural gas (LNG) have increased, the overall share of Russian gas (LNG and piped natural gas) in total EU gas imports has fallen from 45% to 50% in the pre-crisis years to 15%, and the share of Russian pipeline gas to below 10% since January 2023.
- The EU has also expanded on **global efforts to encourage increasing methane abatement** both as an element of climate action and energy security support. Exploring so-called ‘you collect/we buy’ schemes increases the availability of gas supply for the EU and for the global market.
- **The EU and its energy-intensive industry reduced its demand for energy** compared with pre-COVID-19 crisis levels, including by saving more than 18% of gas compared with the previous 5 years¹⁷. At the same time, **the EU filled its gas storage facilities up to 95% ahead of the winter of 2022-2023 and prevented energy disruptions**. The EU also achieved its target of gas storage facilities filled to 90% on 18 August, more than 2 months ahead of the deadline of 1 November 2023.
- The EU accelerated the installation of renewable energy capacities and produced increasing amounts of renewable electricity. In 2022, **39% of electricity was generated by renewable sources** and, in May 2023, **wind and solar surpassed for the first time total fossil electricity generation¹⁸**. 2022 was a record year for **installed new solar photovoltaic (PV) capacity (41 GW)**, which is 60% more than in 2021 (26 GW). Similar results were achieved with **onshore and offshore wind capacity** (45% more capacity installed than in 2021), also thanks to accelerated permitting processes.
- **The EU agreed increased targets for the clean energy transition** in line with REPowerEU and the European Green Deal. Co-legislators have agreed on the target of **42.5% renewables in the EU energy mix by 2030**, with the ambition to reach 45%, and on the target to **reduce final energy consumption at EU level by 11.7% by 2030** compared with the 2020 reference scenario projections.
- As a result of the EU’s existing climate and energy legislation, the **EU’s greenhouse gas emissions have already fallen by 32.5% compared with 1990**, while the EU economy has grown by around 67% in the same period, decoupling growth from emissions.
- In March 2023, the Commission proposed a **targeted reform of the electricity market design and of the Wholesale Energy Market Integrity and Transparency Regulation**. The proposed provisions aim to make the EU’s industry clean and more competitive and include structural measures to empower and protect consumers and to reduce the dominant influence of gas on the

¹⁶ Current figure of Russian gas imports between January and August 2023 is 28bcm.

¹⁷ 5-year average compared with gas consumption between August 2022 and August 2023.

¹⁸ [EU fossil generation hits record low as demand falls | Ember \(ember-climate.org\)](https://ember-climate.org/news/eu-fossil-generation-hits-record-low-as-demand-falls/)

price of electricity. The proposed reform will promote competitive markets and transparent price setting in view of making the EU energy system fit for a decarbonised economy.

- Alongside these interventions, support measures were introduced with the aim of **providing relief for households and businesses against high energy prices**. They successfully eased the impacts of the energy crisis on living costs. Notably, while the number of persons affected by energy poverty increased by 10.7 million across the EU, the increase would have been even more substantial if it were not for the policy interventions.
- **The Commission has supported Member States to optimise the use of our gas infrastructure.** Over the past months, the EU has made remarkable progress in diversifying its energy supplies and strengthening existing natural gas infrastructure by way of pipelines, e.g. the Baltic Pipe, Poland-Slovakia, Interconnector Greece-Bulgaria, enabling reverse flow between France and Germany, and LNG terminals, e.g. in Germany, Italy and Finland.
- Shortly after the Russian invasion of Ukraine, on 16 March 2022 **the EU synchronised Ukraine and Moldova with the Continental European Grid**, an historic milestone. Commercial electricity exchanges started in summer 2022. The Baltic States have agreed to accelerate to February 2025 the synchronisation of their grids with the Continental European Grid.
- In January 2023, **Member States agreed on non-binding goals for offshore renewable energy generation by 2050**, with intermediate goals for 2030 and 2040, in each of the EU's five sea basins. The new 2030 goals are nearly twice as high as the 61 GW target set out in the Commission's 2020 strategy. This gives an overall ambition of installing approximately 111 GW of offshore renewable energy generation capacity by the end of this decade, and it rises to around 317 GW by mid-century in line with the EU strategy on offshore renewable energy.
- In May 2023, the Commission issued **European Semester country specific recommendations** on the green transition to all Member States focusing in particular on renewables, energy infrastructure and energy efficiency.
- The **Recovery and Resilience Facility** implementation is well underway. Out of 705 milestones and targets satisfactorily fulfilled so far, 261 fulfilled milestones and targets contribute to the climate objective. Since 1 March 2022, the most progress has been made in the policy areas of energy efficiency, sustainable mobility, and renewable energy and networks. The 27 national recovery and resilience plans' total estimated climate contribution is EUR 254 billion, 50% of their overall allocation.
- In February 2023, the EU adopted the **amended Recovery and Resilience Facility Regulation** which provides additional funding (up to EUR 166 billion available) for investments and reforms that will deliver the REPowerEU objectives.
- It is to be noted that the 2023 first-ever **assessment of Member State progress on the implementation of their NECPs** submitted in 2019 shows that substantial ambition and implementing efforts are still needed to deliver on the EU's heightened 2030 objectives and to stay on course to achieve climate neutrality by 2050.

1. THE EUROPEAN GREEN DEAL AS GROWTH STRATEGY AND CRISIS RESPONSE: ON THE ROAD TO CLIMATE NEUTRALITY

1.1 The European Green Deal and the Energy Union: taking stock and moving forward in the aftermath of crises

Since the early days of European integration, energy has played a key role. In 1952, the European Coal and Steel Community, the EU's predecessor, created a single market for coal and steel, pooling the main energy source at that time. A few years later, together with the Treaty of Rome (1957), Euratom was established to form a common market for the development of the peaceful uses of atomic energy. In the 1990s, renewable energy arrived on the European agenda with first indicative targets. The Treaty of Lisbon (2007) enshrined in the EU treaties energy policy as a shared competence between Member States and the EU. Since then, its importance has steadily increased, which is also manifest in the current Commission's agenda.

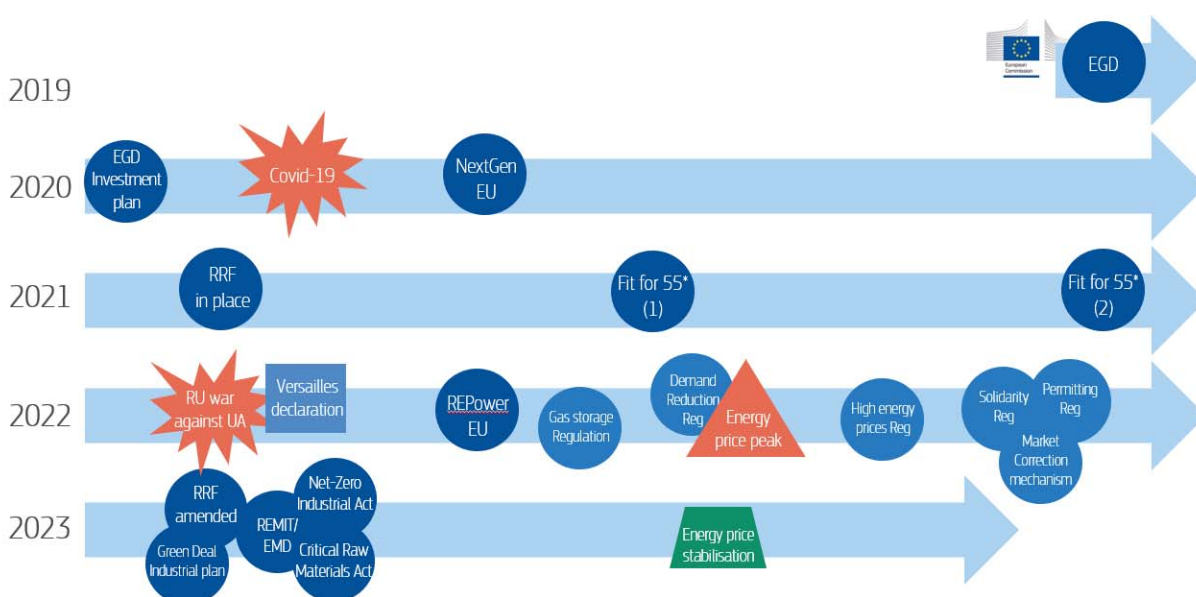


Figure 1: Timeline since the start of the current Commission¹⁹

Shortly after taking office, President von der Leyen announced the **European Green Deal**²⁰ as an overarching policy priority. The Commission committed to tackle energy, climate and environmental challenges and to achieve climate neutrality by 2050, in accordance with the Paris Agreement. The **European Climate Law**²¹ laid down that the EU economy should reduce its greenhouse gas (GHG) emissions by at least 55% compared with 1990 by 2030 and requires the EU to become climate-neutral by 2050. This requires a transformation of the EU towards a society which protects its natural capital, with a modern, resource-efficient and competitive economy based on clean energy. To achieve this objective, the transformation of the energy system plays a fundamental role, as the production and use of energy accounts

¹⁹The first 'fit for 55' proposals included the Renewable Energy Directive, the Energy Efficiency Directive, the Energy Taxation Directive, and the Social Climate Fund; the second 'fit for 55' proposals included the Energy Performance of Buildings Directive and the Hydrogen and Decarbonised Gas Market Package.

²⁰ COM(2019) 640 final.

²¹ Regulation (EU) 2021/1119.

for more than 75% of the EU's GHG emissions. The **Energy Union** supports the clean energy transition as it unites all aspects of energy policy under a coherent, integrated approach. The Energy Union is based on five dimensions: (1) security, solidarity and trust; (2) a fully integrated internal energy market; (3) energy efficiency; (4) climate action and decarbonising the economy; and (5) research, innovation and competitiveness. All dimensions are essential for the European Green Deal, and for the EU's declared ambition to act as a global leader on the challenge of climate change and environmental degradation by setting a credible example for the energy transition.

Only 4 months after the Commission took office, the outbreak of the **COVID-19 pandemic** marked a turning point in the planned work and the Commission moved to a crisis management mode. Large-scale lockdowns caused a severe economic crisis. The Commission took the strategic decision to accelerate the transformation of the economy and society and to use the European Green Deal as a **rebound and growth strategy**.

The Commission designed the **NextGenerationEU recovery instrument**²² through which it is raising funds by borrowing from the capital markets on behalf of the EU as a whole at unprecedented scale. This enables the Commission to offer more attractive conditions, which are passed on to the beneficiaries of its funding programmes. This means that the EU is able to provide loans to Member States' under the **Recovery and Resilience Facility (RRF)** in line with the credit rating and scale of the EU as an issuer. Under this instrument, the EU has become the largest issuer of green bonds worldwide. At least 37% of the RRF are being directed towards reforms and investments in green technologies and capacities, including in sustainable mobility, energy efficiency, renewable energy, climate change adaptation, circular economy, and biodiversity. This has enabled massive investment for the clean energy transition whilst easing the consequences of the economic crisis.

While engineering recovery from the crisis and directing further investment towards the objectives of the European Green Deal, the Commission put several legislative actions in motion to advance on the clean energy transition and its increased climate objective for 2030. In July and December 2021, the Commission proposed the **'fit for 55' package**, a set of proposals to revise and update EU energy, climate and biodiversity legislation. It included, inter alia, proposals on the **Renewable Energy Directive**²³, the **Energy Efficiency Directive**²⁴, the **Energy Taxation Directive**²⁵, the **Energy Performance of Buildings Directive**²⁶, the **Hydrogen and Decarbonised Gas Market Package**²⁷, the **Methane Emissions Reduction in the Energy Sector Regulation**²⁸, a **Social Climate Fund**²⁹ and several other proposals aimed at reinforcing the polluter pays principle, biodiversity aspects and increasing natural carbon sinks. Negotiations on these important files have made significant progress and have largely already been finalised in 2023. The co-legislators approved a higher renewable energy target and a higher energy efficiency target. Negotiations on the energy performance of buildings and the hydrogen and decarbonised gas market

²² COM(2020) 456 final.

²³ COM(2021) 557 final.

²⁴ COM(2021) 558 final, Directive (EU) 2023/1791

²⁵ COM(2021) 563 final.

²⁶ COM(2021) 802 final, negotiations ongoing.

²⁷ COM(2021) 803 final, COM(2021) 804 final.

²⁸ COM(2021) 805 final.

²⁹ COM(2021) 568 final, adopted Regulation (EU) 2023/955.

legislation are ongoing and co-legislators aim at reaching an agreement by the end of 2023. Negotiations on the Energy Taxation Directive are also ongoing and are expected to be finalised by 2024.

February 2022 saw the start of Russia's unjustified and unprovoked war of aggression against Ukraine. Together with prior Russian **manipulation of fuel supplies and prices** as a means of pressuring Europe, this contributed to the severe energy price crisis that had already started to unfold in autumn 2021. Energy prices peaked in August 2022 at EUR 294/MWh for gas and EUR 474/MWh for electricity³⁰, significantly increasing the cost of living, lowering the global competitiveness of EU companies and constraining production of energy-intensive industries.³¹ Again, the EU and its Member States remained united, and agreed on phasing out the EU's dependency on Russian fossil fuels by 2027. Member States implemented various measures to mitigate the impact of high energy prices, most notably through direct support to end consumers. Furthermore, Member States encouraged energy savings and intervened in both wholesale and retail energy markets³².

The Commission led the EU response to the energy crisis and, in May 2022, adopted the **REPowerEU plan**³³, including a **strategy on external energy engagement**³⁴. It had the objectives to save energy and address high energy prices, to diversify energy supply and to accelerate further the clean energy transition, the ultimate goal being to end dependency on Russian fossil fuel imports at the latest by 2027.

The REPowerEU plan also increased funding possibilities under the RRF, which became the main instrument to channel EU funds to support the REPowerEU objectives. Following the adoption of the **REPowerEU Regulation**³⁵, Member States were expected to submit dedicated new chapters³⁶ as part of their updated recovery and resilience plans, in which they outline reforms and investments to increase resilience, security and sustainability of the EU energy system. To date under the existing plans, Member States have assigned 50% of their allocation, i.e. a total of EUR 252 billion to measures contributing to the climate objective and thus supporting REPowerEU objectives and energy independence.

In addition to the **REPowerEU plan** and the **Gas Storage Regulation**³⁷, which was the first legislation proposed in response to the crisis in March 2022, the Commission proposed and the Council adopted in record time several **emergency legislative initiatives**, under Article 122 of the Treaty on the Functioning of the European Union (TFEU), during the course of 2022 to mitigate the effects of the energy crisis in

³⁰ Prices are based on weekly averages of day-ahead Title Transfer Facility gas prices, and a weighted average of electricity prices of main EU electricity markets (DE, ES, FR, NL) and Nord Pool market (DK, EE, LV, LT, FI, SE, NO). Intraday gas prices peaked at over EUR 320/MWh.

³¹ In the day-ahead wholesale market, the price received by all market participants is set by the last power plant needed to cover the demand, which is the plant with the highest marginal costs, when the markets clear. A surge in the price of gas and hard coal can translate into increases of the prices at which the gas and coal-fired generation facilities bid in the day-ahead wholesale market. That in turn can increase prices in the day-ahead market across the Union, as gas and coal-fired generation facilities are often the plants with the highest marginal costs needed to meet the demand for electricity.

³² [ACER: Assessment of emergency measures in electricity markets](#)

³³ COM(2022) 230 final.

³⁴ JOIN(2022) 23 final.

³⁵ Regulation (EU) 2023/435.

³⁶ Under the Technical Support Instrument, the Commission has assisted 17 Member States (BE, BG, CY, CZ, EE, EL, ES, FI, HR, HU, IE, IT, PL, PT, RO, SI, SK) to implement the REPowerEU initiative and identify reforms and investments to phase out fossil fuel imports from Russia.

³⁷ COM/2022/135 final - Regulation (EU) 2022/1032.

industry and households. These included the **Gas Demand Reduction Regulation**³⁸, the **Regulation to address high energy prices**³⁹, the **Solidarity Regulation**⁴⁰, the **Market Correction Mechanism**⁴¹ and the **Permitting Regulation**⁴². These initiatives helped ensure security of gas supply by reducing demand for gas by 18% and electricity (during peak hours), and to accelerate renewable energy deployment. They also aimed at redirecting excess profits of energy producers to consumers and industry, reducing excessive price hikes, and strengthening **solidarity** between Member States so that one steps in when another is at risk of gas supply shortage. Member States decided to pool their demand for gas through the newly created **EU Energy Platform**⁴³ and to make the first steps towards joint purchasing through **AggregateEU**, the demand aggregation mechanism. The Gas Demand Reduction Regulation has in the meantime been prolonged. Other measures adopted under Art. 122 TFEU have proved their usefulness in a longer-term perspective and have already, or might in the future be included in permanent legislation.

At the same time, the EU supported **Ukraine's energy system** through the provision of 4 969 power generators and 2 507 transformers through the EU Civil Protection Mechanism, the setting up of a **Ukraine Energy Support Fund** by the **Energy Community Secretariat** with a current donor pledges of EUR 218 million, the donation of 5 700 solar panels and the stabilisation of the Ukrainian and Moldovan electricity systems through its synchronisation with the continental European grid. The EU also provided Ukraine with more than EUR 54.8 million in material and nuclear-safety-related assistance. Together with the Energy Community, the Commission supports Ukraine, Moldova and the Western Balkans in their continuous alignment with the EU *acquis*, which is an important step in preparing for future accession to the EU. Through international coordination mechanisms, such as the **G7+ coordination group**, the EU coordinates with global actors in responding to Russia's targeted campaign of destruction aimed at Ukraine's energy infrastructure.

Another crucial step taken to uphold strategic autonomy was to prepare for the future by ensuring a secure supply of **net-zero technologies** and **critical raw materials** for the twin transition. The current geopolitical context has also increased competition in the net-zero industry, with the global market for key, mass-manufactured, net-zero technologies set to triple by 2030 with an annual worth of around EUR 600 billion. In addition, several non-EU countries have put in place initiatives⁴⁴ to foster the development of domestic clean energy technology value chains. The combination of the direct and indirect effect of high energy prices, and the economic and geopolitical turmoil, drove up manufacturing and installation costs for wind and, to a lesser extent, solar projects⁴⁵. When looking at the **clean energy value chains**, the EU is highly reliant on non-EU countries to access materials and products that are instrumental to deploy clean energy technologies, and it depends on China in at least one stage of the value chains. Looking specifically at the solar sector, in 2022, almost all panels sold in the EU were imported, and around 90% came from China. Over the last 5 years, EUR 18.5 billion, i.e. 91% of all photovoltaic import expenditure, was spent on Chinese products.

³⁸ COM(2022) 361 - Council Regulation (EU) 2022/1369.

³⁹ COM(2022) 473 - Council Regulation (EU) 2022/1854.

⁴⁰ COM(2022) 549 - Council Regulation (EU) 2022/2576.

⁴¹ COM(2022) 668 - Council Regulation (EU) 2022/2758.

⁴² COM(2022) 591 - Council Regulation (EU) 2022/2577.

⁴³ [EU Energy Platform](#)

⁴⁴ For example, the 2022 US Inflation Reduction Act, the Made in China 2025, and the Japanese Basic Plan for the GX: Green Transition Policy.

⁴⁵ According to some stakeholders, the cost of building offshore wind farms in the EU increased by up to 40% in 2023.

The **Green Deal Industrial Plan**⁴⁶, adopted in February 2023, outlined plans for securing the EU **industrial leadership** in net-zero technologies and to move from being a net importer to relying more on a strong domestic manufacturing base, through accelerated access to funding, enhanced skills and support for trade to boost our clean technology competitiveness. The subsequent legislative proposals, the **Net-Zero Industry Act** and the **Critical Raw Materials Act**⁴⁷, were put forward to simplify the regulatory framework, which is crucial to attract investments, reduce the EU's reliance on highly concentrated imports, and increase circular economy approaches for the supply of strategic raw materials. Both acts are currently being negotiated by the co-legislators with the intention of reaching agreement by December 2023. Associated with this, the **2023 progress report on competitiveness of clean energy technologies**⁴⁸, which accompanies this report, provides insights on the main drivers, opportunities and challenges for the EU to strengthen its competitiveness in the net-zero industry and, more specifically, in strategic net-zero technologies. Further action to increase the EU's competitiveness in the clean tech sector includes a **European wind power package**, a **grids action plan**, a series of **clean transition dialogues** with industry, and a revised **Strategic Energy Technology Plan**. All these measures are meant to boost EU competitiveness in the clean energy sector and will be complemented by the **special report**⁴⁹ **on the future of European competitiveness from Mario Draghi**.

At the same time, the EU is increasing its efforts to move towards a **circular economy**, under which global material extraction and use could be reduced by one third⁵⁰, through better product design, durability, reuse and recycling, all of which will also reduce environmental impacts⁵¹. The Critical Raw Materials Act will incentivise recycling of critical raw materials with the objective to supply 15% of EU demand from secondary raw materials. This will strengthen Europe's security of supply for critical raw materials without creating dependencies elsewhere.

The EU is continuing to work on **empowering energy consumers** and making sure that they benefit from the deployment of low-cost renewable energies across the EU energy system. In March 2023, the Commission proposed a **targeted reform of the electricity market design**⁵² and of the **Wholesale Energy Market Integrity and Transparency Regulation**⁵³, with the aim to make the EU's industry cleaner and more competitive, and to include structural measures to empower and protect consumers, while reducing the dominant influence of gas on the price of electricity. The proposed reform will promote competitive markets and transparent price setting. EU consumers and industry will be better protected against market manipulation and abuse, thanks to a strengthened role of the EU Agency for the Cooperation of Energy Regulators (ACER). Co-legislators aim at concluding negotiations by the end of 2023.

The **affordability of energy** is a major objective of the Energy Union and plays a crucial role in the European Green Deal and crisis response measures. To ensure that the clean energy transition leaves no person, no sector and no region behind, this policy framework remains more important than ever.

⁴⁶ COM(2023) 62 final.

⁴⁷ COM(2023) 160 final.

⁴⁸ COM(2023) 652.

⁴⁹ [2023 State of the Union Address by President von der Leyen](#)

⁵⁰ Circle Economy, 2023, *The Circularity Gap Report*.

⁵¹ A circular economy would reduce environmental pressures related to extraction of raw materials, GHG emissions, and waste generation. According to the International Resource Panel's global resource outlook 2019, a circular economy could reduce impacts on biodiversity and water by 90%, GHG emissions by 50% and improve human health.

⁵² COM(2023) 148 final, SWD(2023) 58 final.

⁵³ COM(2023) 147 final.

Already before the energy crisis, the Commission had proposed several actions to ensure everyone is on board for the green transition, one important initiative being the **Just Transition Mechanism**⁵⁴. Together with the **Coal regions in transition initiative**, the Commission continues providing support to the regions most affected by the transition to climate neutrality. By end of October 2023, twenty-seven Member States have submitted 70 Territorial Just Transition Plans, detailing the pathway of their transition until 2030, in line with the National Energy and Climate Plans (NECPs). The Just Transition Platform provides tailored, needs-oriented assistance and capacity building to coal and carbon intensive regions, and supports the implementation of the Just Transition Fund.

The **Social Climate Fund** aims at preventing the negative impacts that may arise from the new EU emissions trading system, which extends the carbon pricing instrument to emissions from buildings, road transport and fuel combustion in industry not covered by the existing emission trading system. Adopted in April 2023, the Social Climate Fund will provide an estimated EUR 86.7 billion to Member States over 2026-2032 to support vulnerable households, micro-enterprises and transport users by aiding them invest in energy efficiency of buildings, to decarbonise the heating and cooling of buildings and shift to a more renewable energy and to grant improved access to zero- and low-emission mobility and transport. Member States will also have the option of spending a part of the resources on temporary direct income support.

The update of the Energy Efficiency Directive also puts a stronger focus on alleviating energy poverty and empowering consumers. The new provisions include the first-ever EU definition of ‘energy poverty’ and require Member States, when implementing energy efficiency measures, to prioritise people affected by energy poverty, vulnerable customers, low-income households, and where applicable, people living in social housing.

During the energy crisis, many households were unable to pay their energy bills. The **Consumer Conditions Scoreboard** of 2023⁵⁵ shows that, in 2022, 16% of European consumers experienced difficulties in paying their energy bills and 71% of them changed habits to save energy. In 2022, energy poverty, measured by the inability to keep the home adequately warm, affected 9.3% of the EU population impacting approximately 40 million people⁵⁶, against approximately 30 million in 2021. Modelling results⁵⁷ show that as a result of energy price changes between August 2021 and January 2023 (compared to the previous 18 months), energy poverty would have substantially increased across the EU if it were not for the policy interventions. Among the **emergency legislative initiatives** in 2022 to **protect consumers from high energy prices**, the Commission also proposed a **Solidarity Regulation**, which mitigated the impact on the price for gas by addressing demand, and the **Market Correction Mechanism**, which limited prices in EU gas markets.

In October 2022, the Commission proposed **Supporting Affordable Energy** measures, which enabled Member States to use unspent cohesion policy funding under their 2014-2020 allocation to provide direct support to vulnerable families and small and medium-sized businesses. Member States introduced schemes to protect consumers and businesses based on adjusted State aid rules (**Temporary Crisis and Transition Framework**) and other social policy measures. In 2022, the total amount of **energy subsidies** paid are

⁵⁴ The Just Transition Mechanism consist of three pillars: the Just Transition Fund (Regulation (EU) 2021/1056), a public sector loan facility, and a scheme under InvestEU.

⁵⁵ [Consumer Conditions Scoreboard 2023](#)

⁵⁶ Eurostat.

⁵⁷ For background and results, see [AMEDI: Assessing and Monitoring Employment and Distributional Impacts](#) and [JRC: The effect of rising energy and consumer prices on household finances, poverty and social exclusion in the EU](#).

estimated to have been EUR 93 billion for households EUR 53 billion for industry. Total energy subsidies in 2022 are estimated to have been at EUR 390 billion.

The Commission also published a **recommendation on energy poverty**⁵⁸ and facilitated a **joint declaration on enhanced consumer protection** among key stakeholders in the energy sector⁵⁹. Finally, the Commission formally set up a **coordination group on energy poverty** where Member States can share good practices and solutions in helping the most vulnerable in society to navigate the crisis.

According to the International Energy Agency, the **increase in renewable energy supply** had positive impacts for consumers because wholesale electricity prices would have been 8% higher in all European markets without the additional installed capacity. Thanks to additional photovoltaic and wind capacity installed, EU consumers are expected to save about EUR 100 billion from 2021 to 2023⁶⁰. At the same time, high energy prices increased consumer interest in **collective self-consumption schemes**. Member States progressed in implementing the legislative provisions for energy communities and the Commission proposed further widening of consumer empowerment.

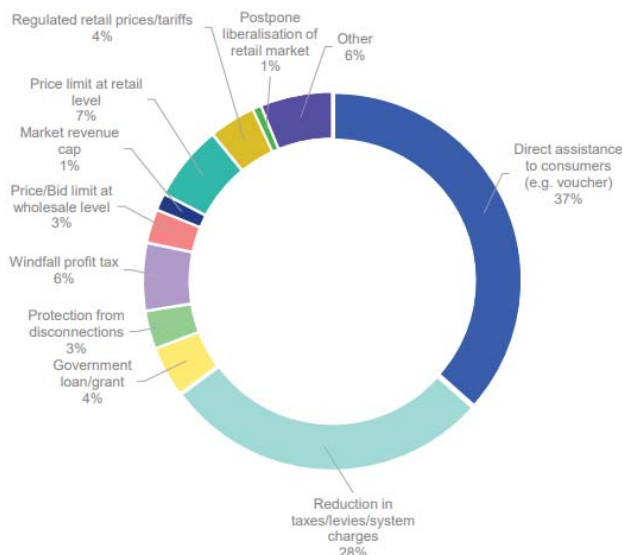


Figure2: Breakdown of measures targeting affordability. Source: ACER – High-level Analysis of Energy Emergency Measures, 20 March 2023 [\[link\]](#)

The EU's decisive and united action, accompanied by favourable conditions (e.g. mild winter, lower energy demand in Asia), helped to reduce the **impacts of the energy crisis**. After the peak in energy prices in August 2022, natural gas prices fell to an average of EUR 44/MWh and electricity prices to an average of EUR 107/MWh from January to June 2023⁶¹. As a response to the Russia's aggression, the EU introduced **restrictive measures against Russia** including a complete ban of imports of coal and a ban on imports of seaborne oil. The EU completely phased out imports of Russian coal, reduced its dependency on Russian oil by around 90%, and imports of Russian gas declined by 75% between March 2021 and March 2023. Collectively, the EU reduced its energy dependency on Russia and avoided energy disruptions.

⁵⁸ C(2023)4080.

⁵⁹ Eurelectric, Eurogas, European Energy Retailers, DSO Entity, E-DSO, CEDEC and GEODE.

⁶⁰ [IEA: Renewable Energy Market Update - June 2023](#)

⁶¹ [EU fossil generation hits record low as demand falls](#) | [Ember \(ember-climate.org\)](#)

Nevertheless, the EU needs to stay vigilant and continue to reduce energy dependencies as the risk of energy supply disruptions and consequent price peaks is still present.

1.2 The EU energy system ahead of winter 2023-2024: Energy security situation in the EU and its Member States

Ahead of **winter 2023-2024**, the EU is well prepared to ensure energy security thanks to the availability of various energy sources, filled gas storage facilities, reduced energy demand, and increasingly diversified energy suppliers.

However, **risks remain** such as a possible complete halt of pipeline imports and attacks on critical infrastructure. More frequent extreme weather events can also affect the energy system and energy security of supply. A balanced approach and solidarity among Member States will continue to play a key role in the EU's collective resilience.

The measures adopted in 2022 have considerably eased the pressure on energy markets and gas prices. Nevertheless, gas prices are still higher than during the period 2015-2019 when on average gas prices ranged from EUR 15-20 per MWh. Prices remain volatile and react to any disruption on the global market, as illustrated by the recent increase in gas prices due to the Middle East crisis and the temporary closure of a gas field in Israel, as well as the leak discovered on a gas pipeline in the Baltic region connecting Finland to Estonia. The EU needs to stay vigilant as the cumulative impact of these events combined with market uncertainty could affect European and global energy markets.

Energy supply with reduced imports from Russia

The years 2022 and 2023 were among the most challenging for the EU energy system, but the EU managed to maintain and even increase the **security of its energy supply**. The swift and successful implementation of the REPowerEU plan has helped to significantly reduce the share of Russian gas in EU imports, while ensuring sufficient gas for high-demand periods and pushing energy prices down from historic highs.

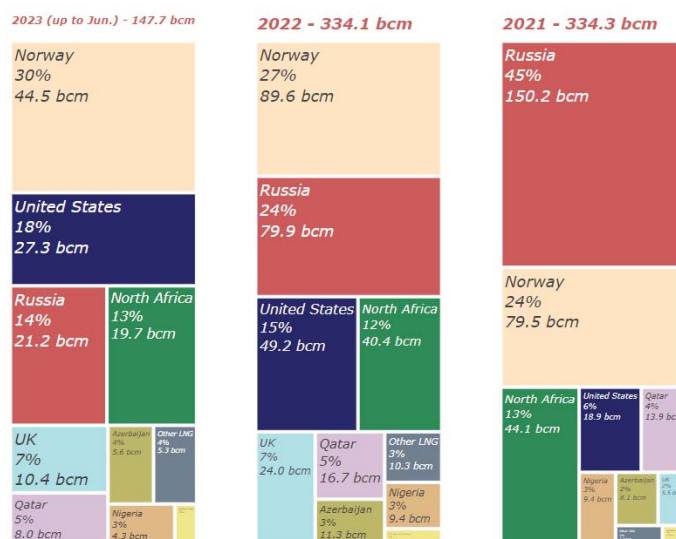


Figure3: Composition of natural gas imports (pipeline and LNG) for the period 2021-2023; Source: ENER Chief Economist team, based on data from JRC, ENTSO-G, Refinitiv]

For **natural gas**, security of supply has improved significantly over the past year and the EU is on track to meet the REPowerEU target to be independent of Russian fossil fuels by 2027. In 2022, total imports of

Russian gas (LNG and piped natural gas) fell to 80 bcm (24% of EU imports), compared with pre-crisis annual imports of 155 bcm (45%). Even though LNG imports from Russia have increased since 2021, they represent a very small portion of overall gas imports. Total imports are falling even further in 2023, projected to be approximately 40-45 bcm. In June 2023, only 8% of gas imports came through Russian pipelines, compared with over 50% before the war of aggression.⁶² Thanks to the important diversification efforts and reduction in demand, the EU has been able to compensate for all the missing Russian volumes. The new **storage policy** not only ensured energy security for winter 2022-2023, but it also ensures a more comfortable situation for the winter ahead.

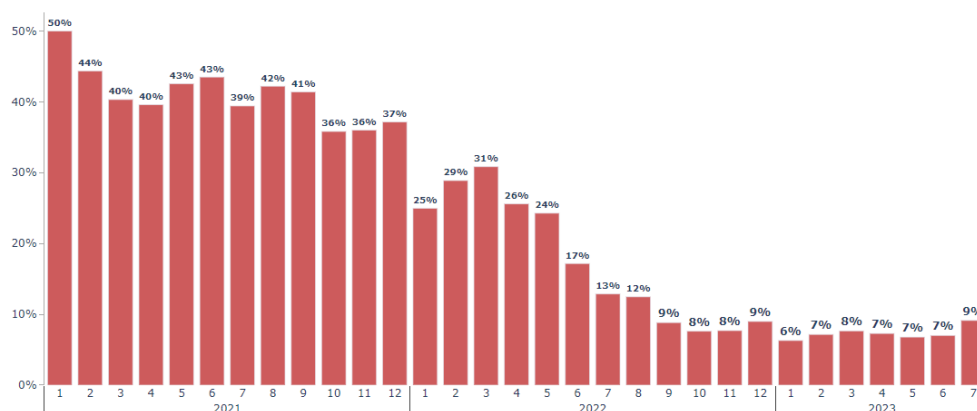


Figure4: Share of Russian pipeline gas in total EU natural gas imports; Source: ENER Chief Economist team, based on data from JRC, ENTSO-G, Refinitiv

The **Gas Storage Regulation**⁶³ adopted in June 2022, contributed to a historically high filling level of 95% in November 2022, surpassing the target of 80% filling level. The EU reached more than 56% of storage filling level at the end of the 2022-2023 heating season and its target of 90% gas storage fillings was reached on 18 August 2023, more than 2 months ahead of the November deadline.

Russian oil imports into the EU have decreased by 90% since March 2022 without significant impacts on the EU economy. Member States are holding **emergency oil stocks** in line with EU legislation. The EU

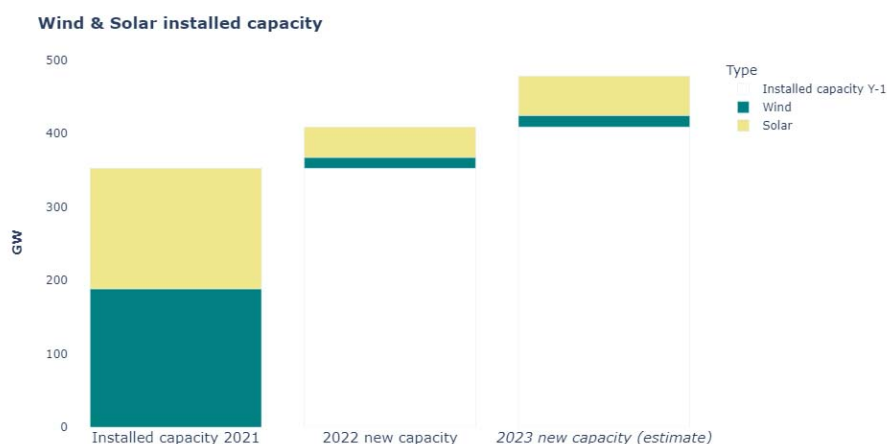


Figure5: New wind and solar additions in 2022 - estimates for 2023; Source: ENER Chief Economist team, based on data from Eurostat, WindEurope, Solar Power Europe

⁶² ENER Chief Economist.

⁶³ COM(2022) 135 final - Regulation (EU) 2017/1938.

sanctions and G7 price cap on oil imported from Russia did not affect the EU's oil security of supply while having the intended effect of limiting Russian oil revenues. In its 11th package of **sanctions**, the EU introduced anti-circumvention tools to prevent imports of oil products produced in other countries from Russian oil or products with unknown origin⁶⁴. The Commission is closely monitoring oil markets along with Member State experts in the Oil Coordination Group as further OPEC and Russian cuts could increase market tightness. Even though, Member States hold high levels of emergency oil stocks, in particular diesel oil, it has to be recognised that the cumulative impact of recent events could potentially affect the EU's security of supply and global energy markets.

In the face of the energy crisis, the EU increased and accelerated the installation of **renewable energy technologies**, which strengthened the EU's energy supply and crucially underpins the long-term elimination of Russian fossil fuels imports. Based on REPowerEU, the EU adopted the **Permitting Regulation**⁶⁵, which simplified and speeded up renewable permitting procedures by focusing on specific technologies and projects with the highest potential for quick deployment, such as solar photovoltaic (PV) on artificial structures and heat pumps, as well as repowering. In 2022, 57 GW of new renewable energy capacity was installed, essentially solar PV and wind turbines. In both sectors, this is about 50% more than in 2021. This helped to more than balance out low production of hydropower in 2022 (12% of total power production), even though it recovered towards average levels in 2023 due to increased rainfall and higher reservoir levels⁶⁶. In the **renewable heating sector**, the use of heat pumps rose by 39% compared with 2021⁶⁷. The solar thermal market increased by almost 12%⁶⁸. Electricity production from solid biofuels was stable, representing around 3% of total electricity production (2.9% in 2020 and 3.1% in 2021). Combining energy for the generation of electricity and heat, the main renewable energy source in the EU remains bioenergy (around 60%). In total, the **share of renewable energies** in the energy mix has increased considerably over the course of 2022 and 2023 and the EU agreed to speed up the deployment of renewable energies, with a target of **42.5% in the EU energy mix** by 2030, and the ambition to reach 45%⁶⁹.

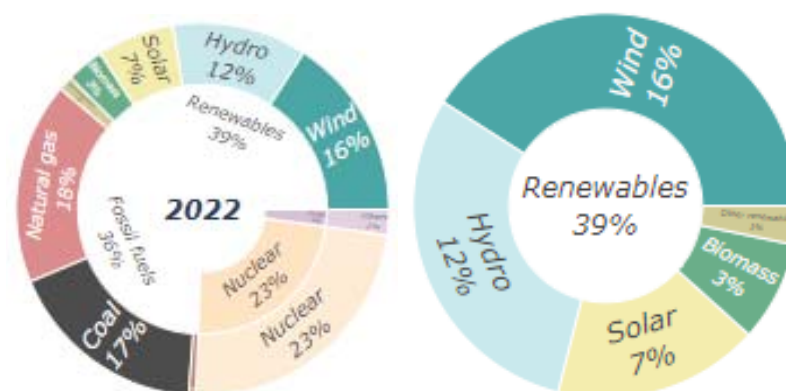


Figure6: Share of renewables in electricity supply in 2022; Source: ENER Chief Economist team, based on data from Fraunhofer, ENTSO-E

⁶⁴ [Russia's war of aggression against Ukraine: EU adopts 11th package of economic and individual sanctions](#)

⁶⁵ COM(2022) 591 - Council Regulation (EU) 2022/2577.

⁶⁶ [EU fossil generation hits record low as demand falls | Ember \(ember-climate.org\)](#)

⁶⁷ [Market data – European Heat Pump Association \(ehpa.org\)](#)

⁶⁸ [Solar thermal and concentrated solar power barometer 2023](#)

⁶⁹ [European Green Deal: EU agrees stronger legislation to accelerate the roll-out of renewable energy](#)

The energy transition also helps to **tackle air pollution** and to reduce associated premature deaths and ecosystem impacts. According to the **Third Clean Air Outlook report**⁷⁰, the accelerated roll-out of wind and solar energy will, thanks to REPowerEU, bring long-term clean air benefits⁷¹.

Nuclear energy continues to contribute to the security of electricity supply. In 2023, it generated around 24% of total electricity produced in the EU (23% in 2022; 26% in 2021). The EU's nuclear power plants are ageing, while new advanced nuclear technologies, such as **small modular reactors**, are emerging, requiring significant investments in this sector. In view of this, the Commission has adopted measures to improve the investment environment for long-term operation and new capacities⁷². In this situation, those Member States having nuclear energy as a part of their energy mix need to take timely decisions regarding investments in the long-term operation of existing nuclear power plants and make appropriate safety and efficiency improvements.

The Commission and the Euratom Supply Agency, in close collaboration with all relevant stakeholders in the concerned Member States and like-minded international partners, also increased their efforts to encourage the continued **diversification of supply of nuclear fuel and nuclear fuel cycle services**, aiming to move towards more reliable non-Russian suppliers⁷³. The objective is to mitigate the risks in some Member States related to dependency on Russian nuclear fuel supplies and fuel cycle services, as well as spare parts and maintenance, by ensuring the availability of fuel and alternative nuclear supplies.

Energy demand

The Commission proposed several measures to **save energy and reduce energy consumption** in line with the 'energy efficiency first' principle. In May 2022, the Commission outlined in its Communication EU 'Save Energy'⁷⁴ possible measures for Member States to cut energy consumption and increase energy efficiency, in buildings, industry and transport. This was complemented by the **Energy Saving Sprint**⁷⁵ - an initiative launched by the Commission, the EU Covenant of Mayors and the European Committee of the Regions, to support cities in taking immediate measures in the same direction.

In 2022, the Council agreed on a **voluntary gas demand reduction target of 15%** (or 45 bcm) by spring 2023, which was overachieved with demand dropping by 18% (or 53 bcm) with all sectors reducing their gas demand. Building on this experience, the voluntary target was extended to March 2024 and is estimated to save around 60 bcm of gas. In October 2022, the Council introduced exceptional **time-limited measures to reduce electricity demand and to redistribute the energy sector's exceptionally high revenues to final customers**⁷⁶. The Regulation set the target to reduce overall electricity demand by 10% and by at least

⁷⁰ COM(2022) 673 final.

⁷¹ However, the rebound in coal use due to phasing out Russian gas will worsen air quality in the short term.

⁷² EU Complementary Delegated Act that under strict conditions includes specific nuclear activities in the EU taxonomy and Net-Zero Industry Act.

⁷³ Out of twelve Member States generating nuclear energy, four are fully (Bulgaria, Czechia, Hungary and Slovakia) and one partially (Finland) dependent on supply of Russian nuclear fuel. Some of these countries are especially vulnerable as nuclear energy represents a large proportion in electricity production (up to 53.8%) and their dependence on other Russian energy supplies (gas, oil) is high. Dependencies on Russia related to nuclear fuel cycle services (conversion, enrichment and reprocessing) extend well beyond the five Member States mentioned above. In addition, the Commission and the Euratom Supply Agency are currently evaluating the extent of existing EU dependencies in the nuclear sector as regards the supply of spare parts and maintenance services from Russian-controlled entities.

⁷⁴ COM(2022) 240 final.

⁷⁵ [Cities Energy Savings Sprint](#)

⁷⁶ COM(2022) 473 - Council Regulation (EU) 2022/1854.

5% during peak hours. While the reduction in demand during peak hours was achieved, the reduction in overall electricity consumption by 10% was challenging for Member States.



Figure7: Natural gas demand reduction (August 2022 – August 2023 vs 5-year average); Source: Eurostat

The EU made major steps to reinforce legislation for more energy efficiency. With the **update of the Energy Efficiency Directive**⁷⁷, the EU is expected to reduce final energy consumption at EU level by 11.7% by 2030 compared with the projections of the 2020 reference scenario. Moreover, new rules have been adopted for standby consumption of electrical appliances⁷⁸, and the **European Product Registry for Energy Labelling**⁷⁹ database, a new tool for the public at large and public procurers to identify efficient products, was made available.

Diversification of energy sources

As a consequence of the REPowerEU Plan and the EU's efforts to phase out its dependency on Russian fossil fuels, the EU significantly diversified its energy supply. In April 2022, the Commission, mandated by the **European Council**, created an **EU Energy Platform**⁸⁰ to pool the EU's demand for gas and to coordinate voluntary joint purchase in view of achieving favourable contracts with non-Russian international suppliers. The EU energy platform was also opened to Georgia, Moldova, Ukraine and the Western Balkan countries, with Ukraine, Moldova and Serbia subscribing to the platform.

The demand aggregation platform **AggregateEU** was launched on 25 April 2023, with so far three successful tendering rounds taking place in May and June/July and September/October 2023. These three rounds resulted in the aggregated demand of 44.75 bcm, received bids of 52 bcm, and in total 34.78 bcm partially or entirely matched between offers and demand. Demand expressed by EU buyers in the first two calls alone was twice the mandatory target of 13.5 bcm set by Council Regulation (EU) 2022/2576. The EU Energy Platform has some 170 companies subscribed and the aggregated volumes indicate that this is an effective tool in leveraging the EU political and market weight. In the context of the interinstitutional

⁷⁷ COM(2021) 558 final, Directive (EU) 2023/1791.

⁷⁸ Commission Regulation (EU) 2023/826.

⁷⁹ [European Product Registry for Energy Labelling \(EPREL\)](#)

⁸⁰ COM(2022) 549 - Council Regulation (EU) 2022/2576.

negotiations on the proposed hydrogen and decarbonised gas market package, the co-legislators are discussing possibilities of prolonging AggregateEU for purchases of gas beyond 2024 and expanding the mechanism to other products, such as renewable hydrogen and other renewable gases.

The Commission has supported Member States in addressing the **gas infrastructure bottlenecks** identified as part of the REPowerEU Plan, and in implementing projects of common interest on the fifth Union list selected in line with the former Trans-European Energy Infrastructure Regulation. Many are backed financially through the **Connecting Europe Facility** (CEF) and cohesion policy funds. Under the CEF alone, grants of EUR 1.64 billion were awarded to energy infrastructure projects of common interest in 2021 and 2022. The projects of common interest finalised in recent months have ended the dependency of all Member States on a single energy supplier and the EU has made remarkable progress in diversifying its energy supplies and optimising existing natural gas infrastructure by way of pipelines, e.g. the Baltic Pipe, Poland-Slovakia, Interconnector Greece-Bulgaria, enabling reverse flow between France and Germany, and LNG terminals, e.g. in Germany, Greece, Italy and Finland. For the energy security of Member States and regions, the EU will continue supporting critical projects, which are not economically viable without EU financial or regulatory help, for instance through CEF, the RRF, permitting acceleration, and exemptions, where relevant.

In addition, the Commission has worked on **strengthening relations with international partners** and diversifying its imports of gas and LNG towards more reliable, non-Russian, suppliers. The EU expanded its imports of natural gas and LNG from **Norway** and the **US** to make up for reduced imports from Russia. With 49.3 bcm, LNG imports from the US more than doubled in 2022 (2021: 18.9 bcm). Pipeline gas imports from Norway increased from 79.26 bcm in 2021 to 86.69 bcm in 2022, enlarging Norway's share of total EU imports via pipeline from 30% to 40%. The Commission has a regular dialogue with **Nigeria**, the largest LNG producer in **Africa**. In July 2023, new memoranda of understanding on cooperation on the energy transition were signed with **Uruguay** and **Argentina**. In July 2022, the EU and **Azerbaijan** adopted a new Memorandum of Understanding on a Strategic Partnership in the Field of Energy and the EU increased gas supplies from this country by 40%. Both parties agreed to double gas delivery to the EU by 2027 via the Southern Gas Corridor and to enhance their cooperation on clean energy, energy efficiency, electricity transmission and on methane emissions.

In the **Mediterranean** region, the Commission continued working with **Egypt**, **Israel** and the **East Mediterranean Gas Forum** on the implementation of the trilateral Memorandum of Understanding, which helped to boost LNG supplies from Egypt to the EU from 1.1 bcm in 2021 to 4.2 bcm in 2022. The Commission will continue to monitor the situation in the Middle East and its potential impact on global energy markets. At the same time, the EU continued its dialogue with both Algeria and Egypt on efforts to reduce methane emissions, including through the implementation of the “**You Collect We Buy**” approach, by which companies would be able to collect and sell the recovered gas that otherwise would be vented or flared. The EU continued its dialogue with **Algeria** in order to further develop its strategic partnership on energy. Algeria is the main Mediterranean supplier of natural gas to the EU and could potentially become a supplier of low-carbon and renewable energy in the future. Total energy imports from Algeria decreased slightly in 2022 to 40.35 bcm (2021: 44.1 bcm). Pipeline imports to Spain decreased, while imports to Italy increased.⁸¹

⁸¹ ENER Chief Economist, based on data from JRC, ENTSO-G Transparency

The EU intends to increase supply of **renewable hydrogen** as part of a diversified and decarbonised energy system independent of Russian energy imports. The proposed **hydrogen and decarbonised gas market package** will define the market set-up for hydrogen and ensure easier market access for renewable and low-carbon gases. The **European Hydrogen Bank**⁸² will help to overcome initial investment challenges for renewable hydrogen by covering the cost gap between renewable hydrogen and fossil fuels. The demand aggregation of hydrogen could enable matching of future producers and off-takers of hydrogen, and it would help to leverage the EU's political and market weight vis-à-vis international hydrogen producers, thereby resulting in more affordable prices. The EU seeks partnerships with countries in the **Mediterranean basin**, the **North Sea region**, the **Gulf countries**, **Saudi Arabia** and **Ukraine** for the possible import of renewable hydrogen. In 2022, at COP 27 in Sharm el-Sheikh, the EU already concluded a partnership with Egypt to facilitate the uptake of renewable hydrogen investments and trade.

2. TAKING STOCK OF MEMBER STATE PROGRESS TOWARDS THE 2030 ENERGY AND CLIMATE AMBITION

By 15 March 2023, Member States were due to report for the first time in an integrated manner on their progress towards implementing their 2020 **national energy and climate plans (NECPs)** covering the period 2021-2030. This reporting covered progress towards their targets, objectives and contributions across the five dimensions of the Energy Union including on greenhouse gas emissions and removals, as well as the implementation or amendment of Member State policies and measures and their financing.

Moreover, Member States had to report on progress towards their **adaptation** goals, the impact of their policies and measures on **air quality and emissions of air pollutants**, and the steps taken to establish a **multilevel energy and climate dialogue**. Based on their reports, the Commission has assessed **Member State progress** towards implementation of their first NECPs. This assessment is crucial to take stock of where the EU stands in meeting its 2030 climate and energy ambitions⁸³. The full assessment is presented in a staff working document accompanying this report. In addition, the **Climate Action Progress Report** provides an assessment of climate policy progress under the Governance Regulation⁸⁴ and under the European Climate Law, including for the first time the collective progress made by Member States towards the **EU's 2050 climate-neutrality objective**.

The integrated nature of the reporting represents a **significant reduction in administrative burden** on the side of both the Commission and the Member States, as compared with the multiple reporting and assessment obligations under the energy and climate *acquis* before the entry into force of the Governance Regulation. This integrated reporting has enabled a more **holistic assessment of progress towards the 2030 energy and climate goals**. The fact that the reporting was done through an **e-platform** contributed substantially to simplify the reporting process and increase the comparability of data, facilitating the subsequent review and assessment.

⁸² COM(2023) 156 final.

⁸³ Each Member State is to report to the Commission every 2 years on the status of implementation of its national energy and climate plan by means of an integrated national energy and climate progress report covering all five dimensions of the Energy Union. Where possible, the reporting and assessment makes use of comparable energy statistics. As a result, the latest consolidated data in certain areas relate to 2021 or 2022. Data with a cut-off in 2021 do not reflect that many Member States have undertaken significant shifts away from fossil fuel imports from Russia since the start of Russia's war of aggression against Ukraine.

⁸⁴ Regulation (EU) 2018/1999.

Member States are currently also **updating their NECPs**, building on the progress achieved so far. They now need to reflect a new legislative and policy environment (the ‘**fit for 55**’ package; a changed geopolitical situation since the original NECPs; and the EU’s response under the **REPowerEU plan**) to ensure that they will achieve collectively the increased ambition through policies that are based on **credible and solid** Member State planning.

2.1. Progress towards meeting the EU and Member State 2030 targets, objectives and contributions

BOX - ‘We must now focus on adopting the rules as soon as possible and turn to implementation’
(Ursula von der Leyen, State of the Union, 2023)

- EU greenhouse gas net emissions decreased by around 3% in 2022, continuing the overall downward trend of the past 30 years. However, the **EU and its Member States need to significantly step-up implementation efforts in order to keep on track towards the EU’s 2030 55% GHG reduction target and the EU’s 2050 climate neutrality objective.**
- The share of **renewable energy** in gross final energy consumption reached 21.8% in 2021. With an average yearly increase of 0.67 percentage points since 2010, reaching the new 2030 EU target of 42.5% (and even more so the aspirational target of 45%) will require a much faster growth in the coming years.
- In 2021, primary energy consumption in the EU (1311 Mtoe) remained lower than in 2019. This trend could indicate, if continued in the coming years, that structural improvements took place in the two-year period.
- While Member States have made good efforts to increase cross-border capacity, **further efforts are required to meet the 2030 interconnectivity objectives**, in particular in terms of the timely delivery of planned cross-border projects between Member States.

After the 2021 strong rebound in greenhouse gas emissions following the unprecedented fall in 2020 due to the COVID-19 pandemic, EU emissions in 2022 are expected to be back in line with the 30-year descending trend achieved before the pandemic. According to provisional data, total EU domestic GHG emissions (i.e. excluding land use, land-use change, and forestry (LULUCF) and international aviation) decreased by 2.4% in 2022 compared with 2021, while EU GDP grew by 3.5%. This translates into a reduction in GHG emissions of 30.4% compared with the 1990 base year (or 29% when international aviation is included). Reported GHG net removals from LULUCF are also expected to slightly increase⁸⁵. 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).

However, the most recent GHG emission projections submitted by Member States, show **significant gaps with the EU collective climate targets**, even when additional measures are considered. In order to stay on track with the EU 2030 reduction target and climate neutrality by 2050, the EU needs to significantly pick up the pace of change and increase the focus on areas where the required emission reductions are significant (e.g. buildings, transport), where the progress has been recently far too slow (i.e. agriculture), or where reductions have even moved in the wrong direction in recent years (i.e. LULUCF)⁸⁶.

⁸⁵ Approximated 2022 data could suggest a break in the declining trend in the LULUCF sink observed in recent years. However, the assessment takes into consideration the great uncertainty of these data and that it will possibly be subject to major revisions.

⁸⁶ Ibid.

To factor in climate change and to lay the ground for effective and informed **climate adaptation** in the context of increased frequency and intensity of extreme weather events, Member States considered heatwaves, droughts, stronger storms and an increased amount of precipitation to be hazards for the Energy Union. Examples of vulnerabilities and risks cited **across Energy Union dimensions** include the vulnerability within the energy system (e.g. hydropower to water scarcity and droughts, nuclear to rising temperatures of cooling water due to heat waves, the reduction in the availability and quality of biomass, grid disruptions).

To deal with these risks, Member States set both overarching national and **sector-specific adaptation goals** in linked sectors, such as agriculture, buildings, forestry, energy, infrastructure and transport. Twenty Member States mentioned adaptation goals, the majority fully corresponding to the identified risks (14 fully, 6 partially). **Monitoring and evaluation frameworks for adaptation goals** are either recent or under development in Member States, and operate under national adaptation strategies or plans, rarely considering synergies with Energy Union dimensions as reflected in NECPs. 12 Member States reported clear progress on implementing adaptation actions for each adaptation goal.

In 2021, the EU reached a share of **21.8 % of renewable energy** in gross final energy consumption, a slight **reduction compared to 2020** (22%).⁸⁷ While in absolute terms, the consumption of renewable energy increased by approximately 5% compared to 2020, at 220 804 Mtoe compared to 209 595 Mtoe the year before, overall energy consumption grew faster as economic activity picked up following the lift of COVID restrictions. Moreover, the renewable energy shares of several Member States dropped because of delays in implementing the Renewable Energy Directive's rules on sustainability criteria for bioenergy.

Putting the progress in the context of the pathway towards 2030, the 2021 share of 21.8% is slightly below the target of the binding interim trajectory share of 22.2% for 2022⁸⁸ based on the current 2030 target of 32%. Based on the updated target of 42.5%, it would, however, be more than 2 percentage points below the trajectory (milestone would be at 24.05%).

On average, the overall renewable energy share has been increasing by 0.67 percentage points annually since 2010. The new 2030 EU target of 42.5% (and even more so the aspirational target of 45%) will require a much faster growth in the coming years. Progress has been especially strong in the **electricity sector**, with an increase in the renewables share from 21.3% in 2010 to 37.6% in 2021. The progress in **heating and cooling** (from 17% to 22.9%) **and transport** (from 5.5% to 9.1%) was more modest.

The renewable energy shares in 2021 vary widely across Member States, reflecting the different starting positions and national targets set for each Member State in the original Renewable Energy Directive and the national contributions set in the national energy and climate plans. Sweden achieved the highest renewable energy share in 2021 (62.6%), followed by Finland (43.1%) and Latvia (42.1%). With shares not exceeding 13%, Belgium, Ireland, Luxembourg, Malta, and the Netherlands had the lowest renewable energy shares. Several Member States saw substantial drops in the share, especially Bulgaria with a drop of 6.3 percentage points and Ireland with a drop of 3.7 percentage points (both mainly due to a reduction in bioenergy). Others, such as Estonia (with a rise of almost 8 percentage points, partially due to statistical transfers), saw large increases.

⁸⁷ As reported by Member States in line with Eurostat SHARES.

⁸⁸ Governance Regulation Article 4.

Considering both national deployment and currently notified statistical transfers, **the following Member States had a 2021 share below their 2020 binding renewable energy target under the original Renewable Energy Directive: France (3.7 percentage points lower than the 2020 target), Ireland (3.5 pp), the Netherlands (1 pp) and Romania (0.6 pp).** Consequently, these Member States will have to take, within one year, additional measures to cover the gap within the next year⁸⁹.

The EU met the 2020 **energy efficiency** target values set in the Energy Efficiency Directive, both in terms of primary energy consumption and final energy consumption⁹⁰. Nevertheless, the values are significantly influenced by the COVID-19 crisis and the lockdown measures, which restricted overall activity and consequently reduced energy demand.

In 2021, primary energy consumption in the EU was 1 311 Mtoe, which is around 6% higher than in 2020. This is most probably due to the COVID-19 crisis recovery, even though primary energy consumption remained lower than in 2019. This does not reflect yet the EU's collective effort to reduce energy demand following Russia's war of aggression against Ukraine. If the downward trend continues in the coming years this would indicate that structural improvements have been made.

Absolute final energy consumption in 2021 declined in 18 Member States compared with 2005, while it increased in 8 Member States, with three of those cases (Lithuania, Malta and Poland) increasing by more than 20%. In **2021, all Member States experienced increases in total final energy consumption compared with 2020.** Overall, **putting the progress in the context of the pathway towards 2030,** primary and final energy consumption values are still not in line with **their 2030 targets.**

Reported new annual energy savings under the **energy savings obligation** of Article 7 of the Energy Efficiency Directive amount to 10 384 ktoe/year. The equivalent amount of new annual savings, corresponding to the target of 0.8%/year⁹¹, is 7 309 ktoe/year for the 25 Member States that reported altogether. Reported savings are thus 42.1% higher than required savings.

The few Member States that have reported data are showing some progress towards the 2030 **building renovation** targets set in the national long-term renovation strategies.⁹² The number of new and renovated nearly zero-energy buildings, which became the standard for new buildings in Member States as of the end of 2020⁹³, increased at an average rate of 80% from 2020 to 2021. Member States have also provided a wide variety of milestones and progress indicators, set at national level, targeting the improvement of the building stock and the reduction of its energy consumption. Efforts in tracking the evolution of the building stock have to be increased. The proposal⁹⁴ to update the Directive on the energy performance of buildings includes beneficial provisions in this regard, such as building renovation plans and national databases for energy performance of buildings to feed data annually into the EU Building Stock Observatory⁹⁵.

Overall, most Member States set national objectives and targets related to energy security in the 2019 NECPs. These objectives take diverse forms and range for instance from the construction and use of energy storage facilities to the construction of LNG terminals or the reduction of energy import dependency. These

⁸⁹ In accordance with Article 32(4) of the Governance Regulation.

⁹⁰ [Analysis of the Reports on 2020 Targets under Article 27 of the Governance Regulation – Energy Efficiency](#)

⁹¹ This rate is 0.24%/year for Cyprus and Malta.

⁹² [Assessment of first long-term renovation strategies under the Energy Performance of Building Directive \(Art. 2a\)](#)

⁹³ As established in the Energy Performance of Buildings Directive 2010/31/EU.

⁹⁴ COM(2021) 802 final.

⁹⁵ The [EU Building Stock Observatory](#) has been updated in 2023.

commitments strengthen EU energy security..

The Commission was not able to assess the EU's progress towards **diversification objectives** and thus **energy security** as only 7 Member States set any related target or objective. However, almost all countries that did set such diversification targets, registered some progress.

The same holds for **reducing energy import dependency** from non-EU countries, as only 6 Member States set quantifiable targets and objectives in this area. Among the countries that had set dedicated targets on import dependency, some reported no significant progress (e.g. Greece) or even registered a worsening of the situation (e.g. Croatia, Poland). Only Bulgaria, Italy and Estonia have registered some progress. The **fossil fuel import dependency** of the EU has been largely stable during the 9 years preceding the reporting period, as it increased by only one percentage point in 2021 compared with 2012. This indicator excludes the consequences of the Russian invasion of Ukraine since the data are only available until 2021. Due to Member States' shift away from Russian fossil fuel imports, the situation is likely to have changed considerably.

Progress by 2021 towards the **objective of developing the ability to cope with constrained or interrupted supply** of an energy source appeared positive, with most countries having achieved significant progress on the resilience of their gas and power systems.

Member States have made good efforts to **increase cross-border capacity**. The completion of various projects of common interest should further **improve the interconnectivity levels**. Nevertheless, seven Member States (IE, EL, ES, FR, IT, CY, RO) were below the 2030 interconnection target, with four (IE, ES, IT, CY) also remaining below the 2020 interconnection target. Further effort is required to meet the 2030 objectives, in particular in terms of timely delivery of planned cross-border projects.

Not all Member States have set national objectives for **energy system flexibility**. For those that have, the national objectives vary in terms of adaptability and measurability. Sweden has set six national objectives for flexibility solutions to identify and remove obstacles and promote flexibilities, such as demand response and storage. Greece has put in place clear frameworks regarding participation and operation of demand response, making progress to attract demand response for the energy markets.

As regards research, innovation and competitiveness, 20 Member States reported on measures implementing objectives and policies under the European Strategic Energy Technology Plan. Most Member States reported on comprehensive research-funding programmes that support the development of technologies included in the scope of the Plan's implementation working groups. As for **public spending** on research & innovation (R&I), 19 Member States provided information on quantifiable national objectives and 5 reported against a target. Of the 13 Member States that reported data for both 2020 and 2021, 12 recorded an increase in R&I investment (AT, CZ, DE, ES, FR, LT, MT, NL, AT, PT, FI, SE), and only one a slight decrease (EL).

The total amount of energy subsidies in the EU increased to EUR 216 billion by 2021. As a direct consequence of the energy crisis, this amount reached **EUR 390 billion** in 2022. Member States created **230 temporary subsidy instruments** as a response to the energy price crisis, for a total estimated value of **EUR 195 billion**. A significant portion of the temporary instruments was aimed at **households**, which received **EUR 93 billion in support**. Support to the road transport sector reached **EUR 31 billion**, while cross-sectoral subsidies were **EUR 75 billion**. Many of these measures, taken by Member States to protect households and commercial and industrial consumers, are **expected to be phased out in 2023** or once

energy prices return to stable levels.

The crisis led to a temporary **surge in fossil fuel subsidies** (primarily natural gas and road fuel), reaching **EUR 123 billion in 2022**. Despite annual renewables deployment growing every single year, **subsidies paid to renewable energies fell** from EUR 88 billion in 2020 to **EUR 86 billion** in 2021 and to **EUR 87 billion** in 2022. This is mainly due to market-based subsidy instruments like feed-in premiums and contracts for difference. In times of high market prices reimbursements were flowing from renewable energy producers to governments.

A long-term decreasing trend in **fossil fuel subsidies** was disrupted by the crisis. About half of the fossil-fuel subsidies (EUR 58 billion) will be stopped in 2024 or are short-term. For the remaining about 1% (EUR 1.7 billion) there is an end date in the medium term (2025-2030). For the remaining 52% (EUR 64 billion) of these fossil fuel subsidies, there is either no end date yet or the end date has been set for after the year 2030⁹⁶.

Member States employ **diverse approaches** to address **energy poverty**, based either on quantitative targets or more qualitative assessments. While some countries made progress, others face challenges in providing clear progress assessments. Energy poverty has been firmly acknowledged under EU law: Member States bear the responsibility for assessing the number of households in energy poverty within their respective territories and implementing a mix of structural and social policies if there is significant incidence⁹⁷.

The share of households unable to keep their homes adequately warm fell in most Member States in 2021. Only Spain reported a strong increase between 2019 and 2021. With substantial geographical diversity all Member States are impacted, although, with figures ranging from 1.4 % in Finland to 22.5% in Bulgaria. It has to be noted that these reported figures do not yet reflect the increase of households unable to keep their homes adequately warm in 2022 as a result of the spike in energy prices (see section 1.1). At the same time, Member States have put in place a significant number of emergency measures last winter that have contributed to limiting the impact of the energy crisis on the most vulnerable households.

2.2. Policies and measures to achieve the EU and Member State 2030 targets, objectives and contributions

Fundamental progress towards achieving the 2030 ambitions is accomplished thanks to **Member States ensuring appropriate and credible policies and measures, as well as the necessary financing**, to underpin their targets, objectives and contributions, as set out in their NECPs and the legislation agreed at EU level. In 2023, this reporting covers for the first time all five dimensions of the Energy Union in an integrated manner. The total number of individual policies and measures reported increased from 2 052 in 2021⁹⁸ to 3 039 in 2023. On average, there are 113 individual policies and measures per Member State. This is a 48% increase compared with 2021. Moreover, there is a large increase of newly implemented policies and measures, which might be due to Member States' need to implement new policies and measures to meet their 2030 climate and energy objectives.

It is not possible to make a **structural comparison of the available and necessary financing for the achievement** of the targets, objectives and contributions that Member States set out in their NECPs. Data are often incomplete or inconsistent, not enabling a structured comparison. In the next reporting cycle, it

⁹⁶ The details on fossil fuels subsidies are presented in the accompanying report on energy subsidies in Europe.

⁹⁷ Article 3 of Regulation (EU) 2018/1999.

⁹⁸ As reported pursuant to Article 18 of the Governance Regulation.

will thus be important to increase the availability, consistency and comparability of the reported information.

At EU level, the first call for proposals under the **EU renewable energy financing mechanism was published in 2023**. The call is based on the voluntary participation of Luxembourg as the contributing country paying EUR 40 million into the mechanism, while Finland is the host country where solar PV projects will be built and will generate renewable energy with total capacity up to 400 MW. For the next 15 years, Luxembourg and Finland will share the statistical benefits of the electricity that is produced by the supported projects. The Commission is currently organising the next call for proposals in 2024.

In 2023, the **CEF for Energy and its window on renewable energy and cross-border projects** was implemented through two successful calls. They provided support to the offshore wind park ELWIND, developed by Estonia and Latvia, the hydrogen value chain project CICERONE, developed by Spain, Italy, Netherlands and Germany, the offshore wind park SLOWP, developed by Estonia and Luxembourg, and the onshore cross-border wind park ULP-RES. In 2021 and 2022, a total of EUR 1.64 billion in CEF grants were awarded to critical infrastructure projects of common interest.

In terms of effects and costs of policies and measures, 18 Member States reported quantitative *ex ante* greenhouse gas savings. The savings add up to 407 Mt CO₂-eq in 2025, 703 Mt in 2030, 577 Mt in 2035 and 537 Mt in 2040. The reported savings appear to be incomplete, considering that the drop after 2030 is not consistent with expectations for increasing savings over time.

Member States reported only to a limited and varying extent on the **future impacts of emissions of air pollutants** arising from the implementation of policies and measures set out in their NECPs. While two Member States report impacts for (almost all their) policies and measures, most cover a (much) smaller share of policies and measures, and six Member States did not report impacts on air quality and emissions to air for any policies and measures. **The majority of the reporting Member States reported a reduction per pollutant** (NO_x, NH₃, PM_{2.5}, SO₂, NMVOC) as a result of implementing the policies and measures, with the impacts being clearer for some pollutants (e.g. SO₂) than for others (e.g. NH₃, PM_{2.5}).

2.3. Regional cooperation

Increased regional cooperation can bolster the impact and coherence of the Energy Union across its five dimensions. Most Member States reported on their progress in implementing regional cooperation, with most of them reporting **some progress in at least one of their regional cooperation initiatives or projects**. Reported regional cooperation projects or initiatives span across the five dimensions, although the **majority focus on energy security, internal energy market, and decarbonisation**, with fewer projects or initiatives related to energy efficiency or to research, innovation, and competitiveness.

Regional cooperation around renewable energies is gaining momentum, particularly in the offshore sector. Building on the cooperation in the North Seas Energy Cooperation (NSEC) and the Baltic Energy Market Interconnection Plan (BEMIP), countries around the North Sea and the Baltic Sea have signed several declarations⁹⁹ and memoranda of understanding in view of jointly developing the offshore potential of the two sea basins. Moreover, European energy ministers met more than 20 times in different formats (e.g.: at informal, extraordinary and TTE Council meetings) since January 2022.

⁹⁹ [The Marienberg Declaration](#) and [Baltic Offshore Wind Joint Declaration](#).

Several Member States report progress on regional cooperation through regional forums such as the Pentalateral Energy Forum and NSEC, through strategies such as the EU Strategy for the Adriatic Ionian Region¹⁰⁰ and through cooperation in the context of technical energy projects implemented via the European Network of Transmission System Operators for electricity, Interreg and Connecting Europe Facility programmes.

2.4. Multilevel dialogue

Multilevel dialogue is a **fundamental tool to gain buy-in across society on the need for the energy transition and the achievement of the 2030 climate and energy ambitions**. Most Member States reported activities related to the setting up of national multilevel climate and energy dialogues, referring to the creation of various engagement fora, platforms and committees. These involved local authorities, civil society organisations, the business community, investors, other relevant stakeholders and the general public.

However, the level of **maturity, sophistication and structure of those dialogues varies** substantially between Member States. Some Member States refer to structures or methods that have been in place for several years, even before the Governance Regulation entered into force, while other Member States refer to processes in place since 2022 or which are in the process of being set up.

Several Member States succeeded in putting their process in perspective, highlighting the regularity and permanence of their initiatives, qualifying and quantifying their activities, the outcomes and the impacts reached, where other Member States rather listed their consultations and events without explaining the overall approach or how their initiatives are interlinked. The inclusion of local authorities has been a strong focus for several Member States but is not applied prominently.

Many Member States **limit the scope** of their multilevel climate and energy dialogues **to the NECP development process**, while the Governance Regulation seeks for a **more comprehensive framework**, requiring Member States to set up multilevel dialogue covering the different scenarios for energy and climate policies, including for the long term, and to review progress.

3. CONCLUSION, OUTLOOK and REMAINING CHALLENGES

The energy crisis affecting the EU has shown the importance of preparedness and resilience. At the same time, coordination at EU level and joint action between the EU and Member States have proven to be effective, resulting in increased unity among Member States and greater EU geopolitical influence and weight. Going forward, both resilience and alignment of Member State and EU action will remain crucial for **ensuring energy security, enhancing the EU's energy independence and completing the clean energy transition**. Recent developments have also highlighted that energy security is crucial for EU economic security as most economic sectors depend on a stable energy supply and supply chains.

The Commission will continue to work closely with both Parliament and the Council with a view to finding, before the end of the current Commission mandate, fair, balanced and yet ambitious agreements on the outstanding initiatives of the European Green Deal. This would allow the EU to build a solid legislative base and **focus on its implementation** to address the challenges of becoming the first climate-neutral continent. At the same time by 30 June 2024, following the Commission's assessment of, and recommendations on, their drafts, Member States will have to finalise their updated **national energy and**

¹⁰⁰ [EU Strategy for the Adriatic Ionian Region \(ec.europa.eu\)](https://ec.europa.eu/eu_strategy_for_the_adriatic_ionian_region/)

climate plans (NECPs). By setting out in detail how each Member State will carry out the crucial task of implementing the European Green Deal by 2030, these plans will be at the centre of the EU and Member State delivery strategy towards the Energy Union's more advanced objectives and ambitions.

The EU has managed to successfully navigate through the recent hardships, but several major challenges remain. These will have to be tackled in the near to medium term in order to strengthen the EU's resilience and sovereignty in energy, help the competitiveness of its industry, secure sustained jobs, and make climate neutrality a reality for future generations. Several areas to be looked at are set out in detail below.

1) A modernised EU energy and climate governance and policy architecture beyond 2030

Thanks to the 'fit for 55' proposals and the REPowerEU plan, the **EU is now almost fully equipped** with legislative and non-legislative tools to achieve the clean energy transition through secure, affordable and competitive energy. In view of the upcoming review of the Governance Regulation in 2024, the **EU climate and energy governance and policy architecture** may need to be revisited. Since the start of Russia's invasion of Ukraine, **EU-level energy coordination** and action was instrumental to successfully mitigate the impact of the energy crisis. Strategic coordination of energy policy at EU level is important to achieve the EU's energy objectives, including the phasing out of Russian fossil fuel imports by 2027 and building strategic energy autonomy. The review of the energy and climate action governance framework needs to reflect the changes brought by the 'fit for 55' package and to reinforce the EU's capacity to deliver on its targets. This would be essential to lead by example and to convince international partners that they too deliver on the clean energy transition, starting with global targets for energy efficiency and renewable energy leading up to COP 28 at the end of the year.

Furthermore, time has come to reflect on the **GHG target for 2040**. This target should represent credible and measurable steps towards the long-term 2050 climate neutrality target. Setting a 2040 GHG target will enhance **long-term predictability for investors** while at the same time allow for a **cost-efficient energy transition, increasing the competitiveness of the EU industry and cementing the EU position as a global leader** in the clean energy transition. Neither the path towards climate neutrality nor security of supply or affordability can be taken for granted. Therefore, the **climate and energy governance of the future** needs to **enable the EU and Member States to address remaining challenges** and ensure that the Union remains a competitive global player.

2) Give a major boost to the EU's competitiveness and industrial leadership

The EU's **competitiveness** is an important safeguard for the EU's technological sovereignty and the independence of its energy system. The current Commission considers the upholding and strengthening of the EU's competitiveness of strategic importance. This is manifested by the Commission President request to Mario Draghi to prepare a special report on the future of European competitiveness. **Competitive European companies** and a **strong manufacturing basis for clean technologies** are vital to achieve EU energy objectives. **Inflation** is still high. This affects the clean energy transition and in particular renewable and energy efficiency investments which are capital-intensive. While prices of natural gas have stabilised after the crisis, they are still at double the pre-crisis levels¹⁰¹ and the EU is experiencing consistently higher

¹⁰¹ [EU fossil generation hits record low as demand falls | Ember \(ember-climate.org\)](https://ember-climate.org/news/eu-fossil-generation-hits-record-low-as-demand-falls)

energy prices than other regions in the world¹⁰². Secure, cheap, safe and stable access to electricity will have to be ensured in the clean energy transition. High energy prices create a competitive disadvantage not only for EU manufacturing but also for the **global clean tech race**.

With the adoption of the Inflation Reduction Act, the US invests public money to stimulate environmentally sustainable consumption, production and investment, mostly through targeted tax breaks (with a total of USD 500 billion, of which 60% is targeted at the energy sector). At the same time, China is leading on support for clean technologies¹⁰³ through an investment-centred economy. China produces vast quantities of subsidised solar PV panels and supplies the strong demand in the EU market.

Through the **Net-Zero Industry Act** as part of the Green Deal Industrial Plan, the Commission aims at enhancing the EU's competitiveness and its domestic manufacturing capacity with respect to net-zero technologies. To remain competitive, the EU must build capacities that leverage all relevant technologies in the most efficient way by providing a suitable legal framework. The Commission is putting forward a **European wind power package** to address the specific challenges in the wind energy sector. The key features of this package will include actions on further acceleration of permitting, improvement of the auction systems across the EU, skills, access to finance, and stable supply chains. Additionally, in the framework of bilateral trade agreements or through net-zero industrial partnerships, the EU could partner with selected non-EU countries that have appropriate industrial capabilities and lower production costs.

The EU's regulatory and financial framework seeks to bridge the **gap between research & innovation (R&I) and market uptake** in new or early-stage clean tech sectors. The Commission will continue to support **R&I** in close partnership with industry to accelerate the development of clean technologies and strengthen the EU's manufacturing base. Specifically, targeted **green public procurement rules** could help to further mobilise private investments to support EU-based start-ups and scale-ups. The business environment for small and medium-sized businesses will be improved by a competitiveness check of every new piece of legislation and a legislative proposal aiming to **reduce reporting obligations** at EU level by 25%. The start of **clean transition dialogues** with industry also supports creating a business model for the decarbonisation of industry (e.g. steel, batteries). At the same time, the EU will step up the protection of its industry against market distortions by non-EU countries. The launch of an anti-subsidy investigation into electric vehicles coming from China is a first step. Smart, innovative technologies already play a fundamental role in energy systems analysis and optimisation. In that context, and for R&I, the role of **artificial intelligence** is expected to increase. The Commission is working towards minimum global standards for safe and ethical use of artificial intelligence. The future of our clean tech industry has to be made in Europe.

3) Secure reliable supplies of critical raw materials

Reliable access to certain raw materials is a growing concern within the EU. Such access will be instrumental for the clean energy transition and the competitiveness of EU industry. Most green technologies require significant amounts of metals and minerals, such as copper, lithium and cobalt.

¹⁰² The energy crisis and the war in Ukraine led to an exponential increase and convergence of prices between Europe and Asia and a temporary exacerbation of the unfavourable price differential of the EU with the US (e.g. even before the peak in summer 2022, EU electricity and gas prices were between 2 to 5 and 3 to 5 times higher than US prices, respectively). This could likely continue in the coming decade (cheaper US gas and, particularly, electricity).

¹⁰³ [Strategic perspectives: Competing in the new zero-carbon industrial era](#)

According to the International Energy Agency, as demand rises, supply might be increasingly constrained¹⁰⁴ for certain raw materials. While EU demand for critical raw materials is projected to **increase dramatically**, it depends heavily on imports from a few, often quasi-monopolistic non-EU countries (e.g. the EU gets 98% of its rare earth supply and 93% of its magnesium from China)¹⁰⁵. The recent crisis has demonstrated the risks and consequences of being overly dependent on one other country and China already introduced export restrictions for gallium and germanium, which are essential for semiconductors and solar panels. The Commission's proposal for a **Critical Raw Materials Act** aims at ensuring access to a secure and sustainable supply of those materials. Progress towards the **circular use of materials** can also improve the EU's security of supply in critical raw materials. Further actions aimed at diversifying access to raw materials appear necessary. Furthermore, the Commission announced it would set up a new critical raw materials club for all like-minded countries willing to strengthen global supply chains, strengthening the World Trade Organization and pushing harder on enforcement to combat unfair trade practices.

4) Secure the needed investments for the clean energy transition

In order to achieve the ambitious 2030 targets, **investments** in the clean energy transition **will have to increase** considerably, while public resources are expected to be limited. In its 2023 strategic foresight report, the Commission estimated that **EUR 620 billion of additional annual investments** are necessary to achieve the objectives of the European Green Deal and REPowerEU¹⁰⁶. Although European financial institutes like the European Investment Bank and the European Bank for Reconstruction and Development will play a key role, the bulk of investments will have to come from the private sector. The EU must create an attractive investment environment and leverage private funding. For this purpose, the EU is working on putting in place a robust sustainable finance framework¹⁰⁷ to channel more private capital towards the green and sustainable transition, including for renewable energy. An important **enabler** for the necessary investments is **long-term predictability in policy**. Simplified and less bureaucratic access to EU support (specifically for loans and loan guarantees) would improve **the single market's attractiveness for green investments** and support the **leverage of private investments** through the EU budget.

5) Provide affordable energy prices and ensure strong consumer protection and empowerment

A true Energy Union needs to ensure **affordable energy prices** for the benefit of all, already in the short-term. **Consumers and society** have played an important role in managing the impact of the energy crisis by reducing their energy demand, even as this exacerbated financial difficulties for many. However, they may have come out **weakened from this crisis** and natural gas and electricity prices today are still twice the price they were before the crisis¹⁰⁸. The transition **towards a more electrified, decarbonised and decentralised energy system** will bring the consumer truly into the driver's seat of decarbonisation action thanks to the emergence of innovative **consumer empowerment models**, which are centred around **collective self-consumption and energy sharing**.

¹⁰⁴ Global demand for rare earth supply used in wind turbines is expected to increase five-fold by 2050, demand for nickel used in batteries is expected to increase by 15-fold by 2040, demand for lithium used in electric vehicles is expected to increase by 57-fold by 2050, demand for platinum group metals used in hydrogen fuel cells is expected to increase by 970-fold by 2050 (source: COM(2023) 160 final).

¹⁰⁵ [RMIS - Raw Materials Information System \(europa.eu\)](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1)

¹⁰⁶ COM(2023) 376 final; based on SWD (2023) 68 final and COM/2022/438 final. In addition, the Net-Zero Industry Act requires in total EUR 92 billion over the period 2023-2030.

¹⁰⁷ [Sustainable finance package, 13 June 2023](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1)

¹⁰⁸ [EU fossil generation hits record low as demand falls | Ember \(ember-climate.org\)](https://www.ember-climate.org/)

These schemes ensure that consumers can benefit from moderate electricity prices stemming from renewable energy generated off-site. For a fair and just transition, it is important that such schemes are accessible to low-income households and that consumers are sufficiently informed and are provided with a strong set of rights, legal protections and support measures, both at national and EU level. The further deployment of smart meters in households will be instrumental to empower consumers and foster smarter energy consumption patterns and energy savings. In border regions, local cross-border cooperation in the energy sector can help to address the issue of fewer people living there by contributing to these areas' economic revitalisation. The EU will have to continue playing a crucial role in helping the public at large to remain a driving force of the green energy transition and to ensure a fair and just transition. Besides this, the implementation of the 'energy efficiency first' principle remains crucial.

6) Improve the energy markets, energy grids and further integrate the energy system

The EU energy system of the future will have to be integrated and cope with more and more decentralisation. Energy grids have to be urgently reinforced, and adjustments of the energy market will be necessary. A clean, efficient and integrated energy system will require significant **investments in transmission and distribution grids** to ensure interconnections, to adapt to a decentralised production and demand-side response, and to enable the penetration of a high share of cheap renewable energy. The upcoming **grids action plan** will propose important steps in this direction. The role of artificial intelligence to manage and optimise the future EU energy system will increase. A higher risk of cyberattacks follows an increasingly digitalised energy system, requiring appropriate cybersecurity measures. Energy markets will have to deliver the appropriate investment signals for renewable energies, energy efficiency measures and necessary grid deployment. Markets will need not only to accommodate more participants acting at local level, but also to facilitate the development of large-scale and complex hybrid renewable energy projects, sometimes far out at sea. As a first step, it will be important that all Member States implement the clean energy package¹⁰⁹.

Digitalisation, flexibility and demand-side response will play a pivotal role in a well-functioning clean and decentralised energy system. The EU has adopted a comprehensive legislative framework to address those challenges. In addition, the Commission tabled a **structural reform of the electricity market design** in the face of the energy crisis. It will decrease the impact of fossil fuels on energy prices and incentivise the take-up of more clean and flexible solutions. Nevertheless, significant barriers remain to the uptake of appropriate business models and technical solutions such as smart grids. The further integration of retail markets may require exploring innovative tools and incentives to accelerate the clean and fair transition. To that end, the EU will engage with all market players in order to facilitate active participation and mobilise the full potential of integrated EU energy markets. At the same time, the energy system needs to adapt to dramatic climate-related changes.

7) Addressing skills and labour shortages in the energy sector

Skills and labour shortages represent a **bottleneck** in delivering on the clean energy transition and for EU competitiveness. According to estimations, achieving our REPowerEU targets will require the **creation of over 3.5 million jobs¹¹⁰ by 2030**, which means more than tripling the existing workforce of an estimated 1.5 million workers. These are jobs in the clean energy sector itself, but also in manufacture, construction

¹⁰⁹ [Clean Energy Package for all Europeans](#)

¹¹⁰ [Pact for Skills: Launch of large-scale renewable energy skills partnership](#)

transportation, and services linked to boosted manufacturing and deployment of these technologies.¹¹¹ A precondition for this is skills availability and ability of workers to transition into these emerging sectors. Nearly 30% of EU businesses involved in electrical equipment manufacturing experienced labour shortages in 2022. This tendency is expected to intensify and is also affecting the **nuclear energy sector**. In this context, **upskilling and reskilling of workers** must be a priority for the EU, while ensuring gender-balanced, fair and inclusive labour environments. Access to the labour market has to be improved, in particular for women, young people and migrants and attention should be given to ensuring good working conditions. Making sure that the clean energy transition translates into good job opportunities for EU citizens is also crucial for its social acceptance, in line with the political objective of leaving nobody behind.

8) Look at the impact of water scarcity on energy systems

More attention needs to be paid to the links between the energy system and freshwater availability. This is because **water is critical for the EU energy system** and extreme weather events are increasing in frequency and intensity. Water is used for almost all types of energy production in the EU and a shortage of water has already affected EU energy production, such as hydropower and conventional thermal power plants, the cooling of nuclear reactors, or the transport of fuels via waterways. The UN 2023 Water Conference highlighted that an integrated approach to water, energy, food, and ecosystem crises is important¹¹².

9) Set a firm time frame for the phase out of fossil fuel subsidies

During the energy crisis, fossil fuel subsidies have increased, even though the long-term trend was decreasing. As more than 50% (EUR 64 billion) of the fossil fuel subsidies have not yet an end-date, it will be important to set a timeframe for the phasing out of fossil fuel subsidies in line with decarbonisation objectives set out in the European Green Deal and REPowerEU.

Conclusion

The EU is acting in an **increasingly complex international environment**¹¹³, with various international players assuming new, often more confrontational, roles. **International energy markets** are undergoing a profound reorientation as the world adjusts to the contraction of Russia-Europe flows and remain vulnerable. The **global clean tech race** is also one of the examples. These new geopolitical realities of international competitiveness need to be embraced when designing future energy policy, which will form the underlying basis for economic prosperity and security. The EU will continue to drive **open and fair trade**, despite practices of some non-EU countries. The launch of an anti-subsidy investigation into electric vehicles coming from China is an example of how the EU can take action to defend its economy fairly against risks of market distortion.

At the same time, it is in the EU's strategic interest to enhance international partnerships, including with candidate countries, as this will increase the EU's security and influence. The EU approach 'partnership of equals' in international collaboration remains crucial, as more and more countries search for the most advantageous partnerships.

Solidarity among Member States, and alliances with like-minded countries such as the G7 members, will be essential. The EU and its Member States need to act in unity and in a coordinated way, both domestically

¹¹¹ See SWD(2023) 68 final on estimation of skills investment needs for the Net Zero Industry Act.

¹¹² [UN 2023 Water Conference: Summary of the proceedings by the president of the general assembly](#)

¹¹³ See 2023 Strategic Foresight Report, COM(2023) 376 final.

and in international fora, to increase their influence. The Commission President put it as such: ‘if we are united on the inside, nobody will divide us from the outside’¹¹⁴.

Up to now, the EU has made progress on energy autonomy, security and safety and is prepared for a fair and affordable global clean energy transition. At the same time, inflationary trends and the consequences of the climate crisis make the future context even more complex. The final updates of Member State NECPs, expected in 2024, will be an important milestone to deliver on the identified challenges and to react to the changed circumstances since the adoption of the first plans in 2019. Now the EU needs to continue to move forward on the process set in motion, to anticipate and address future challenges, and to accelerate on implementing the wide range of policy initiatives launched under the European Green Deal. Policies and investments already have to take into account the post-2030 perspective.

¹¹⁴ [2023 State of the Union Address by President von der Leyen](#)



EUROPEAN
COMMISSION

Brussels, 24.10.2023
COM(2023) 650 final

ANNEX 1

Union Bioenergy Sustainability Report

ANNEX

to the

**Report from the Commission to the European Parliament, the Council, the European
Economic and Social Committee and the Committee of the Regions**

State of the Energy Union Report 2023

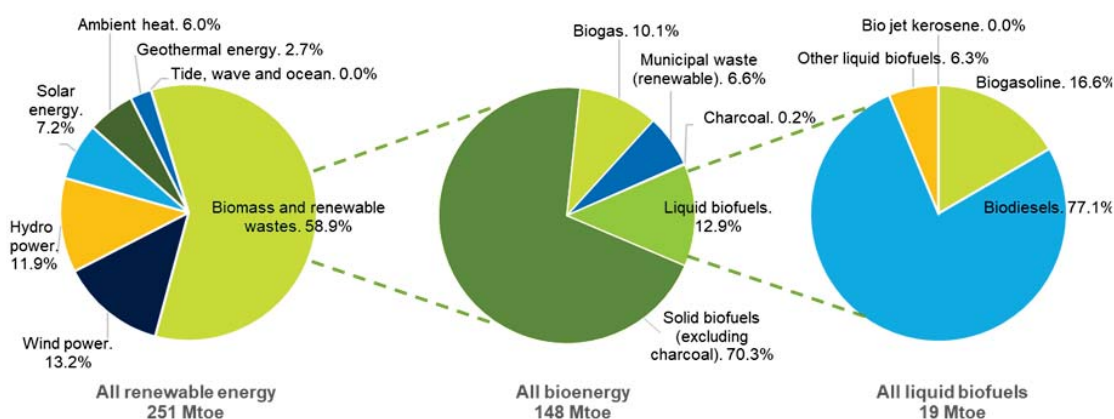
**(pursuant to Regulation (EU) 2018/1999 on the Governance of the Energy Union and
Climate Action)**

{SWD(2023) 646 final}

Introduction

Article 35 of Regulation (EU) 2018/1999¹ (“Governance Regulation”) provides that by 31 October of every year, the Commission must submit to the European Parliament and to the Council a State of the Energy Union report that must include, biennially, from 2023, a report on Union bioenergy sustainability, containing the information specified in Annex X of that Regulation. The present report fulfils that reporting obligation and has been drafted using as a main basis the information provided by Member States in their integrated National Energy and Climate Progress Reports (NECPRs) referred to in Article 17 of the Governance Regulation.

Bioenergy produced from agricultural, forestry and organic waste feedstock continues to be the main source of renewable energy in the EU, accounting for about 59% of renewable energy consumption in 2021. For bioenergy, primary solid biofuels represent the largest share at 70.3 %. Liquid biofuels account for 12.9%, biogas/ bio-methane for 10.1% and renewable share of municipal waste for 6.6%.



Gross EU consumption of renewable energy per type (2021, % and Mtoe)²

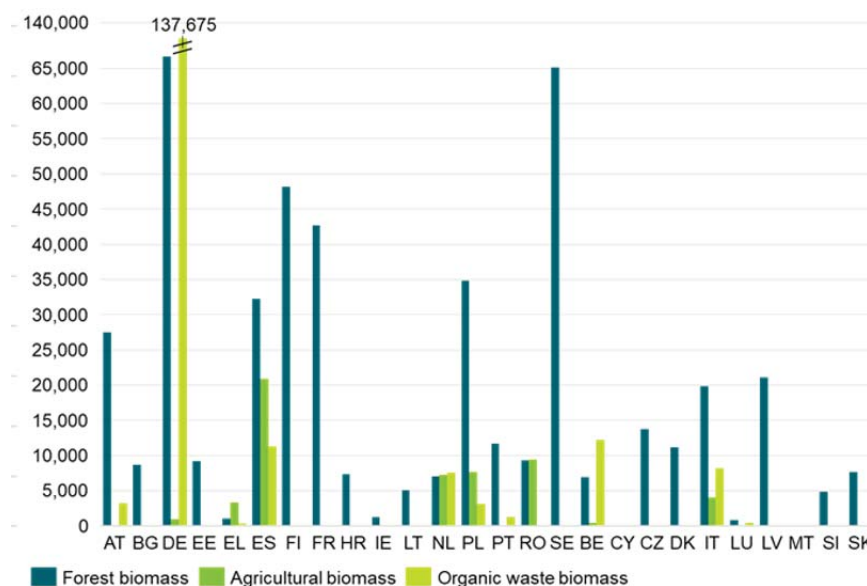
Current and projected sustainable biomass availability and demand

Twenty-six Member States have reported³ their data on biomass supply. In the EU, woody biomass is the main feedstock reported for solid biomass production (labelled as “forest biomass” in the figure below), accounting for 66% of the total and followed by biomass from organic waste (26%) and agricultural biomass (8%). Germany records a significant production of organic waste biomass (137,675 thousand m³). It also records production of the largest share of forest biomass (66,658 thousand m³) in the EU, followed by Sweden (65,102 thousand m³). Spain records the highest volumes of agricultural biomass (20,844 thousand m³).

¹ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, OJ Regulation (EU) 2018/1999.

² Eurostat: Energy Balances 2021.

³ Eurostat: Supply of biomass - annual data.



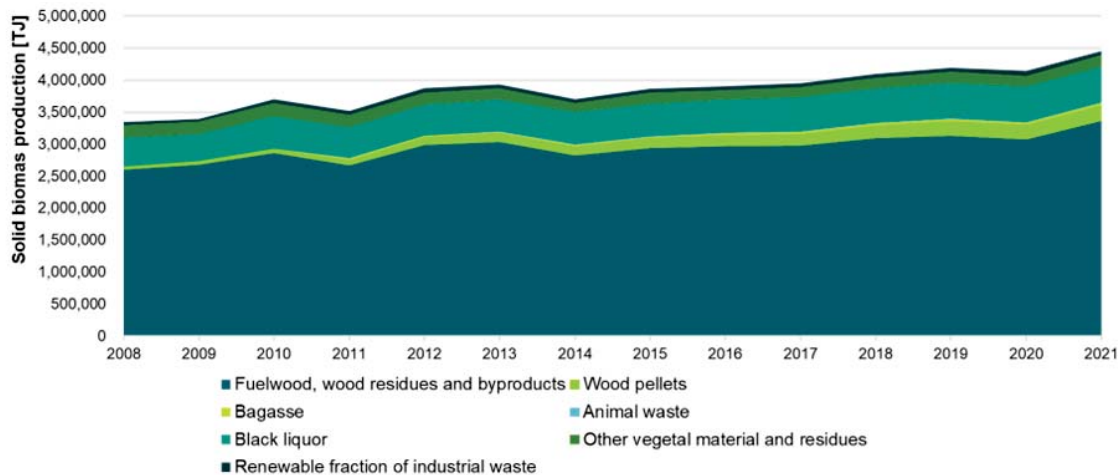
Primary supply of solid biomass in 1000 m3 for energy production, indigenous production in 2021⁴ grouped by feedstock origin

Forest biomass was the largest reported category across all the Member States (262,858 thousand m³). Germany reported 12% of the total reported primary supply of solid biomass from forest, followed by Spain and Poland (both reported 11%), and Sweden and France (both reported 10%). The second largest reported category of supply of solid biomass was municipal waste (171,023 thousand m³ – 24% of the total). Germany reported 74% of the total renewable municipal waste, followed by Sweden (8%), Belgium (6%), Spain and the Netherlands (both reported 4% of the total), Italy (2%) and Austria and Portugal (both reported 1% of the total). The third largest reported category for primary supply of solid biomass was forest-based industry co-products (144,821 thousand m³ – 20% of the total). Sweden reported 22% of the total reported forest-based industry co-products, followed by Finland (20%), Austria (11%), Germany (10%), France (6%), Poland (5%), Estonia (4%) and Latvia (4%).

Among the different types of indigenous production of solid biomass, the largest growth in the period since 2008 has been observed⁵ for wood pellets use (413%), followed by animal waste (351.9%), the renewable fraction of industrial waste (58.6%), fuelwood, wood residues and by-products (29.5%), and black liquor (25%). Other vegetal material and residues were the only solid biomass type, compared to 2008, with a decrease of 8.8%. Overall, primary supply of solid biomass in the EU has increased from 3,336,811 TJ in 2008 to 4,454,768 TJ in 2021, an increase of 33.5% overall.

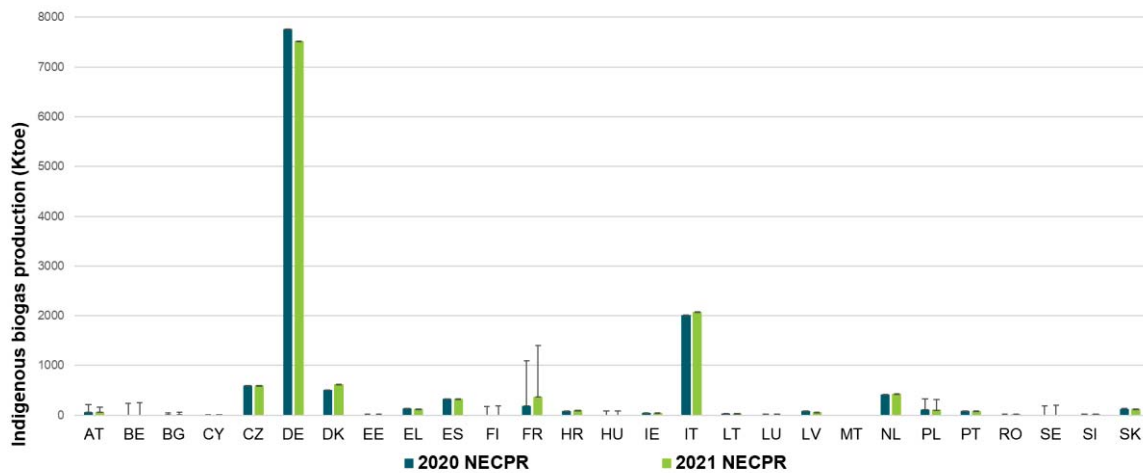
⁴ Eurostat: Supply of biomass, annual data.

⁵ Eurostat: table NRG_CB_RW.



Total EU-27 solid biomass production⁶

The above graph on “Total EU-27 solid biomass production” refers to the categories used in the Eurostat Energy Balances. For the purposes of the NECPRs, different categories are laid down in point (m) of Part 1 of Annex IX to the Governance Regulation that have broader use than energy purposes. In 2021⁷, when it comes to the Member States individually, Germany was the EU’s biggest producer of solid biomass (767,891 TJ), followed by France (530,659 TJ), Sweden (460,620 TJ), Poland (377,690 TJ) and Finland (352,535 TJ). Austria follows with 250,710 TJ, Estonia with 104,208 TJ and Greece with 33,317 TJ. Based on the reported data⁸, in Germany the largest share of solid biomass came from renewable municipal waste (125,984 thousand m³). The other Member States report mainly forestry-based solid biomass, often not distinguishing between energy and material use. Member States collectively reported that roundwood is the largest category of forestry-based solid biomass (215,440 thousand m³), followed by fuelwood (176,304 thousand m³) and renewable municipal waste (171,023 m³).



Indigenous biogas production reported in 2020 (left bar) and 2021 (right bar) per MS. The error bars visualize the difference with the values as reported in the Eurostat energy balances. Source: NECPRs and [NRG_BAL_C]

⁶ Eurostat: table NRG_CB_RW.

⁷ Ibid.

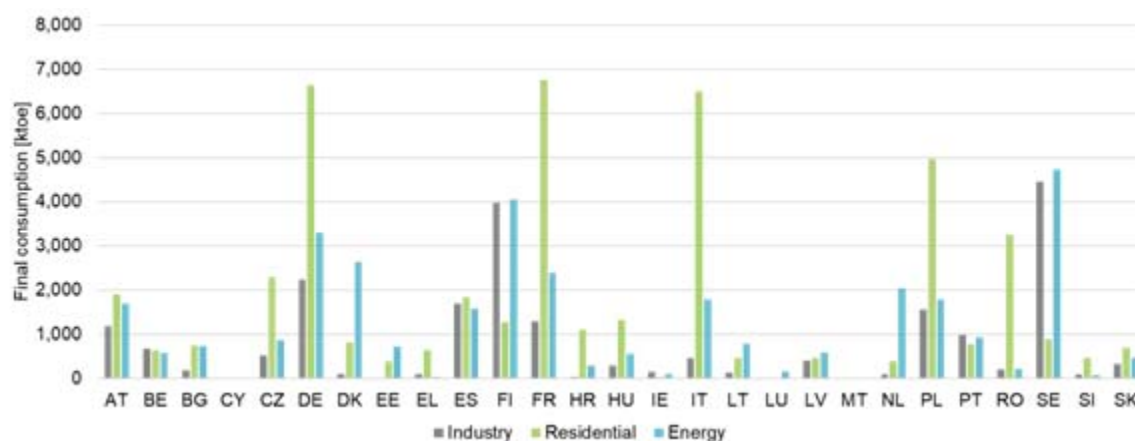
⁸ Eurostat: Supply of biomass, annual data.

In the NECPRs, Member States reported their indigenous biogas production in 2020 and 2021. In 2020, according to the reported data, Germany was the largest producer of biogas, with 52.8 % of the total amount produced (7,765 ktoe), followed by Italy that accounted for 13.7% (2,018 ktoe), France 7.4% (1,090 ktoe) Czechia (4.1%, 595 ktoe), and Denmark (3.4%, 505 ktoe). In 2021, Germany remained the largest producer, accounting for 50,4% of the total production (7,518 ktoe), followed by Italy (13.9%, 2,078 ktoe), France 9.4% (1,404 ktoe) and Denmark (4.2%, 625 ktoe), which overtook Czechia (4.0%, 591 ktoe) in biogas production. Belgium, Finland, Hungary, and Sweden did not report any biogas production neither in 2020 nor 2021, whereas Estonia, Romania and Slovenia reported biogas production only in 2021. Czechia, Greece, Poland, and Latvia reported a decrease in biogas production of 18.5% from 2020 to 2021. The indigenous biogas production reported in the EU collectively in 2021 was 14,929 ktoe, a 1.7% increase compared to 14,687 ktoe in 2020.

Twenty-one Member States reported in the NECPRs regarding the evolution of bioenergy supply and whether that has an impact on the overall and sectoral trajectories for renewable energy from 2021 to 2030. Eight Member States⁹ stated that there were no significant impacts or updates to be reported. Of the remaining thirteen Member States, Hungary and Latvia stressed the impacts related to Russia's war of aggression against Ukraine. Sweden emphasized that prices have risen because of the energy crisis. Some Member States (Estonia, Slovakia) reported that changes in legislation impact biomass use for energy production. Others (Italy, Slovenia) reported an expected increase in the use of biomass for energy production, in the years leading up to 2030.

Biomass demand per sector

Solid biomass is used in the industry, residential and energy sectors¹⁰. In 2021, 21.1 Mtoe of solid biomass were consumed in the industry sector, 45.1 Mtoe in the residential sector, and 33.0 Mtoe in the energy sector. Germany, France and Sweden are the largest consumers of solid biomass. The use of solid biomass in these sectors has increased by 13.4% compared to 2012.



Final consumption of solid biomass in the industry, residential and energy sectors in 2021 per EU Member State¹¹

⁹ AT, BG, CY, CZ, DK, EL, FI, and PT.

¹⁰ Eurostat: table NRG_BAL_C.

¹¹ Eurostat: Energy Balances 2021 table NRG_BAL_C.

Transport sector

In 2021, the final consumption of biofuels in the transport sector accounted for a total of 16.5 Mtoe in the EU¹² and has increased by 39% compared to 2013. In absolute terms, this increase is related to the increased biodiesel supply, however, in relative terms, the share of biodiesel in the total biofuel consumption in the transport sector remains quite stable at around 80%, including 2021. Biodiesel is used in all twenty-seven Member States. Bioethanol was the second most consumed fuel type and accounted for 18% but is used in all Member States except for Cyprus and Malta.

Biomethane and other liquid biofuels consumption is aggregated to less than 1% of the total amount of biofuels consumed in the transport sector. Six Member States¹³ report on the use biogases in transport sector in the NECPRs. Sweden accounts for the 67.4% of the total EU biogases consumption in transport.

In 2020, primary production of liquid biofuels was 15.64 Mtoe, which, if net imports are added, amounts to 17.82 Mtoe of total energy supply. In 2021, primary production of liquid biofuels increased by 3% or to 15.96 Mtoe, with net imports growing by 7% or to 19.06 Mtoe. A similar increase is obtained when a set of multipliers on biofuels pursuant to Annex IX of the Renewable Energy Directive is applied: total RES-T denominator with multipliers was 242.33 Mtoe (2020) and 263.80 Mtoe (2021¹⁴). Yet, given the return to a normal mobility in 2021, after the pandemic-related safety measures in 2020, the overall share of renewable energy in transport (RES-T) dropped from 10.25% to 9.09% from 2020 to 2021. In other words, the increase in biofuels production, together with the other renewable sources, was lower than the increase in the overall transport fuel consumption from 2020 to 2021. The largest drop in RES-T shares has been recorded for Hungary (-5.41%), although the quantity of renewable energy in transport placed on the market increased from 4.4 Mtoe in 2020 to 5 Mtoe in 2021.

Overall, in the transport sector, a continuously increasing shift towards the use of renewable energy can be observed¹⁵. Within the total, the use of advanced biofuels and other biofuels produced from feedstock listed in Annex IX of the Renewable Energy Directive as well as the share of renewable electricity has substantially increased over time. In 2021, such biofuels held the highest share of renewable energy in transport, representing 4.2% (with multipliers). Advanced biofuels and other biofuels produced from feedstock listed in Annex IX of the Renewable Energy Directive are mostly produced from wastes and residues and, therefore, do not have the negative impacts on land use that food and feed crops-based biofuels are associated with. However, in terms of renewable energy supplied (without multipliers), biofuels produced from food and feed crops continued to have the highest share of all renewable energy carriers (3.9% of total energy consumption in transport).

The largest consumption of biofuels produced from food and feed crops has been reported for France and Germany (2,562 ktoe and 2,122 ktoe respectively in 2021), which can be related to the country size and population. In Spain, a decreasing trend can be observed: biofuels produced from food and feed crops accounted for 1,737 ktoe in 2018 but dropped to 693 ktoe in 2021. In Finland, a large drop in food and feed crops biofuels has been observed between 2020 and 2021 (from 303 ktoe to 65 ktoe). When it comes to the data related to the indirect land use change (ILUC) risk for biofuels, the data of fourteen Member States was incomplete. Germany reported that 42% of the food- and feed-originating biofuels were produced from feedstocks with high ILUC risk. Similarly, in Spain and Italy, more than 50% of food- and

¹² Ibid.

¹³ AT, CZ, DK, EE, FI, IT, SE.

¹⁴ Eurostat: SHARES data

¹⁵ Ibid.

feed-originating biofuels have been reported to be produced with high ILUC risk feedstocks. According to the Renewable Energy Directive¹⁶, the counting of biofuels with high ILUC-risk will be phased out by 2030 at the latest. Several Member States already took measures to phase out such fuels.

Heating and cooling sector

In 2021, biomass fuels and bioliquids were used for the production of 17.3 Mtoe of gross heat in the EU¹⁷. Solid biomass accounts for 76.0% of the total biomass fuel consumption for heating in the EU, followed by renewable municipal waste, accounting for 18.1%, and biogases accounting for 5.0%. Sweden is the largest consumer of solid biomass for heating purposes, using 20.8% of the whole EU consumption, followed by Finland (15.8%) and Denmark (13.1%). When it comes to biogas, this is mainly used in the heating sector by Germany and Italy.

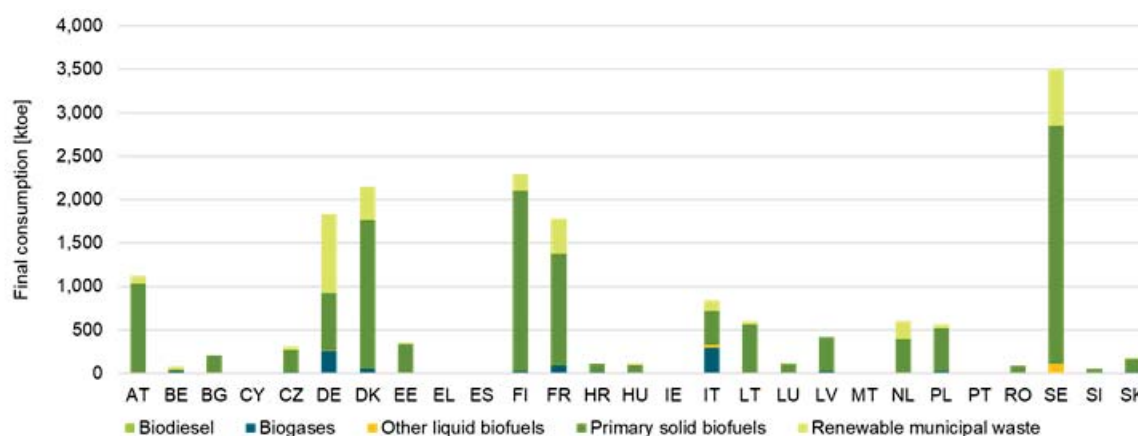


Figure 27: Final energy consumption of biomass fuels used in heat production in 2021 per Member State

Electricity sector

In 2021, 45.6 Mtoe of biomass fuels and bioliquids were used to produce 14.6 Mtoe of gross electricity¹⁸ that made 15% of the total gross renewable electricity mix and 6% in the total gross electricity. 74% of gross electricity from biomass was produced in combined heat and power plants. Solid biomass is the most used type (54.8%), followed by biogases (31.1%). Renewable municipal waste accounts for 11.6%, whereas bioliquids account for 2.6%. Germany is the largest consumer of biomass fuels for electricity generation purposes (27.7% of the total biomass fuel consumption and 57.0% of the biogas consumption).

¹⁶ Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, OJ L 328, 21.12.2018, p. 82.

¹⁷ Eurostat: Table NRG_BAL_C Flow 'Gross Heat Production' (complementing indicator). This indicator includes: Main activity producer heat only + Main activity producer CHP + Autoproducer heat only + Autoproducer CHP. Product codes: biodiesel [R5220P + R5220B]; biogases [code: R5300]; other liquid biofuels [R5290]; primary solid biofuels [R5110-5150_W6000RI]; renewable municipal waste [W6210]. Energy Balances dataset (code: NRG_BAL_C). Please note that this indicator represents 'Transformation output' values. Hence, for heat production this refers to the energy that is obtained from biomass fuels and bioliquids after conversion.

¹⁸ Eurostat: Table NRG_BAL_C . Flow 'Gross Electricity Production' (complementing indicator). This indicator includes Main activity producer electricity only + Main activity producer CHP + Autoproducer electricity only + Autoproducer CHP. Product codes: biodiesel [R5220P + R5220B]; biogases [code: R5300]; other liquid biofuels [R5290]; primary solid biofuels [R5110-5150_W6000RI]; renewable municipal waste [W6210]. Energy Balances dataset (code: NRG_BAL_C).

When it comes to the consumption of solid biomass for electricity generation, Finland and Sweden are significant consumers (with 13.7% and 12.0% respectively). Belgium, Italy, and Slovenia consume, combined, only 1.1 ktOE of biodiesel for electricity generation purposes. The consumption of biomass fuels and bioliquids for electricity generation has seen a steady rise from 2012 and in 2021, mainly due to an increase of 28.7% in the use of solid biomass compared to 2012.

Overall, an increasing trend in the consumption of biomass can be observed in all three sectors.

Outlook

In general, Member States provided limited information on projected primary supply of biomass by feedstock and origin. From twenty-one Member States that have provided information, eight¹⁹ state no significant impacts or updates to add. Five Member States²⁰ have expressed concerns meeting the demand with the indigenous supply of biomass to different sectors, given the physical constraints (limited potential, state of the forest health, limited infrastructure to have a larger bioenergy intake) and legal restrictions on the use of biomass. Five Member States²¹ report stability of biomass demand, Slovenia reports an increase in woody biomass supply whereas the Netherlands introduces a cap on woody biomass for heating. France announces updates in trajectories and Spain highlights positive overall effects, without providing details. Submitted estimated trajectories for the sectoral share of renewable energy in final energy consumption by 2030 in the electricity, heating and cooling, and transport sector as well as by renewable technology, are not granulated sufficiently to provide a comprehensive insight on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply by feedstocks and origin (distinguishing between domestic production and imports).

Biomass Imports

In the NECPRs, twenty-four Member States reported imported solid biomass²². Spain, Romania, and Luxembourg did not report any imported solid biomass. It should be noted that no Member State reported imports of agricultural biomass and stumps. Imports of solid biomass account for 19% of the total primary solid biomass for energy/bioenergy. The largest reported imported feedstock is black liquor²³ (677,404 thousand m³). Forestry-originating biomass was the second largest reported category and wood pellets were the most imported feedstock in this category (21,926 thousand m³), followed by roundwood, chips, saw dust and other wood particles.

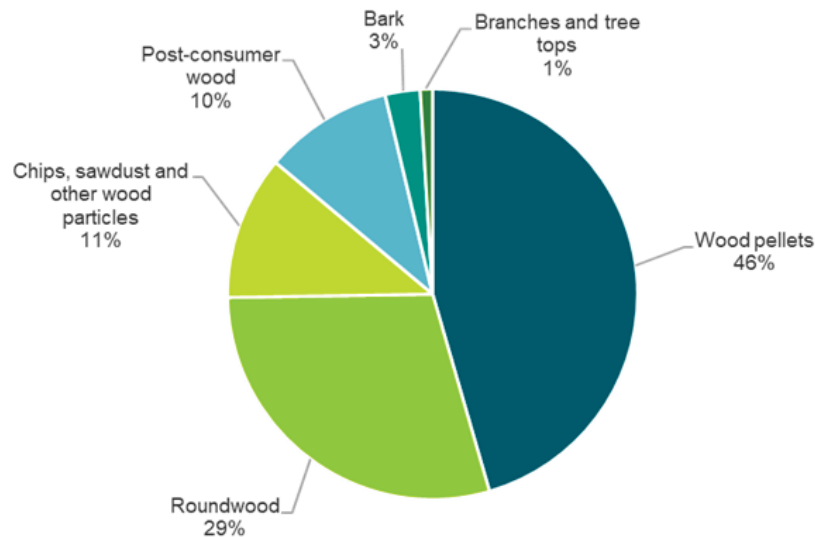
¹⁹ AT, BG, CY, CZ, DK, EL, FI, and PT.

²⁰ HR, ES, HU, LT, SE.

²¹ IT, MT, LV, SK, SE.

²² Eurostat: Supply of biomass, annual data.

²³ Black liquor is a pulp industry by-product where each ton of wood pulp generates 7 tons of black liquor as byproduct; this means that the volume may be high but of low energy density compared to the original wood used for the pulping processing.



Forest biomass feedstock used for energy production, reported as imported in EU²⁴

When it comes to wood pellet imports in the EU, the Netherlands is the largest importer²⁵ (almost 30% of the total EU wood pellet imports), followed by Denmark (26%)^{26, 27}. Wood chip imports account for 8% of the total wood chip supply for energy consumption in 2021. France imported a third (33.2%) of the total wood chip imported volume; Lithuania followed with 22%, Latvia with nearly 10%, and Italy with nearly 9%. Overall, an increase of 27% has been observed in wood pellet imports since 2019, whereas the imports of wood chips decreased from 2019 to 2020 by 10%. Using Eurostat trade balances²⁸, it is possible to track the geographic origin of the wood pellets (up to 2021) and wood chips (only up to 2020). In both categories, Russia was the largest exporter to the EU, followed by the United States and Belarus in the case of wood pellets, and Belarus (that represents together with Russia 82% of the total wood chip imports), Norway (8%), Brazil (5%), Uruguay (4%) and Ukraine (2%) in the case of wood chips. After Russia's unprovoked and unjustified military aggression against Ukraine, stakeholders have expressed concerns about the potential implications this could have on the prices of wood pellet and chip imports.

Organic waste imports account for 1% of the total organic waste supply for energy consumption in 2021. Only four Member States²⁹ reported importing organic waste biomass. Sweden is the largest organic waste and renewable municipal waste importer. The Netherlands and Belgium were the only Member States to report importing waste sludges, 56 thousand m³ and 4 thousand m³, respectively.

²⁴ Eurostat: Supply of biomass - annual data (NRG_CB_BM).

²⁵ Ibid.

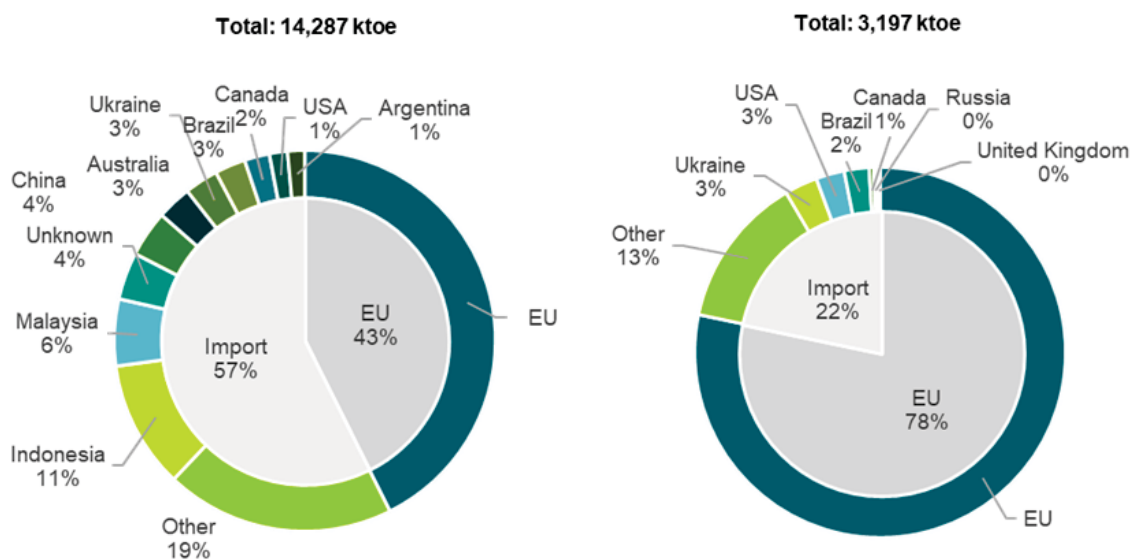
²⁶ More information on wood pellet imports can be found in Eurostat, EU trade since 1988 by HS2-4-6 and CN8.

²⁷ The Netherlands and Denmark were found to be the two largest importing countries in both datasets. According to Eurostat wood pellet imports: 34% of the total imported wood pellets were imported in the Netherlands, 15% in Denmark, 12% in Belgium, and 8% in Latvia in 2021.

²⁸ It should be noted that the reported data are for the total wood pellets imported to the EU, thus not only for energy production.

²⁹ BE, NL, PT, SE.

In total, in 2021, the EU imported feedstock equal to 8,194 ktoe³⁰ to produce biofuels. Bioethanol is mainly produced from feedstock originating from the EU (at a percentage of around 78%), whereas only around half of biodiesel (43%) is produced from EU-originating feedstock (figure below). When looking at biofuel imports, the biofuel feedstock is mainly imported from Indonesia and Malaysia with 17% of the total imports of biodiesel feedstock. The remaining 41% of the biodiesel feedstock imports is diversified across more than 9 countries worldwide.



Geographical origin of feedstock for biodiesel (left) and bioethanol (right) for the EU in 2021

³⁰ European Commission (2023): Union Bioenergy Sustainability Report – Study to support reporting under Article 35 of Regulation (EU) 2018/1999 (draft), to be published.

Measures reported by the Member States to promote bioenergy and respect the sustainability criteria and GHG saving criteria set out in the Renewable Energy Directive

The Renewable Energy Directive (RED II) promotes bioenergy as long as it is sustainable and certified as such. The Directive, including the stricter sustainability criteria in Article 29, had to be transposed by June 2021. The transposition checks are currently ongoing³¹. Most Member States have at least partially transposed Article 29 and updated their existing legislation to include the stricter rules included in the recast Directive. Some Member States have introduced, besides primary and secondary legislation, some guidelines or guidance in environmental or nature protection acts. In the NECPRs, Member States did not explicitly report on measures related to the sustainability criteria. However, Member States mentioned measures related to the transposition of the Directive (and therefore, including the implementation of the sustainability criteria). Sustainable certification was mentioned by two Member States: Spain reported a measure about renewable gas certified sustainably, while Italy reported two measures, one related to the establishment of a National Biofuels Sustainability Certification System, and the other related to an update to the certification system.

Only some Member States reported measures regarding the promotion of the sustainability of forest biomass for energy production, and only Spain reported two measures related to sustainable forest management and maintaining and improving forest reserves. No Member State reported anything about the challenges related to forest biomass availability.

As regards the LULUCF³² criteria, Member States only provided limited information in their NECPRs. It should be noted that all EU Member States are signatory of the Paris Agreement and have submitted nationally determined contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC)³³. thirteen³⁴ out of the eighteen Member States that reported in this section explicitly mentioned that they have implemented national or sub-national laws to ensure that emissions do not exceed removals.

To reduce the EU's reliance on imported fossil fuels, the Commission has proposed, in the REPowerEU plan³⁵, to accelerate the production of sustainably produced biomethane (mainly from organic waste, forest and agricultural residues to avoid land-use change impact). A goal of 35 bcm of annual sustainable biomethane production by 2030 has been proposed to reduce imports of natural gas from Russia and to accelerate the EU's clean energy transition. In the NECPRs, of the twenty-four Member States that already reported measures, twenty-one Member States reported measures related to the promotion of biogas and biomethane³⁶ and about one third of the reporting Member States mentioned measures promoting biomethane in the transport sector, mainly as a blending obligation. Other Member States reported at least one measure promoting or regulating the injection of renewable gas, namely biogas/biomethane, into the natural gas grid³⁷. Sweden does not report on either the use of biomethane in transport, or biogas production in 2020 and 2021, even though it is one of the most mature biomethane markets in the EU

³¹ https://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/

³² Land use, land use change and forestry.

³³ <https://unfccc.int/NDCREG>.

³⁴ AT, BG, CZ, DK, EE, ES, FI, HR, LT, NL, PT, SI, SE.

³⁵ COM(2022) 230 final.

³⁶ AT, BE, CY, DK, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, LV, NL, PT, RO, SE, SI, and SK.

³⁷ DK, ES, FR, IT, PT, SE and SK.

and having the largest share of biogases use in transport. Similarly, Belgium, Finland and Hungary did not report in the NECPRs any biogas production neither for 2020 nor 2021.

In their NECPRs, some Member States referred to blending mandates and quotas for the promotion of advanced biofuels. In some cases (Denmark, France, Italy, Malta, Spain), those measures have already entered in force, whereas in others, such as Slovenia and Croatia, the measures to increase the share of advanced biofuels in the transport sector are to be introduced soon. Spain reported various measures that promote the production of advanced biofuels for use not only in road but also in the air and maritime transport sectors, but the regulatory framework for these measures is still under development.

In the NECPRs, Member States were asked to report on the changes in commodity prices and land use within their country, associated with increased use of biomass. For commodity prices, Member States have reported that even though commodity prices may have increased over the last years, this is not related to increased use of biomass for energy production. Spain reported that the share of feedstocks used for bioenergy purposes are small compared to the total amount of produced feedstocks. Cyprus and Estonia report that, in their countries, agricultural feedstocks are not used for energy production, therefore there is no correlation between the use of biomass for energy production and fluctuations in commodity prices.

When it comes to land-use, fourteen Member States have reported the relevant data³⁸, out of which five Member States³⁹ also provided quantitative data. Finland, Lithuania and Slovakia reported no change in land use. Denmark, Italy and Latvia reported an increase of land area related to bioenergy production. Denmark reported an increase in maize growing as biogas co-feedstock from 2,390 ha in 2012 to the current 17,433 ha in 2020/2021, although biogas production is relying dominantly on waste and residues. Italy reported land-use change without further details. Latvia reported an increase of 3.0% in 2021 compared to 2020 for cereals, but note that the change is negligible in comparison with the remaining cropland. Poland reported an annual 4% increase or estimated 797 kha of land for bioenergy cultivation in 2021. Luxembourg was the only Member State that reported a drop of 0.6 pp of land use for energy crops from 2018 to 2022. The dominant energy crop is maize for biogas (67% in 2022). Austria, Cyprus, Hungary, Malta, Spain and Sweden reported that there was either no or no significant amount of land used for bioenergy.

Technological development and deployment of biofuels made from feedstocks listed in Annex IX to Directive (EU) 2018/2001

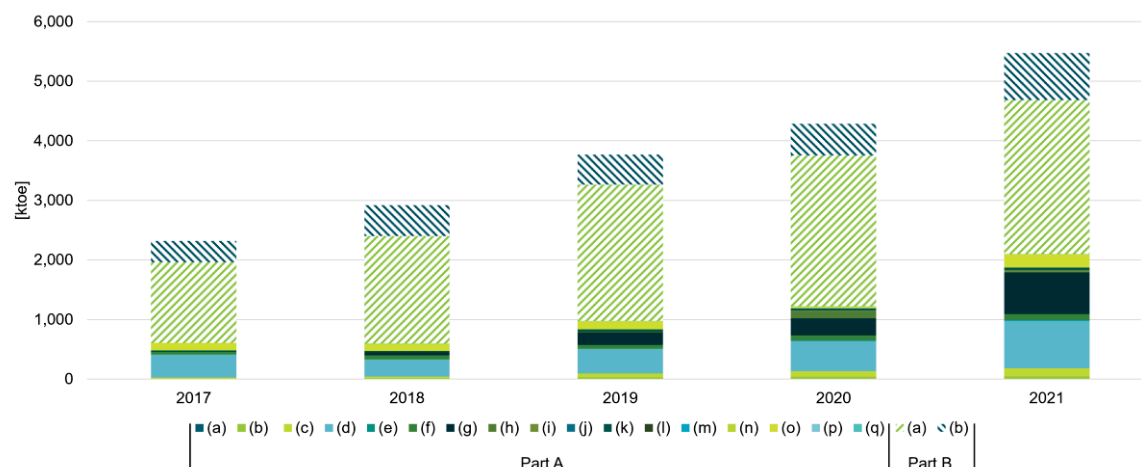
Annex IX of the Renewable Energy Directive includes a list of feedstocks which can be used the production of biogas for transport, advanced biofuels and biofuelsto. Advanced biofuels are produced from feedstocks listed in Part A of Annex IX to the Renewable Energy Directive, whereas Part B lists feedstocks to produce biofuels and biogas for transport (together referred to in this section as “Annex IX biofuels”), the contribution of which towards the minimum share established in the first subparagraph of Article 25(1) shall be limited and may be considered to be twice their energy content. In the NECPRs, most Member States⁴⁰ have not reported the amounts of Annex IX use and production, whereas the units and years for which data has been provided differ per Member States. For the following analysis, data reported in SHARES is used.

³⁸ AT, CY, DK, ES, FI, HU, IT, LV, LT, LU, MT, PL, SK and SE.

³⁹ DK, LV, LT, LU, PL.

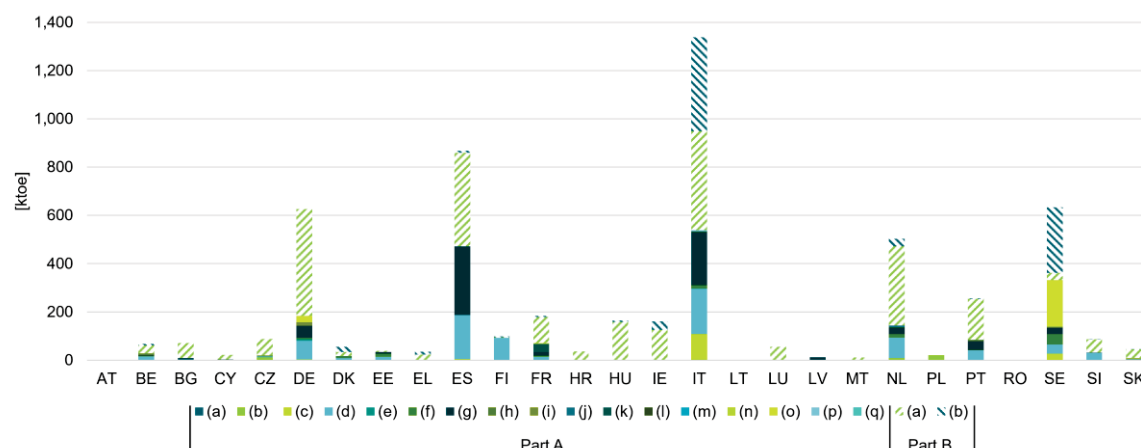
⁴⁰ Reported amounts of Annex IX biofuels in the NECPRs: DK, ES, IE, IT, LU.

The consumption of biofuels pursuant to Annex IX is shown in the figure below for the years 2017-2021. An overall increase is observed in Annex IX biofuels use, from 2,317 ktoe in 2017 to 5,474 ktoe in 2021. Consumption of biofuels produced from used cooking oil (UCO, Annex IX Part B (a)) is the highest of all Annex IX feedstocks. When it comes to Annex IX Part A feedstocks, consumption of biofuels derived from feedstocks listed in points (d) *biomass fraction of industrial waste not fit for use in the food or feed chain* and (g) *palm oil mill effluent and empty palm fruit bunches* is the highest. In contrast, biofuels from the following Annex IX Part A feedstocks are not used at all or used less than 1 ktoe throughout the whole EU in all considered years: (a) *algae if cultivated on land in ponds or photobioreactors*; (l) *nut shells*; (m) *husks*; (n) *cobs cleaned of kernels of corn* and; (q) *other ligno-cellulosic material except saw logs and veneer logs*.



Trend of Annex IX biofuel demand for EU-27 from 2017 to 2021⁴¹

Italy is the largest consumer of Annex IX biofuels and, along with Spain, the largest user of Annex IX Part A biofuels. Italy is also the largest consumer of Annex IX Part B biofuels, followed by Germany, Spain, the Netherlands, and Sweden. Other Member States (Romania and Latvia) did not consume any Annex IX feedstocks, while Austria consumed only a small amount (<1 ktoe).



Split of Annex IX biofuel consumption per feedstock for each Member State in 2021⁴²

⁴¹ Source: Eurostat SHARES database.

⁴² Ibid.

Ten Member States⁴³ reported on technological development and deployment of Annex IX biofuels, yet with fragmented and inconsistent data. Based on information available⁴⁴, there are at least 12 investments related to the production of hydrotreated vegetable oils (HVO) with annual capacity ranging from 24 to 1.300 kt per year in five Member States⁴⁵. The largest single capacities are recorded in Sweden: Lysekil and Gothenburg, each of 1.300 kt of HVO production capacity. The second most represented technology is bioethanol production with six investments of 25 – 50 kt/yr capacity in six Member States⁴⁶. Biomethanol production in five sites (capacity 5.25 – 450 kt/yr) is announced in three Member States⁴⁷. Other investments are Fischer–Tropsch (France), biomethane, BioLPG, Naptha (all in the Netherlands) or unknown/various (Finland).

Available scientific research results regarding indirect land-use change

The Commission is monitoring the situation related to biofuels, bioliquids and biomass fuels with a high risk of indirect-land use change (ILUC) and will continue to regularly update the data based on latest scientific evidence. The Commission has launched two studies⁴⁸ in this regard and the assessment is currently ongoing. The results of the study will be used to support the Commission to also update, if needed, the criteria applied for identifying feedstock with high ILUC-risk and for certifying low ILUC-risk fuels.

Further guidance on the implementation of low ILUC-risk certification was included in Chapter V of the Implementing Regulation (EU) 2022/996⁴⁹ on certification rules for voluntary schemes. In Articles 24-27, the specific requirements for low ILUC-risk certification are explained, and rules for proving additionality and detailed guidance for complying with the requirements for production on unused or abandoned land and for determining additional biomass for yield increase measures are included. These technical rules aim to ensure a harmonized and robust approach across certification bodies. The Commission may further elaborate the guidance based on the results of pilot testing of the methodology that was recently completed as part of the above-mentioned studies contracted by the Commission.⁵⁰

Voluntary and national certification schemes under the Renewable Energy Directive

Voluntary schemes and national certification schemes of EU countries help to ensure that biofuels, bioliquids and biomass fuels as well as renewable hydrogen and its derivatives (renewable fuels of non-biological origin or RFNBOs), and recycled carbon fuels (RCF) are sustainably produced by verifying that they comply with the EU sustainability criteria as well as with the relevant methodologies for RFNBOs and RCF.

As such, the schemes check that:

⁴³ BG, FI, FR, IT, NL, PL, RO, SK, ES, SE.

⁴⁴ European Commission (2023): Union Bioenergy Sustainability Report – Study to support reporting under Article 35 of Regulation (EU) 2018/1999 (draft), to be published

⁴⁵ FI, FR, NL, PL, SE.

⁴⁶ BG, FI, IT, PL, RO, SK.

⁴⁷ ES, NL, SE.

⁴⁸ <https://iluc.guidehouse.com/>.

⁴⁹ Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria, OJ L 168, 27.6.2022, p. 1.

⁵⁰ <https://guidehouse.com/case-studies/energy/2021/biofuels-with-indirect-land-use-change-risk>.

- production of feedstock used for the production of biofuels, bioliquids and biomass fuels does not take place on land with high biodiversity and that land with a high amount of carbon has not been converted for such feedstock production;
- electricity used for the production of renewable hydrogen is of renewable origin; and
- production of renewable fuels and gases leads to sufficient greenhouse gas emissions savings.

Several schemes also take into account additional sustainability aspects such as soil, water, air protection and social criteria. For the certification process, an external auditor verifies the whole production chain from the origin of the raw material and energy to the fuel producer or trader.

While the schemes are run privately, the European Commission can recognise them as compliant with the rules included in the Renewable Energy Directive. The recognition process is carried out in accordance with Article 30 (4) and (6) of the Renewable Energy Directive.

For a scheme to be recognised by the Commission, it must fulfil criteria such as:

- feedstock producers comply with the sustainability criteria and the criteria for RFNBOs production set out in the Renewable Energy Directive and its implementing legislation;
- information on the sustainability characteristics can be traced to the origin of the feedstock;
- all information is well documented;
- companies are audited before they start to participate in the scheme and recertification or surveillance audits take place regularly; and
- the auditors have both the generic and specific auditing skills needed with regard to the scheme's criteria.

The decision recognising a voluntary scheme has usually a legal period of validity of 5 years.

The Commission has so far formally recognised 15 voluntary and national certification schemes⁵¹. The Implementing Regulation (EU) 2022/996 has introduced new and strengthened rules in the area of bioenergy certification. The Commission has launched a formal process of reassessment of all the recognised schemes to ensure that they are still fit for purpose for certifying the compliance of economic operators with the sustainability criteria of the Renewable Energy Directive. This process will be completed by the end of 2023. In parallel, new assessment processes have been launched for schemes willing to certify Renewable Fuels of Non-biological Origin (RFNBOs) on the basis of newly adopted methodologies for assessing their sustainability.

The Commission plans to launch by the end of 2023 a comprehensive study on the performance of the certification system under the Renewable Energy Directive. The first results of this study can be expected at the end of 2024.

Update on the Union database referred to in Article 28(2) of Directive (EU) 2018/2001

Pursuant to Article 28 (2) of the Renewable Energy Directive, the Commission shall ensure that a Union database (UDB) is put in place to “enable the tracing of liquid and gaseous transport fuels”. In scope are “biofuels, renewable fuels of non-biological origin and recycled carbon fuels in the transport sector”. It should be noted that solid biomass fuels are excluded and the scope of the UDB currently only covers the

⁵¹ More information along with the recognising decisions can be found in the following link: https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en.

transport sector. The Commission is in the process of putting the database into operation, which will ensure the traceability of renewable fuels and reinforce transparency. Implementing Regulation (EU) 2022/996 lays down specific rules to ensure that the compliance of biofuels, bioliquids and biomass fuels with the rules of the Renewable Energy Directive are verified in an efficient and harmonized way and that fraud is prevented.

According to the Renewable Energy Directive, Member shall require economic operators to enter information into the database, including for the sustainability and greenhouse gas emission saving characteristics of renewable transport fuels placed on the market. The UDB covers the entire supply chain, starting from the first gathering point for agricultural or forestry raw material or collection point for wastes and residues up to the point of consumption. For gathering and collecting points, this means that also the points of origin will need to be documented in the UDB and all deliveries from these points of origin will have to be registered in the UDB. Similarly, all dependent warehouses and dependent collecting points covered by group certification will need to be recorded so that the relevant material can be traced back at each location where it has been stored.

During 2022, the first pilot testing of the UDB was undertaken by around 20 economic operators. Following this process, the UDB was formally launched on 16 January 2023 with the aim to onboard all the respective economic operators, the voluntary international and national verification schemes, and EU Member States. Member State's national databases can also be linked to the UDB. The onboarding is taking place in stages and involves the registration of all relevant user information. Economic operators have to provide information on the certified site as well as the active certificate of conformity. A National Trade Register Identifier (NTR ID)⁵² is also required to ensure that each economic operator can be uniquely identified by third parties. The Commission has also launched an online Wiki page in March 2023 to support this process. This provides background information on the UDB, relevant training material, and frequently asked questions⁵³.

As of 1 September 2023, about 8,000 economic operators have been onboarded with the support of the voluntary schemes out of an estimated total of about 12,000. Member States have also started the process on their side by identifying and onboarding the institutional users of the system. Initial stock registration of raw materials and fuels is envisaged to commence once at least 80% of the economic operators have been onboarded. The stocks registered should correspond to the net mass balancing figure of the last mass balance period. After this time, economic operators will be able to register and manage transactions of incoming and outgoing material in the UDB. Transactions will need to be registered within 72 hours of the traded date/shipment and the accompanying sustainability certificates must be updated before the end of the mass-balance period.

⁵² The NTR ID is country-specific and could be a VAT number, business register number, or equivalent.

⁵³ <https://wikis.ec.europa.eu/display/UDBBIS/Union+Database+for+Biofuels+--+Public+wiki>.



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ANNEX 2

**Report on renovation of the national stock of residential and non-residential buildings
and on nearly zero-energy buildings**

ANNEX

to the

**Report from the Commission to the European Parliament, the Council, the European
Economic and Social Committee and the Committee of the Regions**

State of the Energy Union Report 2023

**(pursuant to Regulation (EU) 2018/1999 on the Governance of the Energy Union and
Climate Action)**

{SWD(2023) 646 final}

1. Introduction and background

The building sector plays a key role in the long-term strategy on the reduction of greenhouse gas (GHG) emissions for the European Union (EU) as well as to achieve other objectives of the European Green Deal, such as zero-pollution or resource efficiency. The main pathways to an EU decarbonised building stock are designed under the Energy Performance of Building Directive 2010/31/EU (EPBD) and focus on setting cost-optimal minimum energy performance requirements, promoting high energy efficient buildings and developing long-term renovation strategies with the view of mobilising energy efficiency investments in the buildings sector.

As of 2021, all new buildings must be Nearly Zero-Energy Buildings (NZEBs). The broad NZEB definition is given in the EPBD, blending energy efficiency and renewable energy through the cost-optimal framework; NZEB indicators vary widely across the Member States, reflecting national, regional, or local conditions. The European Commission's Joint Research Centre (JRC) assessed the status of NZEBs definitions in Member States and the latest updates related to the definition, its implementation as well as the common features and main differences among NZEBs definitions in place.

To improve the energy performance of existing buildings, the EPBD requires Member States to develop Long-Term Renovation Strategies (LTRSs) for the renovation of the national stock of residential and non-residential buildings. The strategies must include roadmaps with indicative milestones for 2030, 2040 and 2050, measurable indicators, expected energy savings and wider benefits of energy renovation. The strategies must also include a solid financial component. The JRC assessed the compliance of LTRSs with EPBD requirements.

In the framework of the integrated National Energy and Climate Progress reporting (NECPR)¹, Member States are tasked to update, every two years, among others, targets, milestones, and progress indicators of the long-term strategy for the renovation of the national stock of residential and non-residential buildings. Updates on NZEBs are also included in the information to be submitted under the NECPR. Despite all Member States have submitted data and information under the NECPR², on average, completeness of the reported data appears to be limited in most of the building-related topics and indicators.

This report, starting from the assessment of data coming from the first NECPR exercise by the JRC³ and other available sources, fulfils the obligation, introduced at the Article 35 of the Governance Regulation 2018/1999, for the Commission to submit to the European Parliament and to the Council, as part of the State of the Energy Union Report, the following elements:

- biennially, an overall progress report on the **renovation of the national stock of residential and non-residential buildings, both public and private**, in line with the roadmaps set out in the long-term renovation strategies that each Member State shall establish in accordance with Article 2a of Directive 2010/31/EU.
- every four years, an overall progress report on Member States' **increase in the number of nearly zero-energy buildings** in accordance with Article 9(5) of Directive 2010/31/EU.

Finally, the report provides an update on the progress made in executing the Ecodesign and Energy Labelling Working Plan 2022-2024, on which the Commission is called to inform the European Parliament and the Council annually.

¹ Introduced by the by the Governance regulation (EU)2018/1999.

² This report is based on NECPR, integrations, and updates submitted by 12th September 2023. At this date twenty-six Member States submitted a full NECPR including all dataflows, while for one country one dataflow is pending.

³ Paci D., Tsemekidi-Tzeiranaki, S., Clementi, E. L. (2023), Assessment of the 2023 NECP Reports: Monitoring Member States' progress in their energy and climate plans – Summary Report, JRC Technical Report, Publications Office of the European Union, Luxembourg, 2023 (under publication).

2. Main Findings on building-related elements of NECPR

The 2023 integrated national and energy progress reporting exercise (NECPR) represented a first-of-its-kind exercise to track the implementation and progress of the **2020 national Long Term Renovation Strategies (LTRSs)**, including a series of indicators and milestones to be reported by Member States (mostly non-mandatory) describing the **state and evolution of the EU building stock**. The main building-related indicators and data Member States were requested to report relate to **energy consumption, GHG emissions, renovation rates** and number of **nearly zero-energy buildings**⁴.

On average, **completeness of the reported data appears to be limited** in most of the building-related topics and indicators except for the only mandatory field reporting on the contribution of buildings to the Union's overall energy efficiency target. Therefore, it is **difficult to assess**, especially at an aggregated level:

- the progress of Member States towards their targets and
- the **trajectory of the EU building stock** to reach carbon neutrality by 2050, also considering the increased intermediary ambition set by the “Fit-for-55 package”.

This situation underlines the need to improve the tracking of the implementation and progress of the 2020 LTRs, as for example proposed in the EPBD recast proposal⁵.

An additional element of complexity is the **diversity of definitions** as regards some indicators (e.g., worst-performing buildings, renovation rates) and/or reference years. This was already identified during the assessment of the 2020 LTRs.

The reported data under the NECPR allow to take out the following preliminary findings:

- **Energy use:** the level of reporting is generally low especially for primary energy. In general, energy consumption in the building stock has increased between 2020 and 2021 for most of the thirteen Member States reporting in this area (with some exceptions in some countries, depending on the specific sector). This may reflect that 2021 was too soon to measure tangible impacts of the implementation of LTRs.
- **GHG emissions:** figures on building emissions are also relatively incomplete and scattered. GHG emissions on average increases between 2020 and 2021 (for the eleven Member States reporting some data). Furthermore, several countries record some progress towards their 2030 emissions targets.
- **Renovation:** data on number of buildings, square meter or renovation rates are highly incomplete and scattered across Member States, despite the relevance of renovation to decarbonize the building stock. Only eight Member States have reported sufficient renovation data and these showed some progress towards the 2030 building renovation targets set in the national LTRs: the reported progress does not seem sufficient for the achievement of the targets in some Member States, but it is satisfactory in others.
- **Contribution to global energy efficiency targets:** this is the only mandatory elements of the NECPR in relation to buildings and therefore the one presenting the highest level of reporting (close to 100% of the reporting Member States). This requirement is open to descriptive and/or quantitative information and the responses show a variety of interpretation from Member States. In addition, in some cases, the responses fail to provide references to specific milestones or targets, leaving space for improvements.

⁴ For technical and scientific support to this document: Paci D., D’Agostino, Maduta C. Tsemekidi-Tzeiranaki, S., Castellazzi L., Bertoldi P. (2023), Progress on building stock decarbonisation in the EU Member States by 2023, JRC Technical Report, Publications Office of the European Union, Luxembourg, 2023 (under publication).

⁵ Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the energy performance of buildings (recast) COM/2021/802 final.

- **Milestones and indicators:** the NECPR provides the possibility for Member States to set specific milestones and targets to update their 2020 LTRS ambition. Many Member States took this possibility and set targets related either to improvement of the building stock, energy consumption or GHG emissions. Most of the target are set for 2030. This would have to be assessed in conjunction with the draft NECP update also of 2023.

In relation to **NZEBs**:

- As of June 2023, all countries have in place an NZEB definition for new buildings transposing the EPBD. Most Member States also have a specific definition for NZEB renovation.
- Based on the national definitions, the NZEB performance level expressed in non-renewable primary energy demand (kWh/(m² y)) in Member States and averaged at EU level was estimated. The average non-renewable primary energy demand for new single-family houses varies from as low as 15 kWh/(m² y) to 95 kWh/(m² y) with an average at EU level of 52 kWh/(m² y).
- In most cases, the NZEB requirements for new buildings are stricter than those for NZEB renovation. On average, the **NZEB non-renewable primary energy demand of new buildings is about 30% lower than for renovated buildings**. A number of Member States have the same requirements for new and renovated NZEBs.
- Progress towards NZEBs is reported by sixteen countries, with a generally low level of completeness in their breakdown. For twelve Member States it is possible to compare 2021 and 2022 data: in six of these the total number of NZEBs more than doubled in the period considered⁶. The overall number of NZEBs, obtained by aggregating the data of the countries which reported for both years, increased by 12% from 2021 to 2022.

In addition to the above-introduced main findings, the first integrated national and energy progress reporting exercise highlighted a need to improve the tracking of the evolution of the building stock in Member States as well as the streamlining and harmonization of indicators and definitions. In this respect, the EPBD revision proposal⁷ provides that LTRSs should evolve into national **Building Renovation Plans (BRPs)** providing a roadmap for the achievement of a highly energy efficient and decarbonised building stock by 2050. These are thought to better frame and further harmonise the planning and reporting to ensure comparability and a higher level of aggregation. In particular, the revised EPBD will provide a common template for the BRPs with clearer definition of mandatory and voluntary indicators. This would facilitate the presentation of information. In addition, the monitoring framework is strengthened by introducing an assessment of the BRPs by the Commission and the issuing of recommendations as part of the NECP process. Progress in implementation of the BRPs will still be reported as part of the biennial NECPR under the Governance Regulation, which would need to be further reinforced and made consistent with the evolution of the BRPs.

The **2023 major revamping and updating of the Building Stock Observatory**⁸ is aimed to provide an additional contribution in this direction, e.g., for the harmonization of indicators and the tracking of progresses in the building stock. Furthermore, the EPBD revision proposal introduces provisions that task Member States to set up national databases for energy performance of buildings and to transfer yearly their data into the Building Stock Observatory.

⁶ This sudden increase can be also explained by the fact that, by 31st December 2020, all new buildings have to be NZEBs (as stated in the EPBD recast 2010/31/EU).

⁷ Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the energy performance of buildings (recast) COM/2021/802 final.

⁸ [EU Building Stock Observatory \(europa.eu\)](https://europa.eu/europa/en/eu-building-stock-observatory).

3. Assessment of the 2020 Long-Term Renovation Strategies

National long-term renovation strategies (LTRSs) are key policy and planning instruments intended to support the transformation towards a highly efficient and decarbonised building stock by 2050. The entry into force of the amended Energy Performance of Buildings Directive (EPBD) in 2018⁹ implied transferring the provisions on long-term renovation strategies, formerly in Article 4 of the EED, to the new Article 2a in the amended EPBD. The provisions were also strengthened with several additional requirements. The assessment of the submitted 2020 LTRs¹⁰ indicated an overall increase in the level of quality of reporting, despite identifying some room for improvement.

Member States provided a reasonably detailed description of their building stock, with all strategies assessed as fully compliant for this specific item. The improvements identified between the LTRs and previous strategies (under EED) underline the need for and importance of a more uniform approach, which should combine harmonised templates and strengthened guidelines. The experience of the 2020 Target Reports where all EU countries except two used the standard template, together with the e-platform submission, showed that it is possible to move towards win-win solutions where the reporting burden for Member States is reduced while comparability and a structured approach is reinforced, which help in the definition of more effective policy actions. The large majority of 2020 strategies include a good overview of policies to target all public buildings and provide a long-term vision towards a 2050 goal to decarbonise the building stock, with specific intermediate building stock milestones. Most LTRs include milestones for 2030 and 2050, but not always for 2040.

As indicated in the Renovation Wave Communication, tackling energy poverty and worst-performing buildings is one of the areas that deserve specific attention. Member States seem to have recognised the importance of mitigating energy poverty and supporting energy poor households. In general, the actions and measures proposed appear adequate¹¹. All but one of 2020 LTRs include specific measures to address energy poverty. As regards worst-performing buildings, they have been identified by most countries, using a mixture of different approaches (e.g., energy class, age, consumption). Under the 2023 NECPR, 20 Member States mentioned that at least one of their policy measures or group of measures is either contributing among other objectives (e.g. building renovations programmes) or fully dedicated to energy poverty alleviation (in total 42). A specific section on energy poverty, reporting on measures, indicators, and definitions, can be found in the Commission SWD accompanying the 2023 SOEUR Assessment of progress towards the objectives of the Energy Union and Climate Action.

All 2020 LTRs include a specific section about expected energy savings and wider benefits¹², such as those related to health, indoor air quality, and positive economic impacts. However, in half of the cases, Member States did not provide a quantification of these potential benefits¹³.

⁹ Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency was published in the EU Official Journal (L156) and entered into force on 9 July 2018. Member States had to transpose the directive into national law by 10/3/2020.

¹⁰ Tsemekidi Tzeiranaki, S., Paci, D., Clementi, E. and Gonzalez Torres, M., Analysis of the Reports on 2020 Targets under Article 27 of the Governance Regulation – Energy Efficiency, EUR 31361 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-60605-5, doi:10.2760/27622, JRC131606.

¹¹ An overview of how energy poverty was addressed in 2020 LTRs is provided in: SWD(2021) 365 final/2: Analysis of the national long-term renovation strategies. A detailed list of all measures against energy poverty reported in the LTRs is included in the Annex D of the JRC Report: Castellazzi L., Paci D., Zangheri, P., Maduta, C., Economidou, M., Riveiro Serrenho, T., Zancanella, P., Ringel, M., Valentova, M., Tsemekidi Tzeiranaki, S., Assessment of the first long-term renovation strategies under the Energy Performance of Building Directive (Art. 2a), Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/535845, JRC128067.

¹² Shnapp, S., Paci, D., Bertoldi, P. (2020), Untapping multiple benefits: hidden values in environmental and building policies. EUR 30280 EN, Publications Office of the European Union, Luxembourg, JRC120683.

¹³ A JRC study investigated how Member States are coordinating building renovation with asbestos removal in the national LTRs (<https://publications.jrc.ec.europa.eu/repository/handle/JRC129218>)

Strong LTRSs are expected to accelerate the cost-effective renovation of existing buildings, which are currently subject to a low renovation rate, and ensure an increase in deep renovations. As a final remark, however, it can be noted that **the level of ambition of LTRS is not always in line with the 2050 decarbonisation goals**¹⁴.

3.1. Energy saving targets

The energy consumption indicative targets across the EU building stock for 2030, 2040 and 2050 and the energy savings compared to a reference year (reported by Member States in the LTRS roadmaps) are presented in Table 1. For consistency reasons, all measurement units have been converted to ktoe (kilo tonnes of equivalent oil).

Table 1. Energy consumption and saving targets for buildings reported in the 2020 LTRSs (Source: JRC elaboration based on Member State reporting, 2022)

Member State	Reference		Estimated energy consumption and energy saving targets					
	year	FEC/PEC (ktoe)	2030		2040		2050	
			consumption (ktoe)	savings (%)	consumption (ktoe)	savings (%)	consumption (ktoe)	savings (%)
AT	2017	9 235	9 235	0%	9 235	0%	9 235	0%
BE - Br	2015	1 230	n/a	-	n/a	-	n/a	-
BE - Fl	2020	3 353	2 580	-23%	1 806	-46%	946	-72%
BE - Wa	2017	3 543	2 416	-32%	1 591	-55%	1 479	-58%
BG	2020	n/a	-251	-	-560	-	-630	-
CY	2020	580	640	+10%	650	+12%	640	+10%
CZ	2020	8 909	8 240	-8%	7 548	-15%	6 903	-23%
DE	2018	78 819	47 807	-39%	n/a	-	n/a	-
DK	2020	4 247	n/a	-	n/a	-	n/a	-
EE	2020	1 006	n/a	-	n/a	-	413	-59%
EL	2015	6 010	5 530	-8%	4 566	-24%	3 964	-34%
ES	2020	26 163	22 426	-14%	18 562	-29%	16 572	-37%
FI	2020	6 096	4 772	-22%	3 878	-36%	3 130	-49%
FR	2015	n/a	n/a	-22%	n/a	-29%	n/a	-41%
HR	2017	3 177	3 250	+2%	2 940	-7%	2 513	-21%
HU	2018	5 828	4 681	-20%	559	-40%	373	-60%
IE	2018	4 215	n/a	-	n/a	-	n/a	-
IT	2020	47 700	42 000	-12%	n/a	-	24 000	-50%
LT	2020	3 510	2 989	-15%	2 226	-37%	1 390	-60%
LU	2020	902	673	-34%	553	-39%	453	-50%
LV	2018	1 910	1 480	-23%	n/a	-	n/a	-
MT	2018	n/a	n/a	-18%	n/a	-20%	n/a	-25%
NL	2020	13 925	12 062	-13%	n/a	-	n/a	-
PL	2018	27 000	26 000	-4%	n/a	-	n/a	-
PT	2018	n/a	n/a	-11%	n/a	-27%	n/a	-34%
RO	2017	9 520	8 690	-9%	6 200	-35%	3 380	-65%
SE	2020	4 346	4 043	-7%	3 914	-10%	3 848	-11%
SI	2020	1 531	1 268	-17%	1 186	-22%	1 190	-22%
SK	2016	4 067	3 431	-16%	2 889	-29%	2 433	-40%

Notes: FEC – final energy consumption, PEC – primary energy consumption; **Belgium-Flanders:** milestones only for residential buildings; **Germany:** milestone for PEC; **Denmark:** indicative milestones will be determined in connection with the climate action plan; **Greece:** average reduction values for 2040 and 2050; **Finland:** values representing the gross heating demand; **Hungary:** 2030 milestone for residential buildings (3917 ktoe) and public buildings (764 ktoe); 2040 and 2050 milestones only for public buildings; **Ireland:** NECP targets: PEC savings in residential sector: 2020: 8.44 TWh; 2030: 23.7 TWh; **Italy:** own calculation for 2030 milestone based on annual saving rate; **Lithuania:** milestones for PEC; **Latvia:** 2030 milestone from NECP; **Malta:** milestones only for residential buildings; **Portugal:** milestones for PEC; **Sweden:** milestones for purchased heat and electricity for apartment buildings, schools, offices

¹⁴

SWD(2021) 365 final/2: Analysis of the national long-term renovation strategies.

3.2. GHG emission targets

The GHG emission targets for 2030, 2040 and 2050 reported by Member States in the 2020 LTRS are summarized in Table 2. For consistency reasons, all measurement units have been converted to MtCO₂e (million tonnes of CO₂-equivalent). Most countries provided the absolute values of CO₂ or CO₂-equivalent emissions in buildings in 2030, 2040 and 2050 including a reference emissions value used to estimate the percentage savings. The reference year varies between 1990 and 2020 with year 2020 used by most countries as reference. Not all countries provided all emission milestones.

Table 2. GHG emission and saving targets for buildings reported in 2020 LTRSs (Source: JRC elaboration based on Member State reporting, 2022)

Member State	Reference		Estimated GHG emission and saving targets					
	year	value Mt CO ₂ e	2030		2040		2050	
			emissions (Mt CO ₂ e)	savings (%)	emissions (Mt CO ₂ e)	savings (%)	emissions (Mt CO ₂ e)	savings (%)
AT	2020	8.15	5.55	-31%	3.94	-52%	2.57	-68%
BE - Br	2020	4.20	2.80	-33%	1.80	-57%	0.90	-79%
BE - Fl	2018	12.20	9.40	-23%	5.90	-52%	2.30	-81%
BE - Wa	2018	7.60	3.90	-49%	1.90	-75%	1.00	-87%
BG	2020	n/a	-1.31	-	-2.89	-	-3.27	-
CY	2020	n/a	n/a	-24%	-	n/a	n/a	-
CZ	n/a	44.57	n/a	-	n/a	-	26.74	42%
DE	2020	118	70	-41%	n/a	-	n/a	-
DK	1990	n/a	n/a	-70%	n/a	-	n/a	-
EE	2020	4.43	n/a	-	n/a	-	0.48	-89%
EL	2015	n/a	n/a	-50%	n/a	-70%	n/a	-100%
ES	2020	28.42	18.56	-35%	6.58	-77%	0.21	-99%
FI	2020	7.81	2.87	-63%	1.47	-81%	0.65	-92%
FR	2018	82.00	45.00	-55%	25.00	70%	5.00	-94%
HR	2020	2.17	2.01	-7%	1.74	-20%	1.26	-42%
HU	2018-2020	n/a	n/a	-19%	n/a	-60%	n/a	-90%
IE	2019	13.50	7.43	-45%	n/a	-	n/a	-
IT	2020	61.10	43.60	-29%	n/a	-	0.60	-99%
LT	2020	5.29	4.00	-24%	2.11	-60%	0.02	-100%
LU	n/a	n/a	n/a	-62%	n/a	-96%	n/a	-
LV	2017	2.77	2.55	-8%	n/a	-	n/a	-
MT	2018	0.71	0.44	-38%	0.27	-61%	0.17	-76%
NL	2020	23.10	15.30	-34%	8.40	-64%	1.50	-94%
PL	2019	52.00	35.00	-33%	n/a	-	n/a	-
PT	2018	n/a	n/a	-15%	n/a	-47%	n/a	-77%
RO	2020	9.84	7.50	-24%	4.90	-50%	1.90	-81%
SE	2018	0.89	0.01	-99%	0.00	-100%	0.00	-100%
SI	2020	2.68	1.45	-46%	0.94	-65%	0.76	-72%
SK	2016	8.54	5.50	-36%	3.40	-60%	1.80	-79%

Notes: **Italy:** The 2050 milestone corresponds to non-residential buildings (residential buildings are carbon neutral); **Luxembourg:** milestones only for residential buildings; **Latvia:** 2030 milestone calculated based on the information provided in the strategy; **Sweden:** direct GHG emissions are low because the main source of heating is thermal energy and electricity; fossil fuels completely phased out by 2045

Generally, the **targeted GHG emission reductions appear ambitious across the EU**. By 2050, Greece, Italy, Lithuania, and Spain aim at fully decarbonised building stocks, while Sweden aims for this goal by 2045. Flanders region aims for zero emissions in public buildings by 2050. Finland, France, Hungary, and the Netherlands also target at significant GHG emission reductions (over 90% by 2050 with respect to the reference years).

3.3. Renovation targets

Table 3 summarizes the renovation targets in the building stock for 2030, 2040 and 2050 as reported by Member States in the 2020 LTRS.

Table 3. Completed and planned energy renovation of buildings reported in the 2020 LTRS (Source: JRC elaboration based on Member States reporting, 2022)

MS	Completed renovation	Planned renovation		
	2020	2030	2040	2050
AT	1.5% p.a.	1.5% p.a.	1.5% p.a.	1.5% p.a.
BE - Br	less than 1% p.a.		100% public buildings energy neutral	80% cumulative residential
BE - Fl	3.5% cumulative dwellings (105 000)	3% p.a. residential 32% cumulative dwellings (973 500)	3% p.a. residential 64% cumulative dwellings (1 923 500)	3% p.a. residential 96.5% cumulative dwellings (2 873 500)
BE - Wa		12% cumulative residential (194 571 buildings) 63 400 000 m ² cumulative non-residential	51% cumulative residential (830 158 buildings) 114 000 000 m ² cumulative non-residential	99% cumulative residential (1 605 485 buildings, 25% deep renovated) 114 000 000 m ² cumulative non-residential
BG		8% (22 203 509 m ²) cumulative floor area	26% (71 774 177 m ²) cumulative floor area	46% (127 597 192 m ²) cumulative floor area
CY	1% cumulative buildings	1% p.a. 10% cumulative (43 000)	1% p.a.	1% p.a.
CZ	45% cumulative buildings with more than 25% shallow renovation	1.4% p.a. SFH; 0.79% p.a. MFH; 2% p.a. public buildings 55% cumulative	1.4% p.a. SFH; 0.79% p.a. MFH; 2% p.a. public buildings 60% cumulative	1.4% p.a. SFH; 0.79% p.a. MFH; 2% p.a. public buildings 70% cumulative
DE		1.3% to 2% p.a. SFH and 1.5% to 2% p.a. MFH for the period 2020-2030		
DK	80% renovated (55-60% light, 20-25% medium, 5% deep)			
EE	500 000 m ² cumulative floor area	22% cumulative (11 880 000 m ²)	64% cumulative (34 560 000 m ²)	100% cumulative (54 000 000 m ² / 141 000 buildings)
EL		23% residential; 9% non-residential	36-42% residential; 14-16% non-residential	45-49% residential; 19-20% non-residential
ES	56 017 cumulative dwellings	1 256 017 cumulative dwellings (300 000 dwellings/year)	4 756 017 cumulative dwellings	7 156 017 cumulative dwellings
FI	29 % cumulative buildings	54% cumulative	98% cumulative	100% cumulative
FR		1.5-3% p.a. over 2020-50		
HR	0.7% p.a. 5% cumulative buildings	2% p.a.	3.5% p.a. (4% p.a. buildings with cultural value) 60% cumulative NZEBs	4% p.a. 100% cumulative NZEBs
HU	1% p.a.	3% p.a. residential; 5% p.a. public buildings 20% cumulative NZEBs	3% p.a. residential; 5% p.a. public buildings 60% cumulative NZEBs	3% p.a. residential; 5% p.a. public buildings 90% cumulative NZEBs
IE		500 000 dwellings cumulative 100% public buildings 33% commercial buildings	1 000 000 dwellings cumulative 66% commercial buildings	1 500 000 dwellings cumulative 100% commercial buildings
IT	0.86% p.a.	1.9% residential; 2.8% non-residential	2.7% p.a. residential; 2.6% p.a. non-residential	2.7% p.a. residential; 2.6% p.a. non-residential
LT	8% cumulative buildings (58 774 units)	17% cumulative (99 281 units)	43% cumulative (225 421 units)	74% cumulative (436 008 units)
LU	10-14% cumulative residential buildings	3% p.a. residential (4500 dwellings/year)	3% p.a. residential (4500 dwellings/year)	3% p.a. residential (4 500 dwellings/year)
LV	3% p.a.	8 100 units MFH (30%) and 7 500 units SFH;	16 200 units MFH (60%) cumulative	All NZEBs

	678 460 m ² cumulative public buildings	500 000 m ² public buildings (2020-30)	3% p.a. public building	
MT	0.5% p.a. (0.7% p.a. 2025)	5-6% p.a. residential (0.6% deep renovation) from 2025	5-6% p.a. residential (0.6% deep renovation)	5-6% p.a. residential (0.6% deep renovation)
NL		1 500 000 dwellings		
PL		3.6% p.a. (236 000/year) 2 360 000 cumulative	4.1% p.a. (507 000/year) 5 070 000 cumulative	3.7% p.a. (751 000/year) 7 510 000 cumulative
PT		69% cumulative buildings (363 680 501 m ²)	99% cumulative buildings (635 637 685 m ²)	100% cumulative buildings (747 953 071 m ²)
RO	0.5% p.a., 6% cumulative floor area (32 352 000 m ²)	0.5% to 3.39% p.a. in 2030, 19% cumulative floor area	3.79% p.a. 57% cumulative floor area	4.33% p.a. 100% cumulative floor area
SE	2.5%-5% p.a. 2016-2019 10% p.a. after 2019			
SI	1 795 000 m ² cumulative public buildings	29 733 000 m ² cumulative	28 850 600 m ² cumulative SFH; 12 778 700 m ² cumulative MFH	32 549 000 m ² cumulative SFH (74%); 13 924 700 m ² cumulative MFH (91%)
SK		100% cumulative MFH	100% cumulative SFH	

Notes: **Austria:** 1.5% annual renovation rate used to estimate the energy and emissions savings targets; however, the strategy mentions a legislative programme 2020-2024 which has, inter alia, the scope to increase the renovation rate to 3%; **Belgium-Flanders:** 1.1% annual deep renovation rate of residential buildings between 2025 and 2050; **Cyprus:** 1% annual renovation rate considered in the realistic scenarios used to estimate energy and GHG emissions savings. For full building stock decarbonisation by 2050, the renovation rate should be tripled; **Czechia:** annual renovation rates and cumulative renovation based on the optimal scenario development of the building stock by 2050; **Greece:** only building envelope renovation milestone; milestones for energy system renovation provided in the LTRS; **Finland:** average milestone across building types in energy class C or above; by 2050, only 70% of the Finnish building stock will remain as the vacant buildings will be removed; **Ireland:** renovation to energy class B2 or cost optimal equivalent or carbon equivalent; **Lithuania:** 2020 indicator includes all new and renovated buildings in energy class B or above. Targets include buildings to be renovated from 2021 on.; **Poland:** 4.7 million deep energy renovation are estimated between 2021 and 2050; **Sweden:** every 10 years, the proportion of buildings in the A-C energy class should be higher than in the previous reference year, and the proportion of buildings in the E-F EPC class should be lower than in the previous reference year; **Slovenia:** milestones for the share of renovated non-residential buildings by type of building and of renovation (partial or comprehensive) are also given; **Slovakia:** shares of deep and NZEB renovation will increase from 5% (2020) to 50% (2050) while the light renovation will decrease from 50% (2020) to 10% (2050).

As observed, the target renovation indicators are not harmonised across the EU. A significant share of countries/regions (14) provided **absolute values for the number of renovated buildings/dwellings or renovated floor area** (in square meters), while thirteen countries/regions **expressed the renovation targets in terms of annual renovation rate**. Moreover, three countries provided only the cumulative share of renovated buildings.

Most countries/regions (19) covered both residential and non-residential buildings. However, some countries/regions focused only on the residential sector (Malta, Flanders, the Netherlands Germany, Spain, Luxembourg, Slovakia) or on specific segments within the non-residential sector, such as commercial buildings (Ireland) or public buildings (Czechia, Hungary, Latvia).

The annual renovation rate planned for the next decades varies from as low as 1% to 6%. Still, most countries aim at increasing the annual renovation on average from 1.5% to 3%¹⁵.

Different approaches in the definition of renovation targets make difficult to compare renovation ambitions across the EU and to estimate an aggregate renovation target. However, based solely on the information reported in Table 3, renovation ambitions vary considerably across the EU: some countries aim to renovate the entire building stock by 2050, while other countries plan to renovate less than half of their building stock by 2050. Also, the energy renovation impact strongly depends on the renovation depth that in most cases is not clear.

¹⁵ The renovation rate refers to the share of renovated floor area or renovated number of buildings in a given year from the total floor area or number of buildings available for renovation in the Member State's reference year.

4. Progress on the long-term building renovation strategies from NECPRs 2023

The NECPRs include specific reporting tables for Member States' milestones and progress indicators of the long-term strategy for the renovation of the national stock of residential and non-residential buildings (tables 2-5, Annex IV to the Implementing Regulation 2022/2299).

This section is based on NECPRs, integrations, and updates submitted before 12 September 2023. At this date twenty-six Member States submitted a full NECPR (i.e., NECPR including all dataflows)¹⁶, while for one Member State (Romania) the dataflow 2 is pending. The process of submissions was, in some cases, fragmented and articulated with Member States releasing different dataflows, integrations and specifications whenever needed.

Reflecting the NECPR reporting template, data collected in this area are grouped in 11 indicators, organised into seven main topics. Table 4 below summarises the topics and indicators, while giving an overview of the completeness of the reporting in each of them.

Table 4. Completeness of NECPR reporting in the area of the LTRs (Source: JRC elaboration on NECPRs 2023)

Topic	Indicator	Obligation	All	Completed	% Indicator	% Topic
Building Stock	Number of buildings	Mia	486	195	40.1%	39.1%
	Floor area	Mia	486	185	38.1%	
Energy Use	Primary energy use	Mia	486	102	21.0%	23.6%
	Final energy use	Mia	486	127	26.1%	
Emissions	Direct GHG	Mia	486	100	20.6%	19.4%
	Total GHG	Mia	486	89	18.3%	
Renovation	Renovations	Mia	3564	115	3.2%	3.2%
Milestones	Milestone indicators	Mia	216	136	63.0%	63.0%
Contribution to EU targets	Contribution to Union's targets	M	27	25	92.6%	92.6%
NZEBs	NZEB number of buildings	Mia	162	55	34.0%	32.7%
	NZEB floor area	Mia	162	51	31.5%	

Notes: Mia=Mandatory if available; M=Mandatory

Even if with some important differences in sub-indicators (e.g., residential vs non-residential building stock, or 2020 entries more complete than 2021 ones), on average, **completeness of the data appears to be an issue in most of the topics and indicators**. The only topic where almost all Member States reported information is the contribution to the Union's target, which is also the only mandatory field. All the remaining fields, flagged as "mandatory if available", show generally low completeness (in some cases below 3%) and have its maximum in the Milestones Indicators with nearly 63% of entries. Data on the building stock is reported with a completeness of nearly 40%, for NZEBs this is slightly more than 30%, while renovation is in general poorly covered, with only 3.2% of entries reported.

¹⁶ Dataflow 1: "Integrated national policies and measures" – according to Governance Regulation 2018/1999 (GovReg), Articles 17(2)(a), (c) and (e); 18(1)(a); 20(b) and 21(b) and (c); and Implementing Regulation 2020/1208 Annex XXIV and Implementing Regulation 2022/2299 Annex IX-XIV. Dataflow 2: "Progress towards objectives, targets and contributions (Energy Efficiency)" – according to GovReg, Articles 4(2)(a) and 21(a) and Implementing Regulation 2022/2299 Annex IV. Dataflow 3: "Additional reporting obligations in the area of energy efficiency - according to GovReg, Article 21(c) and Implementing Regulation 2022/2299 Annex XVII. Dataflow N. 3 consists of six tables (Reasons, Article 5, Energy audits, National primary energy factor for electricity, NZEB, and Energy services); RO, EI and CY NECPRs missed this section, but they reported on other two dataflows.

4.1. Building stock

Residential

Member States reported data of the building stock with different degrees of completeness: data for residential buildings are the most complete, with 20 and 17 Member States reporting data on the number of buildings for 2020 and 2021 respectively. In terms of floor area, twenty-one Member States reported information for 2020 and twelve for 2021. Overall, among the countries that submitted their NECPRs only two did not report any data on their residential building stock.

Table 5. Residential building stock (Source: 2023 NECPR Reporting, JRC, 2023)

Member State	Number of buildings							
	2020			2021			Change 2020-2021	
	Total (thousands)	Worst performing (thousands)	Worst performing (%)	Total (thousands)	Worst performing (thousands)	Worst performing (%)	Total	Worst performing
BE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BG	1,506	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CZ	n.a.	n.a.	n.a.	1,640	n.a.	n.a.	n.a.	n.a.
DK	1,599	n.a.	n.a.	1,610	n.a.	n.a.	0.7%	n.a.
DE	19,273	n.a.	n.a.	19,376	n.a.	n.a.	0.5%	n.a.
EE	129	n.a.	n.a.	129	n.a.	n.a.	0.0%	n.a.
EL	3,370	1,112	33%	3,390	1,085	32%	0.6%	-2.4%
IE	1,825	n.a.	n.a.	1,842	n.a.	n.a.	0.9%	n.a.
ES	7,288	n.a.	n.a.	7,308	n.a.	n.a.	0.3%	n.a.
FR	29,571	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HR	945	350	37%	956	342	36%	1.2%	-2.0%
IT	12,420	9,231	74%	n.a.	n.a.	n.a.	n.a.	n.a.
CY	466	438	94%	n.a.	n.a.	n.a.	n.a.	n.a.
LV	367	n.a.	n.a.	368	n.a.	n.a.	0.4%	n.a.
LT	571	342	60%	574	342	60%	0.5%	0.0%
LU	149	n.a.	n.a.	151	n.a.	n.a.	1.1%	n.a.
HU	2,400	1,400	58%	2,412	1,398	58%	0.5%	-0.1%
MT	198	n.a.	n.a.	208	n.a.	n.a.	4.8%	n.a.
NL	7,892	1,512	19%	7,966	n.a.	n.a.	0.9%	n.a.
AT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL	15,015	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PT	n.a.	n.a.	n.a.	3,629	n.a.	n.a.	n.a.	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FI	1,293	78	6%	1,296	86	7%	0.2%	9.4%
SE	3,034	164	5%	3,046	148	5%	0.4%	-9.6%
EU	109,310	14,627	43%	55,900	3,402	33%	1%	-1%

Notes: n.a. = not available; n.v. = not validated; Worst-performing (%) and Change 2020-2021 are calculated values (not reported by Member States in NECPRs); EU row (calculated) indicates the sum of the reported data or the average of the calculated %

The number of buildings did not change significantly in the considered years with the highest increase being registered in Malta (4.8%). On average, the building stock grew by 1%, while the number of buildings in the worst-performing sector decreased by nearly 1%. In this latter

segment, however, higher variation emerged: ranging from +9.6% (Sweden) to -9.4% (Finland). Data on floor area complement the number of buildings for most of the countries which reported information on residential buildings, except for Austria and Slovenia (only floor area reported), and for Spain and Latvia (only number of buildings, with a % growth 2020-2021 of 0.3% and 0.4% respectively). Also in terms of floor area, almost all Member States had a small increase of their building stock (3% on average) except for Bulgaria where the increase was more than 18% in one year.

The fields on **worst-performing buildings** have generally a lower completeness in the NECPRs. In the case of residential buildings, nine countries reported on their number of worst-performing buildings for 2020, only 6 for 2021 (figures in terms of floor area are lower). Worst-performing buildings, represent, on average, 33%-43% of the reported building stock in terms of floor area, with important differences among Member States: Italy and Lithuania have the highest shares (74% and 62% in 2020), while the share is marginal in Finland (6%) and Sweden (5%).

Member States use different approaches to define their worst-performing stock: energy class, age, energy consumption, as resulted by the analysis of the last long term building renovation strategies. In terms of EPC class (chosen by seven countries plus Flanders and Wallonia regions of Belgium), the energy label threshold varied from energy label G (in case of Germany) to energy label C (in case of Croatia for coastal areas). It is difficult to compare between labels used across EU as the methodological approaches largely differ from country to country. Important variations are also observed in cases where worst performance was linked to the age of a building: for Estonia and Romania the threshold was set at 2000, while for Sweden buildings constructed between 1945-75 were deemed as worst performing. Six countries defined worst performance according the primary or final energy consumption in kWh/m², while no information was found in twelve other countries (including Brussels region).

The heterogeneity in their definition determines a wide range of shares representing the worst-performing segment of national building stock: looking at the total number of residential buildings, it is on average, 28-43% (the difference depends on the year and countries considered), but it ranges from 5-6% in Finland and Sweden to more than 90% in Cyprus. Where it is possible to compare, these shares remained almost stable in the last two years.

Non-Residential

As observed in previous reporting and studies, **data availability on non-residential buildings is generally lower than for residential buildings**. In fact, only eighteen countries reported some information on non-residential buildings stock in their NECPRs (fourteen Member States reported in terms of number of buildings and fourteen in terms floor area). Missing values are frequent, as visible in the following table.

Table 6. Non-residential building stock - floor area (Source: 2023 NECPR Reporting, JRC, 2023)

Member State	2020			2021			Change 2020-2021	
	Total (Million m ²)	Worst performing (Million m ²)	Worst performing (%)	Total (Million m ²)	Worst performing (Million m ²)	Worst performing (%)	Total	Worst performing
BE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CZ	104.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
DE	n.a.	n.a.	n.a.	3,507.0	n.a.	n.a.	n.a.	n.a.
EE	n.a.	n.a.	n.a.	273.0	n.a.	n.a.	n.a.	n.a.
EL	17.0	n.a.	n.a.	17.0	n.a.	n.a.	0%	n.a.
IE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ES	95.6	15.3	 16%	96.2	16.3	 17%	1%	7%
FR	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HR	58.7	14.9	 25%	60.2	14.2	 24%	3%	-5%
IT	537.7	315.7	 59%	n.a.	n.a.	n.a.	n.a.	n.a.
CY	7.0	5.8	 83%	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
LT	46.6	35.4	 76%	47.0	35.4	 75%	1%	0%
LU	13.0	n.a.	n.a.	13.4	n.a.	n.a.	3%	n.a.
HU	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
MT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NL	416.9	n.a.	n.a.	419.9	n.a.	n.a.	1%	n.a.
AT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	23.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FI	109.9	15.4	 14%	n.a.	n.a.	n.a.	n.a.	n.a.
SE	237.9	7.1	 3%	n.a.	n.a.	n.a.	n.a.	n.a.
EU	1,668.8	409.6	 39%	4,433.7	65.9	 39%	1%	1%

Notes: n.a. = not available; Worst-performing (%) and Change 2020-2021 are calculated values (not reported by Member States in NECPRs); EU row (calculated) indicates the sum of the reported data or the average of the calculated %

Public Buildings

Regarding public buildings, Member States had lower data availability than non-residential, with twelve countries reporting some information in this field. In the case of public buildings shares of worst-performing buildings and change 2020-2021 are aligned with the ones discussed for non-residential (for Member States which reported both). Greece experienced an increase in the share of the worst-performing sector, both in terms of number of buildings and floor area, while Croatia reported a significant decrease.

Table 7. Public building stock - floor area (Source: 2023 NECPR Reporting, JRC, 2023)

Member State	2020			2021			Change 2020-2021	
	Total (Thousands m2)	Worst performing (Thousands m2)	Worst performing (%)	Total (Thousands m2)	Worst performing (Thousands m2)	Worst performing (%)	Total	Worst performing
BE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CZ	n.a.	n.a.	n.a.	76,000.0	n.a.	n.a.	n.a.	n.a.
DK	38,887.3	n.a.	n.a.	38,657.8	n.a.	n.a.	-0.6%	n.a.
DE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EE	5,000.0	n.a.	n.a.	5,000.0	n.a.	n.a.	0.0%	n.a.
EL	40,146.9	6,423.5	16.0%	40,392.3	6,866.7	17.0%	0.6%	6.9%
IE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ES	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FR	373,000.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HR	16,099.5	5,634.8	35.0%	16,510.8	5,367.5	32.5%	2.6%	-4.7%
IT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CY	2,000.0	1,660.0	83.0%	n.a.	n.a.	n.a.	n.a.	n.a.
LV	8,950.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
LT	26,030.2	17,429.0	67.0%	26,177.4	17,429.0	66.6%	0.6%	0.0%
LU	3,084.0	n.a.	n.a.	3,096.0	n.a.	n.a.	0.4%	n.a.
HU	37,110.0	7,839.7	21.1%	n.a.	n.a.	n.a.	n.a.	n.a.
MT	n.a.	n.a.	n.a.	167.2	n.a.	n.a.	n.a.	n.a.
NL	n.a.	n.a.	n.a.	102,000.0	20,000.0	19.6%	n.a.	n.a.
AT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	9,707.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FI	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SE	n.a.	6,654.8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU	560,014.9	45,641.9	44.4%	308,001.5	49,663.2	33.9%	0.6%	0.7%

Notes: n.a. = not available; Worst-performing (%) and Change 2020-2021 are calculated values (not reported by Member States in NECPRs); EU row (calculated) indicates the sum of the reported data or the average of the calculated %

4.2. Energy Use

Primary and Final energy

The reporting rate for energy use in the building sector is generally low, only twelve countries reported information in this field for primary energy, with many missing data in the corresponding tables. Only two countries reported a full sectoral breakdown (residential, non-residential, and public buildings) including the share attributed to worst-performing buildings.

In all Member States that have data available for both years, the overall trend is a **slight increase in primary energy consumption from 2020 to 2021**. Member States show very different situations: the highest increases are observed in Finland, amounting to 12% and 19% in residential and non-residential sectors respectively. Looking at the overall building stock, primary energy consumption decreased in the residential sector in Ireland, Luxembourg, and Germany. If we consider the worst performing buildings, primary energy use decreased in Sweden, Croatia and Lithuania, but in Romania (only for public buildings) and Finland (only for residential buildings). It increased significantly (26%) for non-residential buildings in Finland.

Data on **final energy** (Table 8) are relatively more complete (nearly 60% of the Member States reported data at least on total final energy consumption in the residential sector in 2020), but the high number of missing data restricts the possibility to draw general conclusions at EU level. Also **in terms of final energy, the short-term evolution indicates a general increase with some exceptions**, such as the residential sector in Greece and Ireland and, in most instances, worst-performing buildings (which can be linked with renovation activities).

Table 8. Final energy use in building - Change 2020-2021 (Source: 2023 NECPR Reporting, JRC, 2023)

Member State	Change 2020-2021					
	Residential buildings		Non-Residential buildings		Public buildings	
	Total	Worst performing	Total	Worst performing	Total	Worst performing
BE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CZ	10%	n.a.	-1%	n.a.	n.a.	n.a.
DK	6%	n.a.	15%	n.a.	13%	n.a.
DE	1%	n.a.	4%	n.a.	n.a.	n.a.
EE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EL	-1%	n.a.	7%	n.a.	2%	n.a.
IE	-4%	n.a.	3%	n.a.	-1%	n.a.
ES	1%	n.a.	7%	n.a.	n.a.	n.a.
FR	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HR	1%	-2%	5%	-9%	5%	-9%
IT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
CY	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
LV	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
LT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
LU	-3%	n.a.	n.a.	n.a.	n.a.	n.a.
HU	7%	7%	n.a.	n.a.	2%	n.a.
MT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NL	2%	n.a.	-2%	n.a.	n.a.	n.a.
AT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL	5%	n.a.	n.a.	n.a.	n.a.	n.a.
PT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
RO	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FI	10%	2%	19%	27%	n.a.	n.a.
SE	10%	-7%	9%	-10%	n.a.	n.a.
EU	3%	0%	7%	2%	4%	-9%

4.2.1. Progress monitoring of the energy use

Table 9 summarises the targets and milestones in energy use in buildings as reported by sixteen countries in their 2020 LTRS and 2023 NECPR. The table reports final energy use progress, however, For Germany, Lithuania and Portugal the values represent the primary energy use, since these countries expressed their LTRS targets and milestones in primary energy use (as also shown in Table 1). The progress towards the national targets has been monitored by most countries in terms of annual final energy consumption. Several countries reported other energy-related indicators, most frequently the specific energy use.

Specifically, the table provides from left to right:

- the reference years and values used by countries to set the 2030 targets.
- the final energy consumption (or energy savings in the case of Bulgaria) reported by the Member States for 2020 (by thirteen countries) and 2021 (by eleven countries).
- the 2030 targets set in the 2020 LTRS.
- the 2030 targets reported in the NECPR.

Table 9. Summary of targets and milestones for energy use in buildings reported in 2020 LTRSs, 2023 NECPR (Source: JRC elaboration based on Member State reporting, 2023)

Member State	Milestones				Targets	
	LTRS		NECPR		2030	
	Reference year	Value (ktoe)	2020 (ktoe)	2021 (ktoe)	LTRS (ktoe or %)	NECPR (ktoe or %)
Bulgaria	n.a.	n.a.	-175	-25	-215	-215
Croatia	2017	3 173	2 959	3 013	3 251	n.a.
Cyprus	2020	580	602	n.a.	640	640
Czechia	2020	8 909	10 226	10 914	8 240	n.a.
Denmark	2018	4 248	4 862	5 264	n.a.	n.a.
Finland	2020	6 096	5 586	6 240	4 772	3 130 (2050 target)
France	2020	n.a.	n.a.	n.a.	- 40%	-40%
Germany	2020	78 819	69 526	69 595	47 800	47 800
Greece	2015	6 014	5 790	5 894	5 530	5 530
Hungary	2018	5 830	6 735	7 188	4 681	n.a.
Ireland	2018	4 256	5 464	3 587	n.a.	n.a.
Lithuania	2020	3 510	3 510	3 522	2 989	2 989
Luxembourg	2020	554	446	433	396	396
Netherlands	2020	13 925	15 788	15 890	12 062	n.a.
Poland	2018	27 000	21 201	22 146	below 26 000	below 26 000
Portugal	2017	n.a.	n.a.	n.a.	-11%	-11%
Slovenia	2020	1 531	1 699	n.a.	1 268	-22%
Spain	2020	26 165	24 170	24 667	22 426	22 425
Sweden	2020	4 346	6 234	6 826	4 043	n.a.

Notes: **Bulgaria:** final energy savings, no reference value provided; **Finland:** gross heating demand, NECPR target for 2050; **France:** LTRS/NECPR targets cover only the services sector; **Germany, Lithuania, and Portugal:** primary energy use; **Luxembourg:** values only for residential; **Poland:** NECPR values cover only residential, thus not comparable with LTRS targets; **Slovenia:** LTRS and NECPR targets: weighted average of sector-specific values; **Sweden:** the LTRS reference value and 2030 target cover the energy use by apartment buildings, schools, and offices thus not directly comparable with the values reported in the NECPR.

It is notable that although the reference year is 2020 for more than half of the LTRS targets, these values slightly differ from those reported in the 2023 NECPR for 2020 most likely because in the LTRS these were only estimates. Overall, twelve countries (Bulgaria, Cyprus, Finland, France, Germany, Greece, Lithuania, Luxembourg, Poland, Portugal, Slovenia and Spain) reported targets for final or primary energy consumption in their NECPR. All are aligned with the targets reported in their 2020 LTRS. It appears that between 2020 and 2023, **none of these countries revised their ambition for final energy reduction**, based on the data from the 2023 NECPR compared to 2020 LTRS.

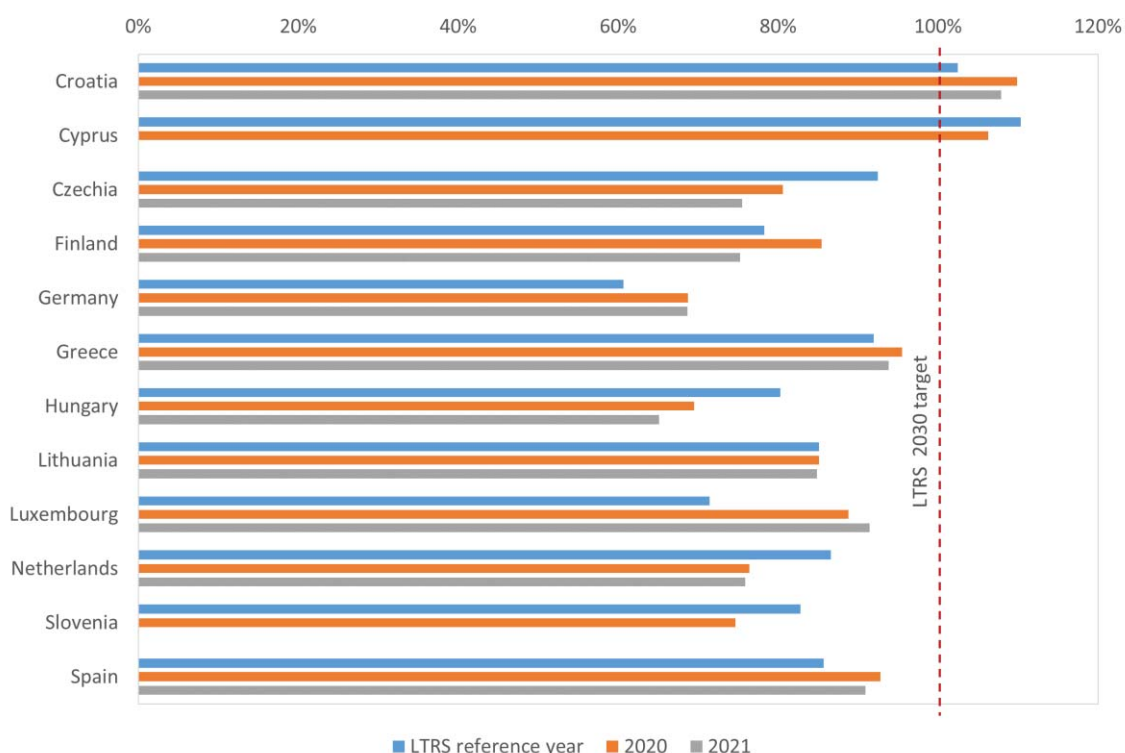
To assess the progress of the Member States towards their indicative targets, Figure 1 shows the 2030 target value set in the LTRS normalised with the energy use in years 2021, 2020, and in the LTRS reference year. **The lower the percentage, the further a country is from the 2030 target.** Values greater than 100% indicate that the 2030 target corresponds to a higher energy use than that of the specific year considered (reference, 2020 or 2021).

Among all countries, Croatia and Cyprus registered building energy use in years 2020 and 2021 below the 2030 target. However, both countries have set energy use targets higher than the LTRS reference values (Croatia +2%, Cyprus +10%; see Table 1).

In several countries (Czechia, Hungary, The Netherlands, and Slovenia), building energy use in 2020 was higher than the LTRS reference value, suggesting a slight deviation from the target. This trend is even more pronounced in 2021 with Finland and Lithuania also recording increased energy use compared to the LTRS reference year, alongside these nations.

Conversely, Greece, Germany, Luxembourg, and Spain demonstrate progress in achieving the LTRS energy use target in both 2020 and 2021, compared to the LTRS reference year.

Figure 1. Illustration of the national progress towards the 2030 energy use targets in buildings. Progress indicators are provided as the ratio of the 2030 target values to the values for each annotated year (Source: JRC elaboration based on Member State reporting, 2023)



4.3. GHG emissions

Figures on GHGs emissions in buildings are highly incomplete and scattered in the NECPRs.

Only ten Member States reported data on total GHG emissions. For nine of them it is possible to compare 2020 with 2021 and only in three cases (Croatia, Lithuania, Finland) the amount attributable to worst-performing buildings is indicated. Seven Member States specified the amount of direct GHGs emissions.

Extrapolating MSs which reported for both years, total GHG emissions increased, but this change is triggered by the increase in the emissions from Spain and Greece non-residential sectors. Emissions decreased in residential and public sector: this change is mainly attributable to a significant decrease in Denmark and Ireland (residential) sector and Ireland, Croatia, and Lithuania (public buildings).

Data show a general reduction in the emissions attributable to the worst-performing buildings. However, worst-performing buildings keep playing a key role, with a significant impact in GHG emissions (larger, on average, than in energy consumption), as they account for 35-36% in residential, 40-42% in non-residential, and 49-51% in the public sector.

In the residential sector, out of the eight Member States that have reported data for 2020 and 2021, data show an overall steady trend of GHG emissions between the two years (-0.1%).

4.3.1. Progress monitoring of GHG emissions

Table 10 summarises the targets and milestones in GHG emissions in buildings as reported by fourteen countries in their 2020 LTRS and 2023 NECPR. The progress towards the national targets is monitored in terms of tonnes of equivalent CO₂, covering either only direct emissions (from the use of fossil fuels in buildings) or total emissions (including indirect emissions from electricity and heat used in buildings). Few countries reported both direct and total emissions (Spain, Finland, and Luxembourg).

Specifically, the table provides from left to right:

- reference years and values used by countries to set the 2030 targets.
- type of emissions reported (either direct or total).
- GHG emissions (or emission savings in the case of Bulgaria) reported by the Member States for 2020 (by twelve countries) and 2021 (by thirteen countries).
- 2030 targets set in the 2020 LTRS.
- 2030 targets reported in the 2023 NECPR.

Table 10. Summary of targets and milestones in GHG emissions (MtCO₂-eq) in buildings reported in 2020 LTRS and 2023 NECPR (Source: JRC elaboration based on Member States reporting, 2023)

Member State	Milestones					Targets	
	LTRS		Emissions type	NECPR		2030	
	Reference year	Value (MtCO ₂ -eq)		2020 (MtCO ₂ -eq)	2021 (MtCO ₂ -eq)	LTRS (MtCO ₂ -eq or %)	NECPR (MtCO ₂ -eq or %)
Austria	2020	8.15	Direct	n.a.	n.a.	5.60	5.60
Bulgaria	2020	n.a.	Total	n.a.	- 0.13	- 1.31	- 1.31
Denmark	1990	6.75	Total	1.68	1.52	2.03	n.a.
Germany	2020	118.00	Direct	122.40	117.00	70	n.a.
Greece	2015	6.09	Total	n/a	5.44	3.05	n.a.
Spain	2020	28.42	Direct	25.18	26.71	18.56	23.9 (2025)
Finland	2020	7.81	Total	6.94	7.81	2.87	0.65 (2050)
Croatia	2020	2.17	Direct/Total	7.21	7.36	2.01	n.a.
Hungary	2018-20	10.79	Direct	11.90	12.80	8.69	-18-20%
Ireland	2019	13.50	Total	8.89	8.41	7.43	n.a.
Lithuania	2020	5.29	Total	5.29	5.30	4.00	4.00
Luxembourg	2020	1.04	Direct	1.04	1.05	0.40	n.a.
Malta	2018	0.71	Total	2.58	2.69	0.44	n.a.
Netherlands	2020	23.10	Direct	23.30	23.40	15.30	n.a.
Poland	2019	52.00	Direct	n.a.	n.a.	35.00	35.00
Sweden	2018	0.89	Direct	0.59	0.56	0.01	0.01
Slovenia	2020	2.68	Direct	2.78	n.a.	1.45	-45-57%

Notes: **Bulgaria:** GHG emission savings; **Denmark, Greece, Luxembourg:** LTRS reference values are taken from [European Environment Agency](#) (EEA); **Spain:** NECPR target for 2025 (also reported in the 2020 LTRS); **Finland:** NECPR target for 2050 (also reported in the 2020 LTRS); **Croatia:** Direct emissions in the LTRS, total emissions in the NECPR, comparison not possible; **Hungary:** 18% reduction in public buildings, 20% reduction in residential, (also reported in LTRS); LTRS reference value is average of EEA 2018-2020 GHG emissions; **Malta:** relevant differences between the LTRS and NECPR values, comparison may be misleading because of possible inconsistency or errors in reporting.

Nine countries reported emission targets in the NECPR, and all are aligned with the 2020 LTRS, thus **no country revised the ambition** in term of GHG emissions reduction from 2020 to 2023.

It can be observed that several countries record progress towards the 2030 target in 2020 (Denmark, Spain, Finland, Ireland, Romania, and Sweden) and in 2021 (Germany, Denmark, Greece, Spain, Finland, Ireland, and Sweden) compared to the LTRS reference year. On the opposite side, Hungary and Slovenia appear slightly off track, while Lithuania, the Netherlands, and Luxembourg show a stable trend.

4.4. Building Renovation

Despite the central role of renovation in energy and climate policies and the fact that some Member States have set renovation milestones, data on renovation rates in NECPR are highly incomplete, with only eight Member States reporting in this field. Data are also scattered across countries, years, depth of renovation (light/medium/deep), building use (residential/non-residential/public), and unit measure (building units/floor area). This makes it very difficult to have a complete overview, perform comparisons, and draw general conclusions at EU level.

In the following tables are the data available in the dataset collected for each Member State that submitted information on the number of buildings renovated in 2020 and 2021.

Table 11. Renovation of the building stock: number of buildings renovated in 2020 (Source: NECPR, JRC, 2023)

MS	Renovation type	Number of buildings					
		Residential buildings		Non-Residential buildings		Public	
		Total	Worst performing	Total	Worst performing	Total	Worst performing
EE	TOTAL	235	n.a.	n.a.	n.a.	13	n.a.
IE	TOTAL	16,694	n.a.	n.a.	n.a.	n.a.	n.a.
HR	TOTAL	3,192	2,685	195	103	122	103
LT	LIGHT	405	n.a.	n.a.	n.a.	n.a.	n.a.
	MEDIUM	752	n.a.	n.a.	n.a.	25	n.a.
LU	LIGHT	5,060	n.a.	n.a.	n.a.	n.a.	n.a.
	MEDIUM	1,603	n.a.	n.a.	n.a.	n.a.	n.a.
	DEEP	267	n.a.	n.a.	n.a.	n.a.	n.a.
	TOTAL	6,930	n.a.	n.a.	n.a.	n.a.	n.a.

Table 12. Renovation of the building stock: number of buildings renovated in 2021 (Source: NECPR, JRC, 2023)

MS	Renovation type	Number of buildings					
		Residential buildings		Non-Residential buildings		Public	
		Total	Worst performing	Total	Worst performing	Total	Worst performing
BG	TOTAL	13	13	147	n.a.	n.a.	n.a.
CZ	LIGHT	4,901	n.a.	567	567	n.a.	n.a.
	MEDIUM	3,446	n.a.	726	n.a.	n.a.	n.a.
	DEEP	3,094	n.a.	571	571	n.a.	n.a.
	TOTAL	11,441	n.a.	1,864	n.a.	n.a.	n.a.
EE	TOTAL	306	n.a.	n.a.	n.a.	9	n.a.
IE	TOTAL	14,331	n.a.	n.a.	n.a.	n.a.	n.a.
HR	LIGHT	3,101	2,594	92	n.a.	19	n.a.
	MEDIUM	91	91	103	103	103	103
	TOTAL	3,192	2,685	195	103	122	103
LT	LIGHT	405	n.a.	n.a.	n.a.	n.a.	n.a.
	MEDIUM	752	n.a.	n.a.	n.a.	25	n.a.
LU	LIGHT	2,979	n.a.	n.a.	n.a.	n.a.	n.a.
	MEDIUM	944	n.a.	n.a.	n.a.	n.a.	n.a.
	DEEP	157	n.a.	n.a.	n.a.	5	n.a.
	TOTAL	4,080	85,263	0	0	5	n.a.
HU	DEEP	478	n.a.	110	n.a.	174	n.a.

Eight Member States reported data on renovated number of buildings in 2021, but only five countries reported comparable data for 2020, at least for the residential sector. The comparison highlighted a reduction in the number of renovated buildings in Luxembourg and Ireland, and an increase in Estonia. The same number of renovated buildings are reported for 2020 and 2021 by Croatia and Lithuania. Two countries (Italy and Austria) reported data only in terms of floor area. According to what reported, in both Member States the renovated area for residential sector increased in 2021 compared to 2020, in particular in Italy where it almost doubled.

The only data reported on renovation rates are from Ireland, Lithuania, Luxembourg, Hungary. Ireland reported a renovation rate of 0.83% for the residential sector in 2021 (0.93% in 2020).

Lithuania indicated the following rates for 2020: 0.8% light renovation rate (residential); 0.52% medium renovation rate (residential) and 0.21% medium renovation rate (public). In addition, it reported a 0.16% (deep-equivalent renovation rate for residential and a 0.08% deep-equivalent rate in the public sector). The rates were very similar in 2021: the only change was in the deep-equivalent renovation rates, i.e. 0.37% for residential and 0.05% in the public sector.

Hungary reported data for 2021: 0.02% renovation rate in the residential sector, and 0.73% renovation rate in the public sector.

Luxembourg indicated low rates of renovations in residential sector (0.011% for deep, 0.064% for medium, and 0.18% for light renovation in 2021, slightly lower than in 2020). Higher values are reported for non-residential (1.37% medium) and public buildings (0.8% deep) in 2021.

Additional information on renovations can be retrieved in the milestone indicators. For instance, as progress toward its targets, Italy indicated for 2020 and 2021 a virtual (deep-equivalent) renovation rate of 2.4% (2020) and 3.1% (2021).

4.4.1. Progress monitoring of building renovation

This section provides an overview on the Member States progress towards the 2030 target set for building renovation in the 2020 LTRS, using progress indicators provided in the 2023 NECPR. Following is a summary of milestones and targets solely on building renovation.

Table 13. Summary of milestones and targets for building renovation reported in 2020 LTRS and 2023 NECPR (Source: JRC elaboration based on Member States reporting, 2023)

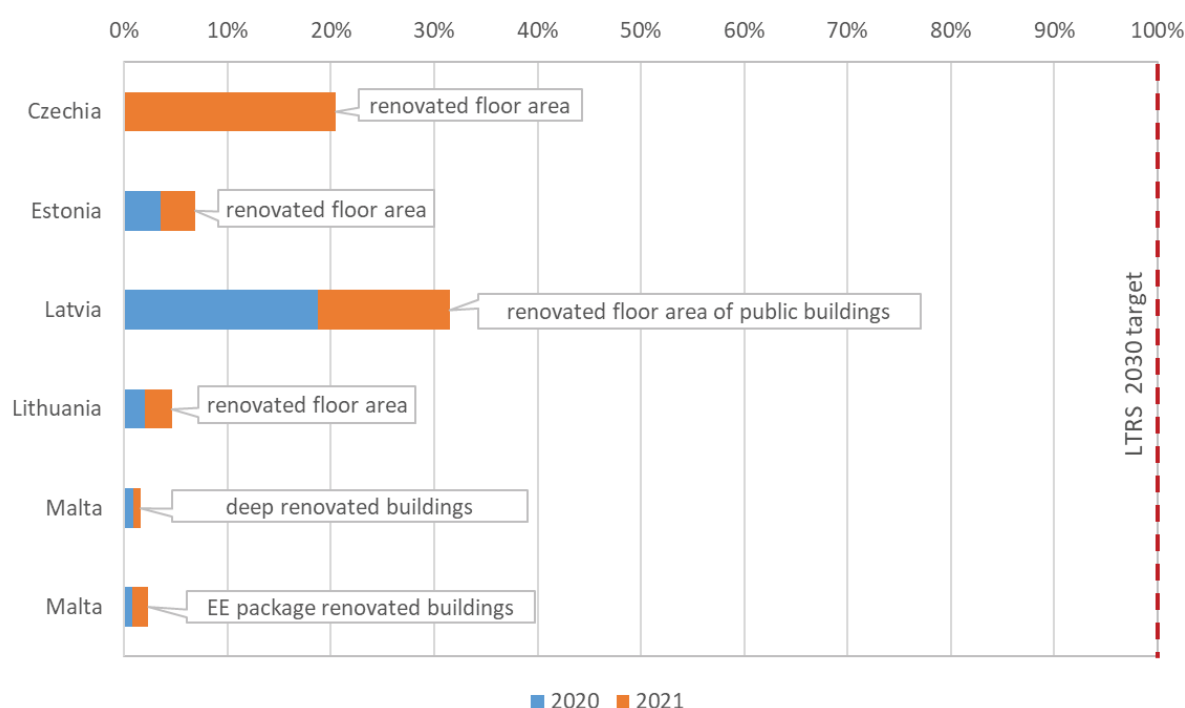
MS	Milestones			Targets	
	LTRS	NECPR		2030	
	Ref. 2020	2020	2021	LTRS	NECPR
AT	1.5% p.a.	3 414 000 m ²	3 887 000 m ²	1.5% p.a.	n.a.
BG	n.a.	n.a.	61 672 m ²	22 203 509 m ² (8%)	22 203 509 m ²
HR	0.7% p.a. 5.0% cumulative	3 509 units	3 406 units	2.0% p.a. 30 838 830 m ² (18%)	n.a.
CZ	45% cumulative (269 768 577 m ²)	n.a.	12 245 115 m ² (13 305 units)	55% cumulative (329 715 928 m ²)	n.a.
EE	500 000 m ² cumulative	401 470 m ² (248 units)	374 499 m ² (315 units)	11 880 000 m ²	54 000 000 m ² by 2050
EL	n.a.	n.a.	n.a.	23% cumulative res.; 9% cumulative non-residential	12-15% cumulative
HU	1.0% p.a.	n.a.	347 353 m ² (762 units)	3% p.a. residential. 5% p.a. public buildings 20% cumulative NZEBs	20% cumulative NZEBs
IE	n.a.	2 283 237 m ² (16 694 units)	2 032 831 m ² (14 331 units)	500 000 dwellings cumulative 100% public buildings 33% commercial buildings	500 000 dwellings cumulative 100% public buildings 33% commercial buildings
IT	0.86% p.a.	8 559 693 m ² 2.4% p.a. res. 0.4% p.a. non-res.	16 754 527 m ² 3.1% p.a. res. 0.3% p.a. non-res.	1.9% p.a. residential; 2.8% p.a. non-residential	1.9% residential. 2.8% non-residential. 3 200 000 m ² cumulative public buildings
LV	3.0% p.a. (678 460 m ²) cumulative public buildings	96 739 m ² public buildings	63 769 m ² public buildings	8 100 units MFH (30%) and 7 500 units SFH 500 000 m ² public buildings	500 000 m ² public buildings
LT	29 471 000 m ² cumulative (58 774 units)	29 471 000 m ² cumulative (58 774 units)	30 204 000 m ² cumulative (59 551 units)	17% cumulative (49 782 000 m ² ; 99 281 units)	17% cumulative (49 782 000 m ² ; 99 281 units)
LU	10-14% cumulative residential buildings	85 093 m ² (6 930 units)	85 263 m ² (4 080 units)	3% p.a. residential (4 500 units/year)	3% p.a. residential
MT	0.5% p.a. (0.7% p.a. 2025)	79 units deep renovated. 329 units with EE package	65 units deep renovated. 654 units with EE package	5-6% p.a. residential 8 950 deep renovated. 42 600 units with EE package	400-450 p.a. deep renovation by 2024, 1 800 units p.a. with EE package in by 2023
NL	n.a.	n.a.	n.a.	1 500 000 dwellings	1.5 mil owner-occupied and 1 mil rented dwellings. 15% worst-performing non-residential building label G to C by 2027; 15% worst-performing non-residential label F to C by 2030
PL	n.a.	n.a.	n.a.	3.6% p.a. (236 000/year) 2 360 000 cumulative	2 400 000 cumulative units (500 000 deep renovation)
PT	n.a.	n.a.	n.a.	69% cumulative buildings (363 680 501 m ²)	363 680 501 m ²
SI	1 795 000 m ² cumulative public buildings	n.a.	n.a.	29 733 000 m ² cumulative (23 333 000 m ² cumulative residential)	23 279 000 m ² cumulative residential

Notes: Austria, Bulgaria, Malta: NECPR values only for residential buildings; Czechia: own calculation of the renovation floor area by 2020 based on the 2020 LTRS; Ireland: NECPR values only for residential buildings; Italy: NECPR absolute values (floor area) only for residential buildings. The renovation rate is calculated as the share of renovated floor area in a given year from the total floor area of existing buildings in 2020.

Comparing the 2020 LTRS with the 2023 NECPR building renovation targets, it appears that **only the Netherlands revised its ambition by including additional targets**, such as phasing out worst-performing non-residential buildings (however, it does not report any progress indicators). On the opposite side, the Greek targets do not seem aligned; however, the LTRS target refers only to envelope upgrades, whereas the NECPR target refers to a wider energy efficiency upgrading.

To provide a better overview on how countries are progressing towards the 2030 building renovation target, Figure 2 shows the 2020 and 2021 NECPR values normalised with the 2030 LTRS target. Due to inconsistencies in reporting observed in Table 13, only for five countries such analysis was possible (two indicators are included for Malta in the figure below). For comparability reasons, the graph considers year 2020 as the baseline while the achievements before this year are not considered.

Figure 2. Illustration of the national progress towards the 2030 targets in building renovation. Progress indicators are given as the ratio of values for each annotated year to 2030 target (Source: JRC elaboration based on Member State reporting, 2023)



Czechia, Estonia, and Lithuania monitor the renovated floor area across all building categories, while Latvia focuses on renovated floor area of public buildings. Malta tracks the number of buildings undergoing deep renovation as well as buildings renovated with an Energy Efficiency package previously defined in the LTRS.

It can be observed that **all countries that reported on this are showing some progress towards the 2030 target** (the higher the percentage, the closer to achieving the target). Latvia and Czechia registered the highest progress; however, Latvia focuses only on public building renovation for which the renovation rate is at least 3% as required in Article 5 of EED (Article 6 of the revised EED 2023/1791). Czechia already reported 45% renovated floor area by 2020 and set the target to 55% by 2030 but about 30% is light renovation, while deep renovation only 5% in 2030. On the opposite side, Malta registered the lowest progress. It has planned to carry out deep renovation on 8 950 buildings between 2021-2030 and EE renovation on 42 600 buildings over the same period. Malta's targets appear highly ambitious considering that only around 1.5% is achieved by 2022, whereas the indicative estimated value was around 15% by 2022 in the LTRS.

4.5. Milestone indicators

With a good level of completeness, NECPRs show a wide variety of specific milestones and indicators set by Member States. It is difficult to summarise all entries. Table 14 gives an outline of the information available: in eleven cases, target(s) and progress are all clearly specified and quantified while in the remaining countries some missing values either on target or progress, make the reporting only partly complete. The large majority of Member States indicates targets for 2030. In some cases, they set also intermediate targets or forward-looking goals (2040, 2050). Three Member States (Estonia, Slovakia, Finland) reported only 2050 targets.

Table 14. Overview of milestones and target indicators (Source: 2023 NECPR Reporting, JRC, 2023)

Member State	Number of milestone indicators	Target quantification	Progress quantification	Target year
BE	n.a.	n.a.	n.a.	n.a.
BG	3	yes	yes	2030
CZ	1	yes	yes	2030
DK	4	yes	yes	Multiple (2030; 2040; 2050)
DE	1	yes	yes	2030
EE	1	yes	no	2050
EL	2	yes	partly	2030
IE	8	partly	no	2030
ES	8	partly	yes	Multiple (2030; 2025)
FR	1	yes	yes	2030
HR	n.a.	n.a.	n.a.	n.a.
IT	3	yes	partly	2030
CY	3	yes	partly	Multiple (2030; 2040)
LV	1	yes	yes	2030
LT	13	yes	yes	2030
LU	3	yes	yes	Multiple (2030; 2040)
HU	5	yes	yes	2030
MT	3	yes	yes	Multiple (2030; 2024; 2023)
NL	6	yes	no	Multiple (2030; 2027; 2023)
AT	15	yes	no	Multiple (2030; 2040; 2050)
PL	6	yes	yes	Multiple (2030; 2040)
PT	6	yes	yes	Multiple (2030; 2040; 2050)
RO	n.a.	n.a.	n.a.	n.a.
SI	19	yes	yes	2030
SK	1	yes	no	2050
FI	2	yes	partly	2050
SE	66	partly	yes	2030

It is possible to group milestones and targets in three main categories:

- **Improvement of the building stock:** 36% of the milestones reported is related to the improvement of the building stock, most frequently indicated. Sixteen Member States reported at least one target or milestone within this objective, with a variety of approaches and indicators: from the indication of a renovation rate (e.g., Greece, Lithuania, Luxembourg, Italy), to a target floor area/number of buildings to be renovated (e.g., Bulgaria, the Netherlands, Latvia, Lithuania), to a specific increase in the share of NZEBs (e.g., Hungary, Slovenia), to an increase in the share of buildings in high energy classes (e.g., Lithuania, Sweden), to the phasing-out of the worst-performing buildings (e.g., the Netherlands, Lithuania). One country (Ireland) has set a specific target for social housing, while some countries indicated specific renovation targets for state-owned or central government buildings (e.g., Italy, the Netherlands). Among the Member States that indicated a renovation rate: Greece reported its target renovation rate as 12-15%, with no further specifications, and Lithuania indicated a 17% renovation rate to be achieved by 2030 with additional targets expressed in terms of number of buildings and floor area to be renovated. Italy set a target of 1.9%/year as average deep renovation (virtual or deep-equivalent) rate in residential sector compared to the total m² of existing residential building stock in 2020. Luxembourg

indicated an annual building envelope renovation rate of 3% of the total number of residential units built before 1991.

- **Reduction in energy consumption:** Eighteen Member States indicated at least one target or milestone related to reducing energy consumption.
- **Reduction in GHG emissions:** Ten Member States reported at least one target or milestone related to reducing CO₂ or GHG emissions. This objective represents 10% of the total number of targets and milestones reported and it is mostly linked here with the reduction of non-renewable energy use¹⁷. Some countries address, in the cross-sectoral policies and measures reported under NECPRs as well as, in fewer cases, in those in the building sector, aspects of resource efficiency and circularity, but they do not seem to have in place a system of milestones and indicators to specifically account for progress in this area.

Other targets indicated include technical systems (e.g., Ireland, Sweden), installation of PV panels (e.g., Malta); information, advice, energy audits to SMEs and citizens (e.g., Hungary).

4.6. Contribution to Union's target

NECPR obligations require Member States to describe how progress towards the milestones in the long-term renovation strategy contributed to achieving the Union's energy efficiency targets in accordance with Directive 2012/27/EU. This requirement is open to descriptive and/or quantitative information and the responses show a variety of interpretation from Member States and, being this one mandatory element, the reporting rate in this field is close to 100% of the submitted NECPRs. However, in some cases, the responses failed to provide references to specific milestones or targets, leaving space for improvements and additional specifications.

In the Commission's evaluation, five Member States did not provide a satisfactory level of elaboration and details. Nine Member States have reported significant information but not completely aligned with the request: in most of the cases they specify their progress towards national milestones and targets, without mentioning EU targets. Eleven Member States replied to the request either qualitatively or quantitatively even if in some cases more details and reference to indicators may help in giving a comprehensive picture of the contribution of the progress.

5. Nearly Zero-Energy Buildings

5.1. NZEB performance level

The EPBD requires nearly zero-energy buildings (NZEBs) as the new building target in Member States as of the end of 2020. This report assesses the progress in NZEBs implementation in terms of established definitions and uptake across Member States.

As of June 2023, all countries have in place an NZEB definition for new buildings, while only a few do not have a specific definition for NZEB renovation. Countries without an NZEB renovation definition reported either a major renovation definition, requirements for building components undergoing renovation (e.g., U-value), or the NZEB definition for new buildings. The most common approach is the energy balance over a year at building level including on-

¹⁷ However, as stated in the Renovation Wave Communication, applying circularity principles to renovation reduces materials-related GHG emissions for buildings. Among the mandatory indicators in the Building Renovation Plans (BRPs), introduced in the EPBD Recast Proposal, are policies and measures with regard to: the reduction of whole life-cycle GHG emissions for the construction, renovation, operation and end of life of buildings, and the uptake of carbon removals; prevention and high-quality treatment of construction and demolition waste in line with Directive 2008/98/EC, notably as regards the waste hierarchy, and the objectives of the circular economy.

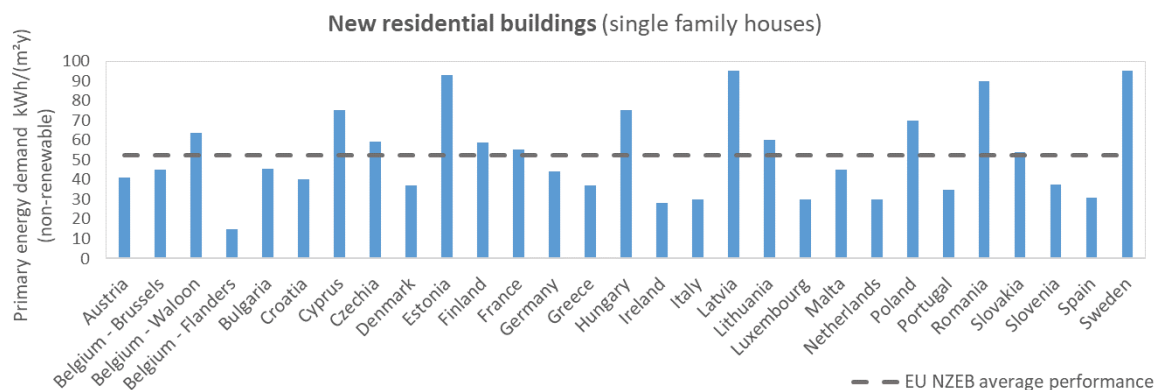
site, nearby, and off-site renewables, using as indicator the primary energy demand for heating, cooling, ventilation, domestic hot water, built-in lighting, and auxiliary energy¹⁸.

The renewable energy requirement is quantified in almost 70% of the NZEB definitions for new buildings (provided either as % or absolute value in kWh/(m²y)) and in over 40% for existing buildings undergoing NZEB renovation. The minimum RES share for new buildings ranges between 20% and 60%. Solar thermal, PV, biomass, and wind energy are the renewable energy technologies indicated as more frequently implemented in Member States.

Many definitions rely on the comparison with national reference buildings or on a formula involving additional indicators rather than a fixed energy indicator. In addition, several countries have varying performance values based on building types, geometry (heated/cooled floor area), climate zone and other parameters. As such, estimations and assumptions were necessary to derive comparable NZEB performance values¹⁹. The focus is on the maximum allowed non-renewable primary energy demand, which is framed by most definitions. When the Member States refer to total primary energy, the non-renewable energy share was calculated considering the renewable energy requirements²⁰.

Based on the national definitions, the **NZEB performance level** expressed in non-renewable primary energy demand (kWh/(m²y)) in Member States and averaged at EU level was estimated. The average non-renewable primary energy demand for new single-family houses varies from as low as 15 kWh/(m²y) to 95 kWh/(m²y) with an average at EU level of 52 kWh/(m²y) (Figure 3). For new offices, the estimated performance level ranges between 20 and 220 kWh/(m²y) with an EU average of 76 kWh/(m²y) (Figure 4).

Figure 3. NZEB energy performance in new residential buildings (single family houses) expressed in non-renewable primary energy demand kWh/(m²y), (Source: JRC estimation based on Member States reporting, 2023)

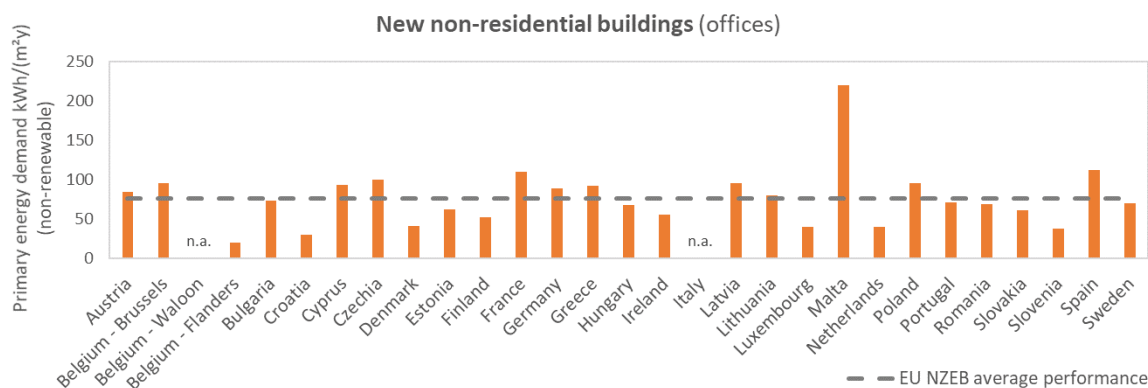


¹⁸ D'Agostino, D., Tsemekidi-Tzeiranaki, S., Zangheri, P. and Bertoldi, P., Assessing Nearly Zero-Energy Buildings (NZEBs) development in Europe, ENERGY STRATEGY REVIEWS, ISSN 2211-467X, 36, 2021, JRC123143.

¹⁹ The following assumption were considered to derive harmonised NZEB performance indicators in Member States: **Austria:** NZEB levels for new buildings are sourced from [CA EPBD database](#). **Brussels:** NZEB levels of offices equals the upper boundary of energy class B for new buildings and of class C for renovated. **Croatia:** NZEB levels are averaged across the two climatic zones (continental and coastal). **Czechia:** NZEB levels are calculated using the reference buildings for new buildings defined in the 2018 cost-optimal report. **Denmark:** NZEB levels are calculated using the reference buildings defined in the 2023 cost-optimal report. **Finland:** A share of 15% is subtracted from the Member State values to eliminate appliances and user equipment energy demand. The NZEB levels are calculated using the reference buildings defined in the 2023 cost-optimal report. **France:** NZEB levels for new buildings are sourced from CA EPBD database. The NZEB level of renovated SFH is calculated using average values for coefficients a and b according to CA EPBD database. The NZEB level of renovated office is calculated based on the reference office building defined in the 2018 cost-optimal report. **Germany:** NZEB levels are calculated using the reference buildings for new buildings defined in 2018 cost-optimal report. **Latvia:** NZEB levels are sourced from CA EPBD database. **Poland:** NZEB levels of offices include primary energy for cooling and lighting according to the CA EPBD database. **Romania:** NZEB levels corresponds to climatic zone 2, reported as representative for Romania. **Portugal:** NZEB levels are calculated using the reference buildings for new buildings defined in 2018 cost-optimal report.

²⁰ For those cases providing the total primary energy and not quantifying the share of renewable energy, the non-renewable energy demand was considered equal with the total primary energy demand.

Figure 4. NZEB energy performance in new non-residential buildings (offices) expressed in non-renewable primary energy demand kWh/(m²y), (Source: JRC estimation based on Member States reporting, 2023)



For existing buildings undergoing renovation to NZEB level, the average non-renewable primary energy demand varies between 35 kWh/(m²y) and 125 kWh/(m²y) with an average at EU level of 70 kWh/(m²y) for single family houses (Figure 5), while for offices it ranges between 30 and 270 kWh/(m²y) with a EU average of 100 kWh/(m²y) (Figure 6).

Figure 5. NZEB energy performance in renovated residential buildings (single family houses) expressed in non-renewable primary energy demand kWh/(m²y), (Source: JRC estimation based on Member States reporting, 2023)

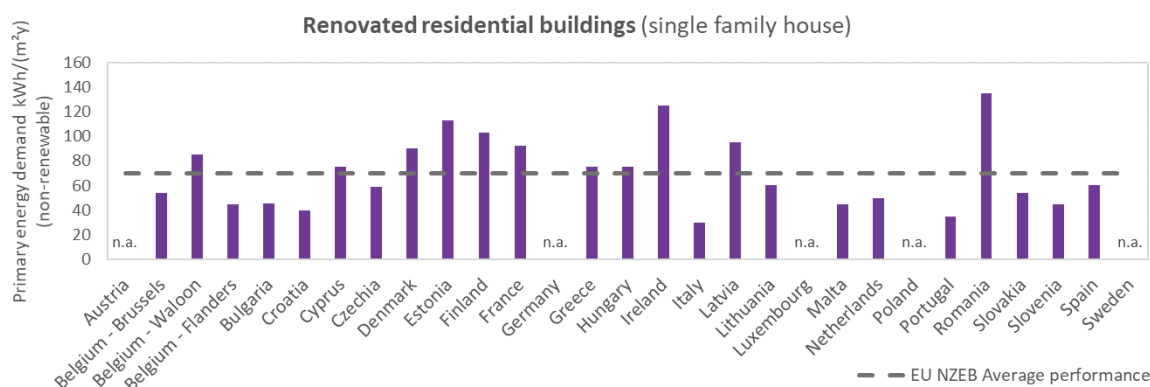
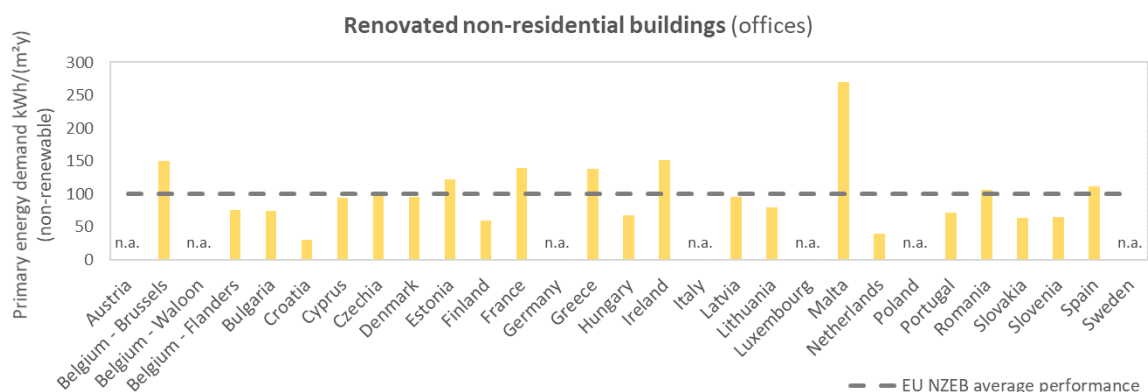


Figure 6. NZEB energy performance in renovated non-residential buildings (offices) expressed in non-renewable primary energy demand kWh/(m²y), (Source: JRC estimation based on Member States reporting, 2023)



In most cases, the NZEB requirements for new buildings are stricter than those for NZEB renovation. On average, the **NZEB non-renewable primary energy demand of new buildings is about 30% lower than for renovated buildings**. This may also be explained by the fact that the renewable energy requirements are more common and stringent in new buildings compared to existing buildings.

Regarding the envelope, thermal transmittance (U-value, expressed in W/m²K) requirements for both new and existing NZEB buildings are provided in about 80-85% of current NZEB definitions. Values range between 0.09-0.49 W/m²K for roofs and 0.13-1.57 W/m²K for walls.

Most common NZEBs technologies include both passive solutions (e.g., sunshade, natural ventilation and lighting, night cooling), and active solutions (e.g., mechanical ventilation with heat recovery, heat pumps in combination with efficient lighting, appliances, and envelope). Several Member States also established cooling systems and lighting specifications.

5.2. NZEB uptake

In the available 2023 NECPR, progress towards Nearly Zero-Energy Buildings is reported by 15 countries, with a generally low level of completeness in their breakdown.

In terms of number of buildings, sixteen countries reported information on NZEB, but only for twelve of them it is possible to compare 2021 and 2022 data. In these cases, with the only exception of Romania and renovated NZEB in Hungary, the number of new and renovated NZEBs increased significantly from 2022 to 2021. In six countries the total number of NZEBs more than doubled in the period considered. Aggregating the MSs which reported data for both years, the overall number of NZEBs increased by 12%.

Table 15. New and renovated NZEB – Number of buildings (Source: NECPR 2023, NZEB data collection, JRC, 2023)

	2022			2021			Years (if different than 2021, 2022)				Source
	Total	New	Renov.	Total	New	Renov.	Total	New	Renov.	Year	
AT	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	56 604	n.a.	2021-2022	NZEB data collection
BE-WA	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9 300 building units	7 000 building units***	Jan'23 (new residential), Jan '22 (new non-residential), to date (renov) NZEB tables	NZEB data collection
BE-FL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	413 000	3 000 000 ***	Since 2006 (new), since 2015 (renov)	NZEB data collection
CZ	n.a.	n.a.	1 297	n.a.	n.a.	n.a.	n.a.	797 222	n.a.	Since 2020	NZEB data collection, NECPR
CY	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	19 227	16 798	2479	n.a.	NZEB data collection
DK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	69 381	17 307	n.a.	NZEB data collection
EE	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3 052	4 000	2020-2023 (new), n.a. (renov)	LTRS2020, Building Registry
EL	18 614	1 281	17 333	12 721	493	12 228					NECPR
HR	3 346	3 048	298	1 361	1 193	168					NECPR
FR	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
DE	n.a.	n.a.	n.a.	n.a.	125313	n.a.					NZEB data collection
IE	20 305	19 898	407	9 133	8 773	360	n.a.	64 534***	27 281***	By Q1 2023 (new), to date (renov)	NZEB data collection, NECPR
IT	10 830	8 863	1 967	7 307	6 603	704					NECPR
LT	186	183	3	81	79	2					NECPR
LU	7 630	7 630	n.a.	3 680	3 680	n.a.					NECPR
HU	12 212	11 436	1 083	7 258	6 491	1 284					NECPR
MT	4 747	n.a.	n.a.	4 615	n.a.	n.a.		32 077		n.a.	NZEB data collection, NECPR
NL	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	146 500 building units	4 800***	Jan '23 (new), 2015-2020 (renov)	NZEB data collection

PT	553	535	18	11	11	0					NECPR
RO	50 565	n.a.	n.a.	58 728	n.a.	n.a.					NECPR
SI	n.a.	n.a.	n.a.	165	156	9					NECPR
SK	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	21 940	3 390	Status: April 2023	NZEB data collection, InfoREG
FI	171 452*	n.a.	n.a.	163 843	n.a.	n.a.	n.a.	50 053	28 000**	2.3.2023 (new), n.a. (renov)	NECPR, energiatodistusrekisteri.fi
SE	25 007	n.a.	n.a.	21 770	n.a.	n.a.					NECPR

* Data reported for some countries in NECPR may indicate the total cumulative values and not only referring the ones created (built or renovated) in the MS a given year. This information is not specified in the NECPR

** Estimation based on energy certificate industry

***Only residential.

Fifteen Member States reported NZEBs progress in terms of floor areas and the details are shown in Table 16. Also measured in terms of floor area, data reported shows an overall increase in the uptake of NZEBs over the last two years. However, as in other sections of the NECPRs, the scarcity and dispersion of the data available hardly allow for general conclusions.

Table 16. New and renovated NZEB – Floor area (m²) (Source: NECPR, JRC, 2023)

MS	2022			2021		
	Total	New	Renovated	Total	New	Renovated
DE	n.a.	n.a.	n.a.	n.a.	32 622 000.0	n.a.
EL	3 153 786.0	552 438.0	2 601 348.4	2 358 141.0	236 198.0	2 121 942.0
IE	3 323 271.0	3 135 115.0	188 156.0	1 693 395.0	1 636 632.0	56 763.0
FR	n.a.	n.a.	n.a.	n.a.	52 821 414	n.a.
HR	1 782 998.5	1 608 124.7	174 873.7	781 875.2	671 734.5	110 140.8
IT	1 309 068.0	990 388.0	318 680.0	1 046 771.0	823 754.0	223 017.0
LT	334 650.0	331 831.0	2 818.0	773 593.0	201 378.0	2 623.0
LU	920046.0	920046.0	0	1919019.0	1919019.0	0
HU	4 422 995.0	3 937 395.0	562 101.0	3 143 370.0	2 778 994.0	487 395.0
MT	620 515.0	n.a.	n.a.	645 116.0	n.a.	n.a.
PT	129 983.0	118 306.0	11 677.0	1 700.0	1 700.0	0
RO	15 233 996.0	n.a.	n.a.	15 396 972.0	n.a.	n.a.
SI	n.a.	n.a.	n.a.	61 837.0	60 067.0	1 770.0
FI	49 694 834.0	n.a.	n.a.	46 798 291.0	n.a.	n.a.
SE	18 570 000.0	n.a.	n.a.	16 100 000.0	n.a.	n.a.

Notes: Data reported for some countries in NECPR may indicate the total cumulative values and not only referring the ones created (built or renovated) in the MS a given year. This information is not specified in NECPR. In bold are calculated values

In relation to information on NZEBs reported in the draft NECPs submitted until July 2023, some countries reported specific measures for NZEBs. The type of instrument of these measures is in most cases regulatory/economic (Cyprus, Estonia, Spain, Finland, Italy, Luxembourg, the Netherlands, Portugal), followed by information/education (Spain, Croatia, Portugal) and planning (Lithuania).

The EPBD recast proposal introduces the new definition of Zero-Emission Buildings (ZEBs) that will become the new standard for buildings of new construction or undergoing deep renovation and lead towards the 2050 vision of a decarbonised building stock. The ZEB concept will also address circularity and resource efficiency aspects, e.g., through the calculation of the life-cycle Global Warming Potential. This will become a mandatory indicator to be calculated and disclosed in the Energy Performance Certificates for all new buildings, as of 2030.

6. Progress made in the implementation of the Ecodesign and Energy Labelling Working Plan 2022-2024

As regards the uptake of more **energy efficient and sustainable appliances and products**, progress has been made in executing the Ecodesign and Energy Labelling Working Plan 2022-2024²¹, adopted on 30 March 2022.

New rules have been finalised for standby consumption of electrical appliances, for smartphones/tablets, for tumble dryers and for local space heaters, and several other reviews will be completed or launched by the end 2024. A Code of Conduct for Energy Smart Appliances is being finalised with the aim of mobilising the flexibility potential of appliances through interoperable solutions.

In parallel, new actions to facilitate compliance and market surveillance have been undertaken and public access to the European Product Registry for Energy Labelling (EPREL)²² database was launched together with REPowerEU, giving citizens and public procurers a ground-breaking new tool to find efficient products among all those available on the EU single market. A new web portal giving easier access to targeted information about these policies for citizens, industry and authorities is being prepared and expected to launch by early 2024.

An overview of the status and progress of individual items of the working plan can be found in Table 17.

Table 17. Overview of the status and progress of individual items of Ecodesign and Energy Labelling working plan

Product group ²³	Type(s) of measure ²⁴			Relevant acts/legislation ²⁵	Deadline for evaluations, reviews and/or rescaling ²⁶	Status/ Next steps
	ED	EL	VA			
Heating and cooling						
Space and combination heaters	X			Regulation (EU) 813/2013 Council Directive 92/42/EEC	2018-09-26	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1
		X		Regulation (EU) 811/2013	2018-09-16 2025-08-02	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1
Water heaters/storage tanks + solar devices	X			Regulation (EU) 814/2013	2018-09-26	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1
		X		Regulation (EU) 812/2013	2018-09-26 2025-08-02	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1
Local Space Heaters (labelling in same regulation)	X			Regulation (EU) 2015/1188	2018-01-01	Planned: Link to Have-Your-Say portal
		X		Regulation (EU) 2015/1186	2023-08-02	Planned: Link to Have-Your-Say portal
Solid fuel local space heaters	X			Regulation (EU) 2015/1185	2024-01-01	Planned: Link to Have-Your-Say portal
	X			Regulation (EU) 206/2012	2017-03-30	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1
Air conditioners (incl. air to air heat pumps)		X		Regulation (EU) 626/2011	2016-07-26 2023-08-02	Planned: Link to Have-Your-Say portal Publication for feedback 2024-Q1

²¹ [Ecodesign and Energy Labelling Working Plan 2022-2024](#).

²² [European Product Registry for Energy Labelling \(EPREL\)](#).

²³ NB. The short titles do not necessarily reflect full scope of products covered.

²⁴ ED: Ecodesign rules, EL: Energy labelling rules (including tyre labelling), VA: Voluntary agreements.

²⁵ Only basic act listed (not subsequent amendments).

²⁶ For implementing regulations and delegated acts, the deadlines are for presenting the review to the Consultation Forum as specified in the review clause. For energy labels yet to be rescaled, also the deadline for this is as laid down in the framework regulation is mentioned. For the evaluations of the latter and of the tyre labelling regulation, the deadlines are those laid down by the co-legislators.

Solid fuel boilers	X			Regulation (EU) 2015/1189	2022-01-01	Planned: Link to Have-Your-Say portal
		X		Regulation (EU) 2015/1187	2022-01-01	To be initiated Link to Have-Your-Say portal
Air heating/cooling products	X			Regulation (EU) 2016/2281	2022-01-01	Planned: Link to Have-Your-Say portal
Other product groups with energy labels up for rescaling						
Ventilation units (labelling for residential only)	X			Regulation (EU) 1253/2014	2020-01-01	Planned: Link to Have-Your-Say portal
		X		Regulation (EU) 1254/2014	2020-01-01	Planned: Link to Have-Your-Say portal
Tumble driers	X			Regulation (EU) 932/2012	2017-11-02	Planned: Link to Have-Your-Say portal Adopted – awaiting objection period before publication in OJ Link to Transparency Register
		X		Regulation (EU) 392/2012	2017-05-29 2023-08-02	Planned: Link to Have-Your-Say portal Transmitted for scrutiny before adoption and publication in OJ Link to Reg.Com.
Vacuum cleaners	X	*		Regulation (EU) 666/2013	2018-08-02	Planned: Link to info on Have-Your-Say portal *(New EL: Link to info on Have-Your-Say portal)
Domestic cooking appliances: ovens, range hoods, hobs (NB: no label for hobs)	X			Regulation (EU) 66/2014	2021-02-20	Planned: Link to Have-Your-Say portal
		X		Regulation (EU) 65/2014	2023-08-02	Planned: Link to Have-Your-Say portal
Other priority reviews						
Horizontal: Standby / off mode consumption	X			Regulation (EC) 1275 /2008	2016-01-07	Adopted and published in OJ
Water pumps	X			Regulation (EU) 547/2012	2016-07-15	Planned: Link to info on Have-Your-Say portal
Industrial fans	X			Regulation (EU) 327/2011	2015-04-26	ISC
Circulators	X			Regulation (EC) 641/2009	2017-01-01	
External power supplies	X			Regulation (EU) 2019/1782	2022-11-14	Planned: Link to info on Have-Your-Say portal
Computers	X	*		Regulation (EU) 617/2013	2017-01-17	Planned: Link to info on Have-Your-Say portal *(New EL: Link to info on Have-Your-Say portal)
Simple set-top boxes	X			Regulation (EU) 107/2009	2014-2-25	Repealed
Tyres		X ²⁷		Regulation (EU) 2020/740	2025-06-01	To be initiated.
Other reviews						
Servers and data storage products	X			Regulation (EU) 2019/424	2022-03-31	To be initiated
Horizontal: energy labelling framework legislation		X		Regulation (EU) 2017/1369	2025-08-02	To be initiated
Welding equipment	X			Regulation (EU) 2019/1784	2024-11-14	To be initiated
Power transformers	X			Regulation (EU) 548/2014	2023-07-01	To be initiated
Electric motors + var. speed drives	X			Regulation (EU) 2019/1781	2023-11-14	To be initiated
	X			Regulation (EU) 2015/1095	2020-05-25	Planned: Link to info on Have-Your-Say portal

²⁷

Adopted by Council and Parliament through ordinary legislative procedure.

Professional refrigeration equipment		X		Regulation (EU) 2015/1094	2020-05-25	Planned: Link to info on Have-Your-Say portal
TVs/Electronic displays	X			Regulation (EU) 2019/2021	2022-12-25	Planned: Link to Have-Your-Say portal
		X		Regulation (EU) 2019/2013	2022-12-25	Planned: Link to Have-Your-Say portal
Light sources and (only for ecodesign) separate control gears	X			Regulation (EU) 2019/2020	2024-12-25	To be initiated
		X		Regulation (EU) 2019/2015	2024-12-25	To be initiated
Household dishwashers	X			Regulation (EU) 2019/2022	2025-12-25	To be initiated
		X		Regulation (EU) 2019/2017	2025-12-25	To be initiated
Household washing machines + washer-dryers	X			Regulation (EU) 2019/2023	2025-12-25	To be initiated
		X		Regulation (EU) 2019/2014	2025-12-25	To be initiated
Refrigerating appliances (including Household fridges and freezers)	X			Regulation (EU) 2019/2019	2025-12-25	To be initiated
		X		Regulation (EU) 2019/2016	2021-01-01 2025-12-25	To be initiated
Refrigerating appliances w. a sales function	X			Regulation (EU) 2019/2024	2023-12-25	To be initiated
		X		Regulation (EU) 2019/2018	2023-12-25	To be initiated
		X		Regulation (EU) 2015/1187	2022-01-01 2025-08-02	To be initiated
Imaging equipment			X	COM (2013) 23	n.a.	Consultation Forum Q4
Game consoles			X	COM(2015) 178	n.a.	Consultation Forum Q4
Newly regulated products						
Smartphones, mobile phones other than smartphones, cordless phones and slate tablets	X			Regulation (EU) 2023/1670	n.a.	Adopted and published in OJ
		X		Regulation (EU) 2023/1669	n.a.	Adopted and published in OJ
Photovoltaics panels	X					Planned : Link to Have-Your-Say portal
		X				Planned: Link to Have-Your-Say portal
Low temperature emitters		X			n.a.	To be initiated
EV charging boxes	X	X			n.a.	To be initiated
Professional laundry	X	X			n.a.	To be initiated
Professional dishwashers	X	X			n.a.	To be initiated
Horizontal activities						
Key actions on EPREL (legal basis: Regulation (EU) 2017/1369 on Energy Labelling). Ongoing						
Key actions on market surveillance (legal basis: Regulation (EU) 2019/1020 on Market Surveillance). Ongoing						
Progress on standards (legal basis: ecodesign Directive and energy labelling Regulation and Regulation (EU) No 1025/2012 on European standardisation). Ongoing.						
Total: 33 specific product groups, excl. standby, incl initiated new products	31	17	2	54	38	

APPENDIX A

Table A1. Summary of LTRS definitions used to define "worst-performing buildings"

Type of indicator	Frequency	Countries/regions that used this indicator	Definitions*
Energy class	9	BE (Flanders, Wallonia), BG, DE, FR, HR, LT, SE, SI	Buildings with EPC class: C or below (HR - coastal), D or below (HR - continental, LT), E or below (BG), F or below (BE, FR, SE, SI), G (DE)
Age	7	AT, EE, IT, RO, SE, SK, SI	Buildings built before: 1976 (IT), 1980 (AT, SI), 1983 (SK), 2000 (EE, RO); Buildings built between: 1945-1975 (SE)
Energy consumption	6	BG, DE, HU, LV, MT, RO	Buildings with annual consumption of more than: 76 kWh/m ² (MT - <u>delivered</u> energy), 200 kWh/m ² (DE, LV), 262 kWh/m ² (MT - <u>primary</u> energy), 300 kWh/m ² (HU, RO), 340 kWh/m ² (BG)
No definition	12	BE-BCR, CZ, DK, EL, ES, FI, IE, LU, NL, PL, PT	-

*In some countries, the definition is based on the combination of these indicators.

Table A2. Definition of worst-performing residential buildings and associated share of building stock as identified in the long-term renovation strategies (countries with no definition are not included in the table)

	Definition
BE	Energy classes F or lower
BG	Energy classes E, F, G
DE	Energy class G or H (>200 kWh/m ²)
EE	Built before 2000
FR	Buildings constructed before 1974 (OR building with class F or G)
HR	Buildings in energy class D or below for continental Croatia and class C or below for coastal Croatia (energy classes defined based on heating need)
IT	Buildings constructed before 1976
LV	Buildings with a consumption that over the last three calendar years exceeds 200 kWh/m ² per annum or 150 kWh/m ² per annum, where the heat is used exclusively for residential heating.
LT	Building in energy class D or lower
LU	(i) conditionally rehabilitable buildings (buildings under protection as historical monuments or listed groups of buildings); (ii) buildings that are not under protection as historical monuments or listed groups of buildings and that have the highest average energy consumption; (iii) underoccupied buildings; and (iv) social housing
HU	Buildings consuming more than 300 kWh/m ² .y
MT	Buildings that consume more than 76 kWh/m ² per year of delivered energy (262 kWh/m ² of primary energy)
AT	Styria region: all buildings built before 1980 are identified as worst-performing (in 1883 the first energy regulation was introduced)
PT	The strategy until 2030 is to tackle first the buildings prior to 1990. 65% of housing buildings pre 1990 will be subject to "some renovation" to improve comfort according to their needs. Portugal has defined in its LTRS that due to the features of the building stock, the totality of the stock is to be renovated until 2050 because that by then the present energy efficient buildings will be needing renovation too.
RO	Buildings constructed before 2000 with the final energy use above 300 kWh/m ² /year and heating energy use above 200 kWh/m ² /year and well connected to transport and communication systems and core public services (health, education, social protection) to avoid investments in buildings that are more likely to be abandoned
SI	Buildings in energy class F and G
SK	Buildings built before 1983
FI	Buildings in energy class F and G
SE	Energy class F and G, usually older public housing erected in 1945 to 1975



EUROPEAN
COMMISSION

Brussels, 24.10.2023
COM(2023) 650 final

ANNEX 3

**Report on the implementation of Directive (EU) 2019/944 on common rules for the
internal market for electricity**

ANNEXES

to the

**Report from the Commission to the European Parliament, the Council, the European
Economic and Social Committee and the Committee of the Regions**

State of the Energy Union Report 2023

**(pursuant to Regulation (EU) 2018/1999 on the Governance of the Energy Union and
Climate Action)**

{SWD(2023) 646 final}

ANNEX

Article 69(1) of Directive 2019/944/EC requires the Commission to submit a progress report on the implementation of the Directive as an annex to the State of the Energy Union Report.

The deadline for the transposition of most provisions of Directive 2019/944/EC was 31 December 2020. In the Communication REPowerEU Plan (COM(2022) 230) the Commission called on the Member States to speed up the transposition of the Electricity Directive to effectively allow consumers to participate in energy markets (individually or via energy communities or collective self-consumption schemes) to produce, self-consume, sell or share renewable energy. At this point almost all Member States have notified their transposition. The Commission, in close consultation and cooperation with national authorities is verifying the completeness and conformity of national transposition and implementing measures with the directive and, where appropriate, is carrying out infringement procedures.

Commission services have been in close contact with Member States to support them in the implementation of the Directive to identify best practice and any areas where particular challenges have arisen. The Commission has also established the Energy Communities Repository and the Rural Energy Community Advisory Hub which are providing technical assistance, sharing best practices and producing guidance documents for energy communities and relevant stakeholders implementing these provisions of the Directive on the ground. The Energy Communities Repository is compiling information on existing energy communities, their impacts, common barriers and action drivers and policy developments across the EU. The Energy Communities Facility will merge both initiatives 2024 onwards and continue some of the activities of the Repository in addition to providing cascade funding to energy communities.

A handbook on cross-border energy communities is under preparation to provide guidance and information in the setting up of local cross-border energy projects. This handbook will build upon the *b*-solutions¹ initiative, which addresses legal and administrative border obstacles faced by public authorities and cross-border entities along EU borders.

Another important step the Commission has taken to facilitate greater consumer empowerment and engagement is the adoption in June 2023 of an implementing Regulation on interoperability rules for accessing electricity metering and consumption data². This marks the beginning of a broader initiative aimed at safeguarding and engaging consumers in the energy transition through digitalisation. This implementing regulation is key for the development and uptake of data-driven digital services and empowering consumers – it not only allows consumers smooth access to the necessary information and tools for active participation in the energy market but also optimises operations for retail businesses and system operators. This regulation is the first in a series mandated in Article 24 of the Directive and aligned with the Digitalisation of Energy Action Plan's objectives³. Upcoming implementing acts, currently in preparation, will address customer switching, demand response, and thereafter related services. The Commission remains committed to collaborating closely with Member States and system operators to facilitate the effective implementation of these technical rules.

¹ <https://www.b-solutionsproject.com/>

² Commission Implementing Regulation (EU) 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data (OJ L 154, 15.6.2023, p. 10), http://data.europa.eu/eli/reg_impl/2023/1162/oj

³ Digitalising the energy system - EU action plan (COM/2022/552)

Council Regulation (EU) 2022/1854 of 6 October 2022 on an emergency intervention to address high energy prices extended the possibility for Member States to intervene in price setting for the supply of electricity to households and SMEs beyond what is possible under Article 5 of the Directive. As explained in the report from the Commission on this Regulation⁴, several Member States have taken the opportunity to extend existing schemes or to create new ones on a temporary basis.

⁴

Report From the Commission to the European Parliament and the Council on the review of emergency interventions to address high energy prices in accordance with Council Regulation (EU) 2022/1854