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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.

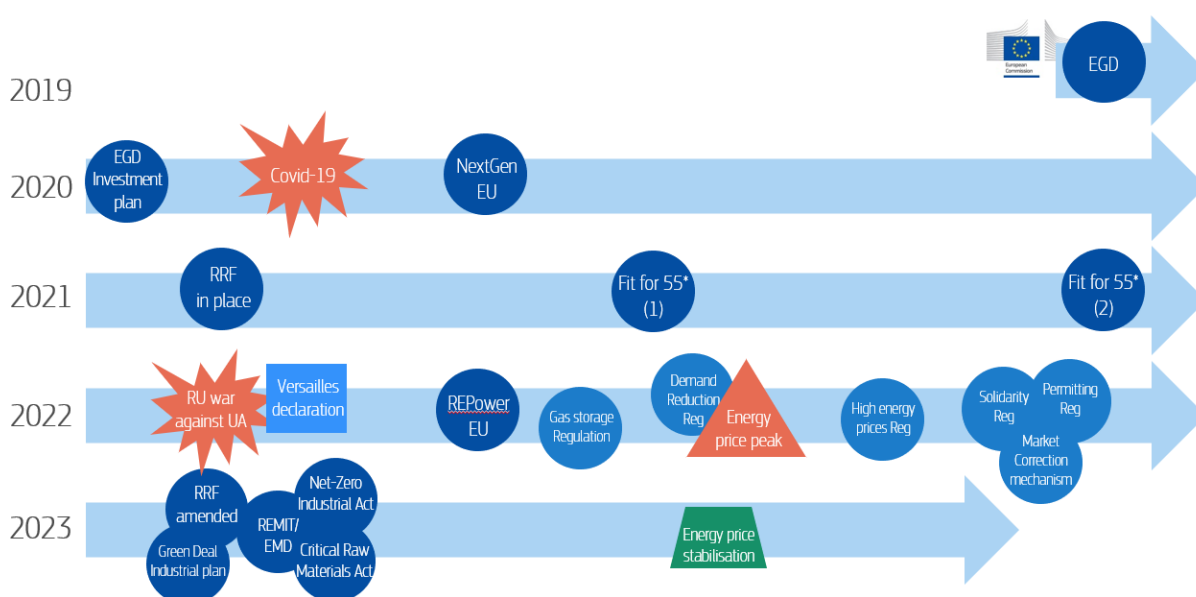


Figure 1: Timeline since the start of the current Commission¹⁹

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.

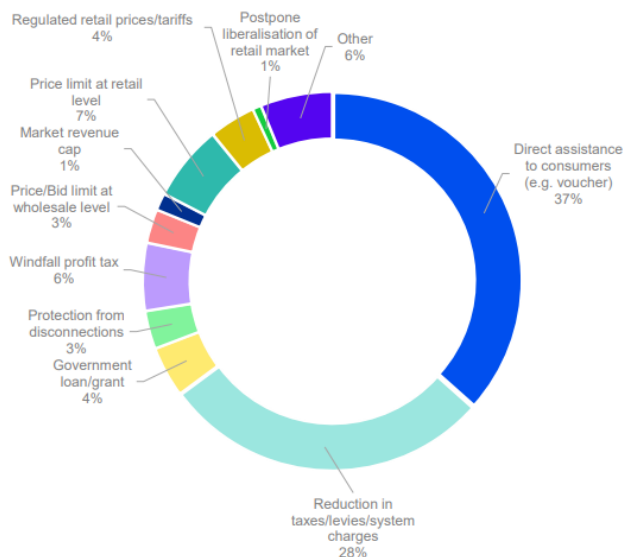


Figure2: Breakdown of measures targeting affordability. Source: ACER – High-level Analysis of Energy Emergency Measures, 20 March 2023 [\[link\]](#)

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.

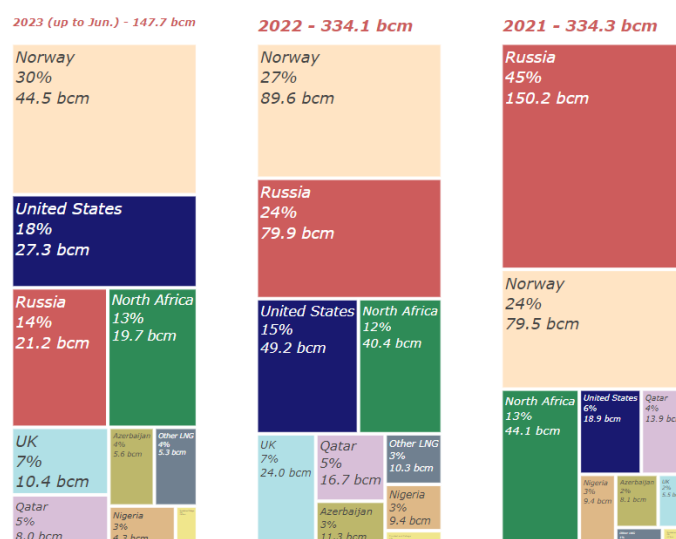


Figure3: Composition of natural gas imports (pipeline and LNG) for the period 2021-2023; Source: ENER Chief Economist team, based on data from JRC, ENTSO-G, Refinitiv]

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.

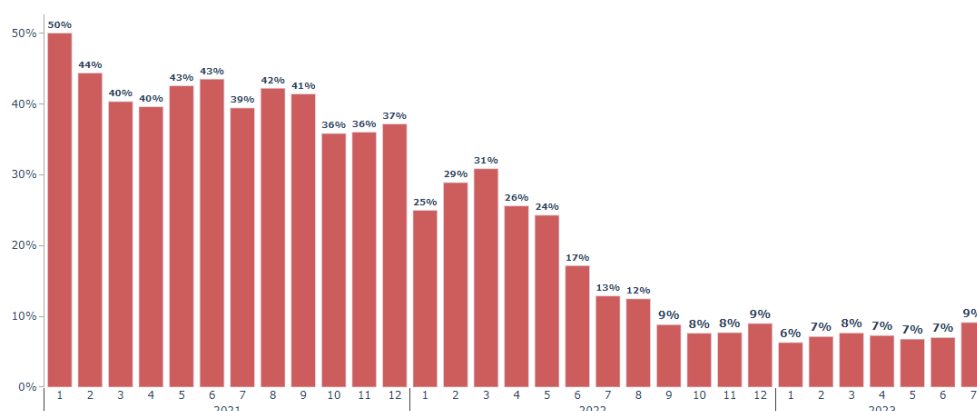


Figure4: Share of Russian pipeline gas in total EU natural gas imports; Source: ENER Chief Economist team, based on data from JRC, ENTSO-G, Refinitiv

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

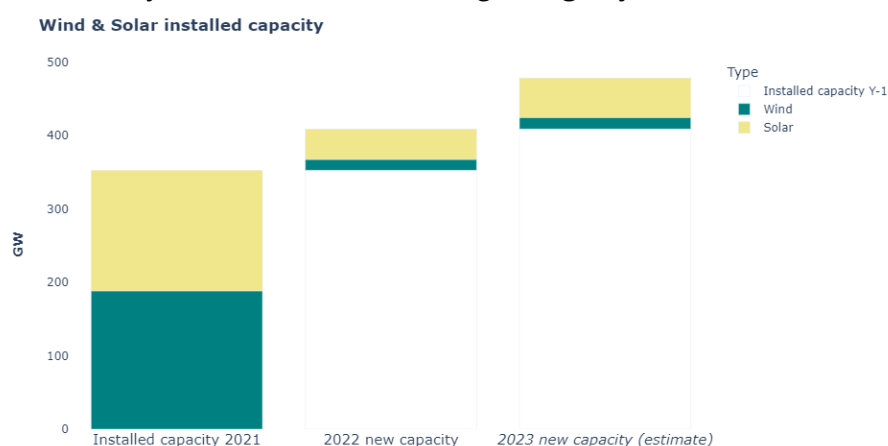


Figure5: New wind and solar additions in 2022 - estimates for 2023; Source: ENER Chief Economist team, based on data from Eurostat, WindEurope, Solar Power Europe

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.

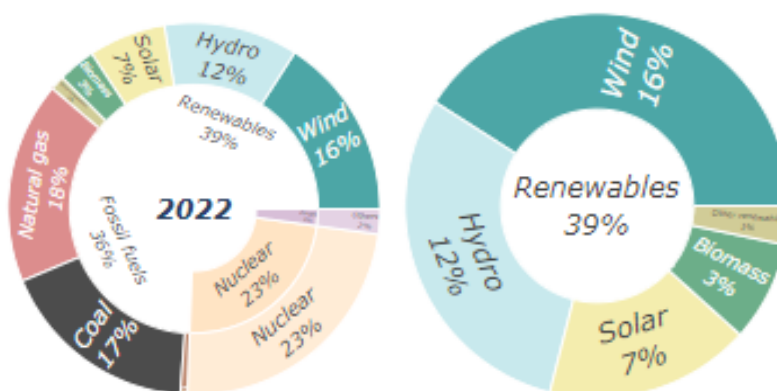


Figure6: Share of renewables in electricity supply in 2022; Source: ENER Chief Economist team, based on data from Fraunhofer, ENTSO-E

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.

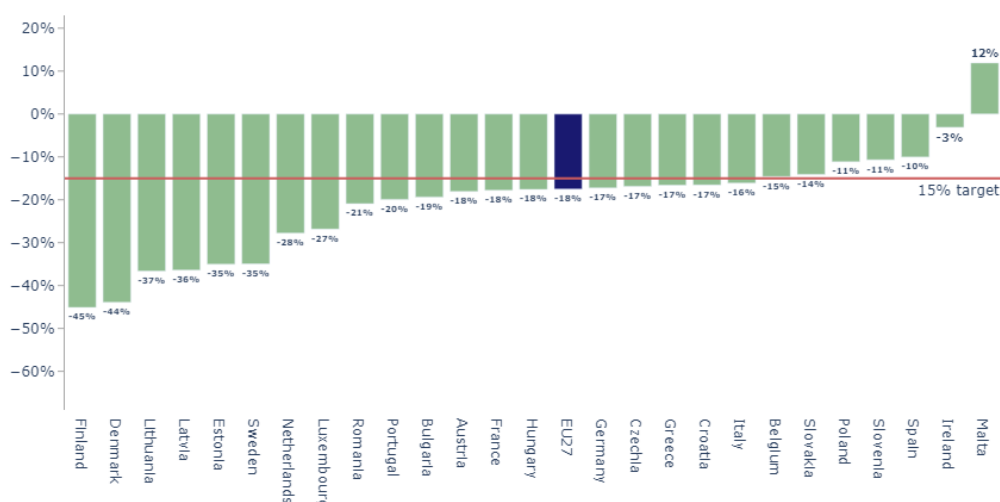


Figure7: Natural gas demand reduction (August 2022 – August 2023 vs 5-year average); Source: Eurostat

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](#)