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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 2022

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

1. INTRODUCTION AND HIGHLIGHTS

The State of the Energy Union report reviews the latest policy developments and describes the progress made at Union level towards meeting the objectives of the Energy Union, including the Union's 2030 targets for energy and climate. **The 2022 edition of the report takes stock of the EU's energy policy response to the current energy crisis** and elaborates on their scope, anticipated impacts and consistency. This report is accompanied by the proposals addressing energy prices and security of supply ahead of this winter.

Russia's unprovoked and unjustified military aggression against Ukraine has upended energy markets, triggering price volatility and energy insecurity across the world with impacts and repercussions for the EU's energy system. The EU and its Member States are **dynamically reshaping their energy strategies** to reflect new geopolitical realities and to address the need for affordable energy. This includes intensified actions to increase gas supplies from the EU's trusted partners. **Record-high energy prices** since the second half of 2021 have been exacerbated by the conflict, with Russia's weaponisation of energy supplies and heavily impacted also by the record-high temperatures in the summer period. It is imperative to **accelerate the transition to clean energy and bring dependence on Russian energy to an end** as soon as possible[1] and well before the end of this decade[2].

A crucial new element in the European policy response to this unprecedented situation is the **REPowerEU Plan**[3], presented by the Commission in May 2022 and building on the full implementation of the European Green Deal. The plan, adopted with a new Joint Communication on EU external energy engagement[4], includes a set of integrated actions to **save energy**, **diversify and secure energy supplies**, **boost renewable energy deployment** and **smartly combine investments and reforms**. REPowerEU increases the ambition of **Fit-for-55** legislative proposals in energy efficiency and renewables, which are currently in advanced stage of legislative negotiations.

The REPowerEU Plan was preceded by a proposal for a **Regulation on Gas Storage**[5]**,** adopted by the co-legislators on 27 June 2022, and the establishment of the **EU Energy Platform** in April 2022. It was swiftly followed by emergency interventions, including the **Save Gas for a Safe Winter** Communication[6], **a new legislative instrument** and a **European Gas Demand Reduction Plan** to reduce gas demand in Europe by 15% by next spring, as well as a proposal for a **Regulation on an Emergency Intervention to Address High Energy Prices**[7] politically agreed at the extraordinary meeting of the Energy Council on 30 September. Annex I provides an overview of actions taken in view of the rising energy prices since October 2021.

The 2022 State of the Energy Union report highlights that the **Energy Union** will help accelerate the implementation of the European Green Deal, foster energy security and affordability, encourage the uptake of renewable energy and promote energy savings and

[1] Versailles Declaration by Heads of State and of Government (10 and 11 March 2022), page 5, European Council conclusions of 24-25 March 2022, point 15.
[2] Communication on REPowerEU (COM(2022) 108 final – 8 March 2022), page 2.
[3] COM(2022) 230 final
[4] JOIN(2022) 23final
[5] COM(2022) 135 final
[6] COM (2022) 360 final
[7] COM(2022) 473 final

energy efficiency measures. It also elaborates on the EU support to its neighbours and the new partnerships that have been established to accelerate the global green and just energy transition.

Together with this report, the Commission is publishing energy snapshots for each Member State that provide a comprehensive overview of its energy situation. The accompanying annexes of the State of the Energy union report 2022 will be published shortly:

- 2022 Report on energy subsidies in the EU;
- EU Climate Action Progress 2022;
- 2022 Report on the Achievement of the 2020 Renewable Energy Targets;
- 2022 Report on the Achievement of the 2020 Energy Efficiency Targets;
- Guidance on cost-benefit sharing in cross-border renewable energy cooperation projects;
- Report on performance of support for electricity from renewable sources granted by means of tendering procedures;
- Report on Progress on competitiveness of clean energy technologies;
- Fuel quality report;
- Report on the functioning of the carbon market (ETS).

State of the Energy Union 2022 – key findings

- ***Current high and volatile energy prices are having an impact on consumers*** *across all EU Member States, affecting not only low-income households, but also lower middle-income households, SMEs and industries. Between 2019 and 2022 on average across EU Member States, the energy expenditure share[8] increased by more than one third, with the share having almost doubled in some countries[9]. According to Eurostat's figures, about 35 million EU citizens (approximately 8% of the EU population) were unable to keep their homes adequately warm in 2020. The surge in energy prices that started in 2021 and worsened with Russia's invasion of Ukraine in February 2022, along with the impact of the COVID-19 crisis, are likely to have worsened an already difficult situation for many EU citizens.*

- ***All Member States have implemented measures to tackle higher energy prices****. National measures related to the Commission's* ***toolbox 'Tackling rising energy prices: a toolbox for action and support' of October 2021[10]*** *were adopted to avert the crisis. For instance, regulated prices/social tariffs have been set; energy vouchers and temporary subsidies have been introduced for private consumers and business consumers (including SMEs and industries). The reduction of energy-related taxes and network tariffs are additional key measures taken by Member States to cushion the impact of higher energy prices on the end consumer. In several instances, these constitute fossil fuel subsidies that are likely to affect the EU's targets and commitments.*

- *The* ***EU's*** **gas storage filling was above 91% by mid-October**. *14 Member States had already exceeded 80% by 5 October 2022 and are well in advance of the target of 80% by 1 November 2022.*

[8] This does not include transport fuel costs.

[9] European Commission (forthcoming): Energy prices and costs report 2022.

[10] COM(2021) 660 final.

- ***The share of Russian pipeline gas in EU imports went down from 41%** in 2021 **to 9%** in September 2022. Liquefied Natural Gas (**LNG) is now a key source of supply** accounting for **32% of EU total net gas imports**.*

- *In 2021 **subsidies for oil, coal and gas showed a slight increase**, while subsidies for fossil electricity generation fell, with fossil fuel subsidies overall remaining fairly stable. **Subsidies for renewable energy** were up 7% in 2020 and **fell slightly back in 2021**. **Energy efficiency subsidies** fell in 2020 but **rebounded in 2021**.*

- *The **EU has substantially surpassed the 2020 emission reduction target** set under the United Nations Framework Convention on Climate Change, achieving a reduction in domestic net greenhouse gas emissions (without LULUCF[11]) of 32% in 2020 in the EU. Provisional estimates show that emissions are expected to rebound in 2021, but still falling compared to pre-pandemic levels.*

- *The **EU energy efficiency and renewable energy targets for 2020 were overachieved**. Final Energy Consumption (FEC) and Primary Energy consumption (PEC) were 5.4% and 5.8% lower than the 2020 targets, respectively. The EU reached a share of 22.1% of renewable energy in gross final energy consumption, thus exceeding the 20% share aimed at under the 2009 Renewable Energy Directive.*

- *In 2019 and 2020, **the increase in the use of renewable energy substituted around 155.6 Mtoe and 164.6 Mtoe of fossil fuels** respectively. This corresponds to a saving **of EUR 43.5 billion from avoided fossil fuel use** for the EU in 2019, **and EUR 34.6 billion** in 2020.*

- ***The EU generated a record 12% of its electricity from solar** from May to August 2022; and **13% from wind**. Early indications suggest that **2022 will be a record year for the European solar photovoltaics (PV) market** with annual deployment growth in the largest EU Member State markets between 17-26%. Nevertheless, **hydroelectricity production decreased from 14% to 11% in summer 2022** compared to previous years, due to drought-related low water levels in rivers and reservoirs.*

- *The **share of renewables in the electricity mix is expected to grow from 37% in 2021 to 69% in 2030**. C**umbersome permitting procedures, grid integration issues** and **difficulties in the supply chains** need to be addressed as a priority to speed up this process.*

- *The EU has remained at the forefront of clean energy research, with Member States steadily increasing public R&I investments, and the EU confirming its leading position in technologies such as offshore wind. However, **more public and private investments in R&I,** as well as **scaling up and deployment activities** are needed to reinforce EU competitiveness.*

- *There is a substantive **increase in funding options at EU and national level for the European hydrogen value chain**. Under the Important Projects of Common European Interest mechanism, EUR 10.6 billion of public investments in the hydrogen value chain have been approved as incentive to crowd-in private investment in the hydrogen sector.*

[11] Land use, land use change and forestry.

Approximately EUR 10.6 billion will be available under the Recovery and Resilience Facility to support hydrogen projects. Electrolyser manufacturers in Europe committed to ***increase their capacity to manufacture electrolysers tenfold: to 17.5 GW by 2025.***

- ***Member States are implementing measures to boost energy efficiency across all sectors****. In industry, businesses are now obliged in some instances to implement energy audit recommendations when the payback period is less than 5 years. Measures to utilise waste heat are reaping significant savings potential. Member States are implementing energy renovation measures, including programmes dedicated to social housing and to tackle energy poverty, upgrade of public buildings notably schools, universities and health care infrastructure.*

2. ENHANCING ENERGY SECURITY, DIVERSIFICATION AND ACCELERATING THE EUROPEAN GREEN DEAL

Gas and electricity prices have hit all-time highs in 2022. Over the past year, electricity prices in Europe have rapidly risen to a level much higher than in recent decades. This dynamic is intrinsically related to the high price of gas, which increases the price of electricity produced from gas fired power plants. **Prices started rising rapidly during the second half of 2021** when the world economy picked up after COVID-19 restrictions were eased. Subsequently, Russia's invasion of Ukraine has exacerbated this situation.

At the same time, **electricity generation in the EU has been below usual levels**. **Record-breaking temperatures this summer** have driven energy demand for cooling and have added pressure on electricity generation due to droughts (challenging hydro production) and high water temperatures (challenging nuclear production). The **extreme weather conditions and its consequences on water have thus contributed to energy scarcity and high energy prices**, constituting a burden for consumers, businesses and industry and dampening the economic recovery. Additional supply pressures on energy and food commodity prices are feeding **global inflationary pressures, eroding the purchasing power of households** and the economy.

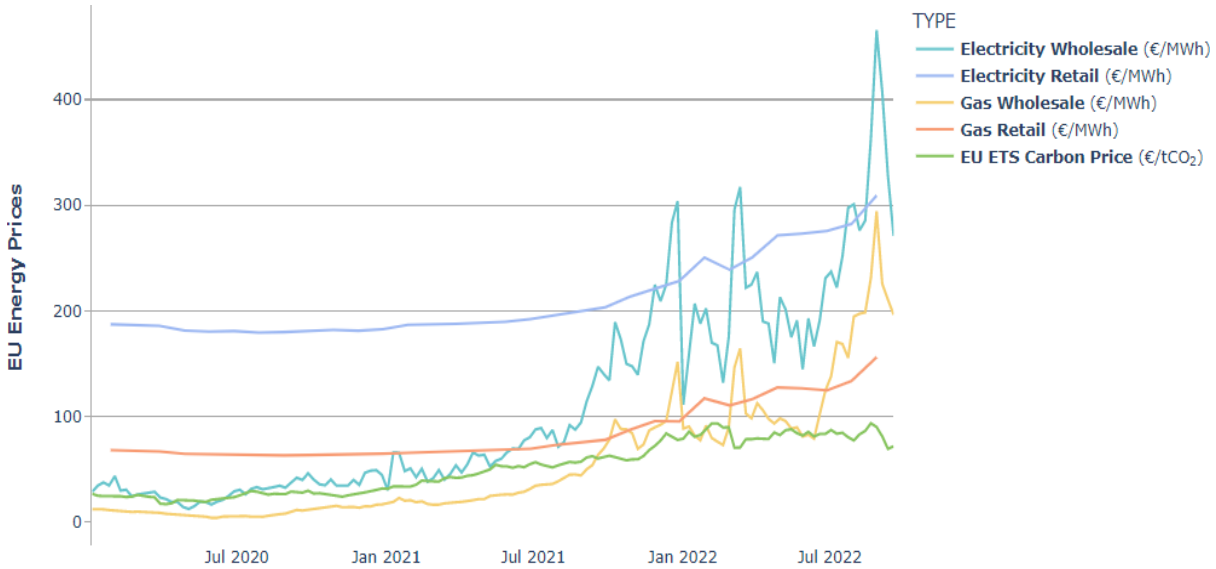

Figure 1. Wholesale and retail gas and electricity prices and carbon prices in the EU. Sources: Platts, VaasaETT

The 14 September **Commission** proposal for a **regulation on an emergency intervention to address high energy prices** received the political agreement of the Energy Council in record time, on 30 September. It sets out a **target for an overall reduction of electricity demand** from all consumers with a focus on reducing demand during peak price hours, a **revenue cap for inframarginal technologies** and a **solidarity contribution on excess profits** generated from activities in the oil, gas, coal and refinery sectors. **The revenues would be** collected by Member States and **redirected to energy consumers**, in particular **vulnerable households**, **hard-hit companies**, including SMEs, and **energy-intensive industries**. It also expands the Energy Prices Toolbox available for Member States to help consumers, which would allow below cost regulated electricity prices and expand regulated prices to also cover small and medium-sized enterprises.

Further to this action to reduce electricity prices, the Commission proposed a set of measures on 18 October to **dampen the price of natural gas and to strengthen solidarity between Member States**. The Commission proposed to equip the EU with the legal tools to **jointly purchase gas**, ensure gas flows where it is needed and to boost the EU's ability to react swiftly in case of emergency by setting **default rules on bilateral solidarity agreements** for those Member States that have not concluded them yet. To dampen gas prices, ACER would be tasked to develop a **new, complimentary benchmark for LNG purchases**. Moreover, in order to respond to the ongoing energy crisis, the Commission proposes to put in place a mechanism **to limit prices via the main European gas exchange,** the TTF, to be triggered when needed.

The Commission is closely monitoring and discussing with Member States' the progress of the **ongoing adequacy assessments that should provide an overview of concrete risks for this winter.** These assessments are based on the most up to date measures and the state of generation sources over the winter, and the actions needed to tackle the concrete risks. Such action should fully respect the internal market, as cross-border trade is not only an essential element of the internal market but also a key feature of European solidarity in electricity and gas. Any undue restriction may therefore jeopardise the security of electricity supply of Member States, regions, and the EU.

2.1. ENERGY SUPPLY

Since the start of Russia's invasion in Ukraine, Russia has been manipulating gas supply with the aim of undermining EU solidarity and energy security. Overall, 13 Member States are directly affected by partial or total **supply reductions**[12] with **five Member States** (Bulgaria, Poland, Lithuania, Latvia and Finland) **no longer receiving any gas supply** from Russia. **Gazprom has gradually reduced gas flows** by Nord Stream 1 to zero by the beginning of September, and the recent incidents regarding Nord Stream 1 and 2 have been another wake-up call for the EU to strengthen security of supply and to increase preparedness to tackle serious disruption scenarios. The EU energy system is robust, including with respect to hybrid threats. However, beyond energy security of supply, we need to continue the work on protection of critical infrastructure and cybersecurity. The continuous manipulations of **gas supply** to the EU has led to a considerable reduction in the Russian share in our pipeline imports. While the Russian Federation supplied 41% of EU's natural gas imports in 2021**, Russian pipeline gas imports have decreased to 9% by September 2022**.

[12] BG, PL, DE, FI, DK, NL, IT, FR, AT, CZ, SK, LV – and LT who decided on its own to stop all imports from Russia.

With the implementation of the REPowerEU Plan and the EU External Energy Strategy, the steady drop in Russian supply since the start of the war has been compensated by an increase of alternative gas supplies thanks to successful efforts to reach out to our international partners. Between January and July, non-Russian deliveries via liquefied natural gas (LNG) increased by 19bcm and 14bcm via pipelines. **LNG now is a key source of supply and accounting for 32% of total net gas imports**. Norway and the USA are the EU's main suppliers.

The Commission also decided to act on a major element of preparedness for winter: **gas storage**. The Storage Regulation set a target of at least 80% of gas in storage by November 2022. Today, **the EU gas storage filling level** was above 91% by mid-October and 14 Member States had already exceeded 80% by 5 October 2022. The Member States are all in line with their storage trajectories and the Commission is continuing its work on implementing the Regulation to ensure that none will have difficulty in achieving these targets.

The EU's electricity supply has also been affected by some other disruptions. While the EU generated a record 12% of its electricity from **solar** from May to August 2022 and 13% from **wind**, the share of **hydropower**[13] fell from 14% to 11% compared to previous years, due to low water levels in several rivers and reservoirs related to the summer droughts.

In 2020, **nuclear** power plants generated around 24.6 %[14] of the total electricity produced in the EU. However, the **EU's nuclear fleet is ageing, and until new investments are coming online, its total output is set to temporarily decline until the end of the decade**[15]. Droughts and high temperatures have led to a lack of cooling water for nuclear power plants and to low water levels which have hampered production and the transportation of nuclear fuels. This has resulted in lower production in 2022.

Since March 2022, tightness and even shortages of some **key petroleum products** (mainly diesel, jet fuel and fuel oil) **have been observed, mainly due to increasing demand** and self-sanctioning by EU operators in anticipation of EU wide measures. This was aggravated during the summer by **incidents in some EU refineries as well as by some logistic difficulties,** driven by the low water levels on the Rhine and Danube, which are key waterways for transporting fuel. This prompted some Member States to **release emergency oil stocks** to compensate for the shortages in petroleum products. Developments are continuously monitored by the Commission in close cooperation with the Member States and the European Oil Coordination Group.

2.2. DIVERSIFICATION OF EU ENERGY SUPPLY

The EU, as the biggest importer of natural gas in the world has a long strategy to **diversify sources and importing routes of natural gas**. This includes connecting EU with new sources of supply, for instance via the **Southern Gas Corridor** and new sources of LNG in the Mediterranean area. Diversification efforts have accelerated recently, for instance with

[13] Within the Copernicus Programme, the Copernicus Climate Change Service (C3S) offer support to the renewable energy sector with dedicated products targeting near-real-time PV, wind and hydropower production (historical, near-real-time and projections under different scenarios).

[14] Latest Eurostat data: Nuclear energy statistics - Statistics Explained (europa.eu)

[15] Nuclear energy is projected to have 16% share in gross electricity generation by 2030 ('Fit for 55' modelling) and 15% share in power generation by 2050 (Communication 'A Clean Planet for all' and the Climate Target Plan).

the **Baltic Pipe**, supported by the Trans-European Networks for Energy, inaugurated on 28 September 2022. The Baltic Pipe enhances the diversification of gas supply in Central-Eastern Europe and the Baltic States by opening a new import route from the North Sea to the EU. It will make it possible to import up to 10 bcm of gas annually from Norway to Poland and to transport 3 bcm of gas from Poland to Denmark. Also recently, the Greece-Bulgaria interconnector, a game changer in the diversification and resilience strategy, was inaugurated on 1 October.

Faced with today's energy supply pressure, the Commission and Member States set up the **EU Energy Platform** as **voluntary coordination mechanism supporting the purchase of gas, LNG and hydrogen**, and aimed at helping to diversify gas supplies. The EU Energy platform builds on three pillars: aggregating gas demand for joint purchase, optimising infrastructure usage in the EU to support change in flow patterns and coordinating outreach to international partners.

The Platform fast-tracked **agreements with reliable and trusted energy partners** to diversify and secure the EU energy supply over the short and medium term. On 15 June 2022, a trilateral agreement between the **EU, Egypt and Israel** was concluded in Cairo to support the export of gas supplies from Israel to the EU via Egypt's LNG terminals. On 18 July 2022, the **EU and Azerbaijan** signed a Memorandum of Understanding (MoU) on a Strategic Partnership in the Field of Energy. The new MoU will support doubling the capacity of the Southern Gas Corridor up to at least 20 billion cubic metres annually as of 2027 in line with the REPowerEU plan while continuing to ensure attractive and stable conditions for natural gas supplies to the EU, reflecting the long-term nature of the energy partnership between the EU and Azerbaijan. In addition, the EU has intensified dialogue on increasing gas supplies with its trusted partners including the US, Norway and Algeria. It has also intensified discussions with Canada for possible supplies in the medium-term.

In its direct **neighbourhood**, the EU has taken the bold and unprecedented step to support the emergency synchronisation of the Ukrainian and Moldovan with the continental European electricity network thereby preserving grid stability and creating the conditions for mutually beneficial electricity trade.

As the inputs from companies in the gas market is key for this mechanism to be successful, the Commission is also **establishing an Industry Advisory Group**[16]. This group will advise the Commission on the practical implementation of the joint purchasing and on the technical specifications for joint purchase in line with industry needs. It will look at arrangements such as joint tendering and the creation of joint ventures for gas purchase.

Cooperation with industry is already leading to results. For instance, the implementation of the REPowerEU Action plan on **bio-methane** has attained an important milestone with the official launch of the **Bio-methane Industrial Partnership (BIP)**. The action plan will facilitate achieving the 35 bcm annual EU production of sustainable bio-methane by 2030. The Bio-methane Industrial Partnership will support the implementation of the action plan through several task forces, made up of experts from industry, the primary sector public authorities, academia, and civil society.

Furthermore, **five Regional Groups have been established under the Energy Platform** involving the Commission, the Member States and the Energy Community countries identified. They will create a better understanding of potential gas demand, which will feed into the joint purchase scheme, once established.

[16] https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3865

The diversification of routes needs to be accompanied by a diversification of energy sources, for example by boosting renewable energy, accelerating renewable hydrogen uptake, scaling up sustainable biomethane, reducing fossil consumption in industrial and transport sectors where GHG are hard to abate and speeding up permitting and innovation.

As regards the **use of domestic sources**, 2021[17] saw a record of 36 GW newly installed renewable power generation capacity. With the increase of **renewable energy, the EU substituted around 164.6 Mtoe and 155.6 Mtoe of fossil fuels** in 2020 and 2019 respectively, compared to the level of use of renewable energy in 2005. This corresponds to a saving **of EUR 43.5 billion** for the EU collectively from avoiding fossil fuel use in 2019, **and EUR 34.6 billion** in 2020[18]. Fossil fuel savings from deploying renewables, which would strongly increase when meeting the proposed 2030 target of 45% renewables, would allow the EU to steadily reduce to zero dependence on fossil fuel from Russia by 2027.

The EU's well-advanced policies to deploy renewable energy sources have been given a significant boost since the adoption of REPowerEU, helping renewables to grow massively also in all end-use sectors. Early indications suggest that **2022 will be a record year for the European solar photovoltaic market** with annual deployment growth in the largest EU Member State markets between 17% and 26%[19]. All in all, the **share of renewables in the electricity generation is expected to grow from 37% in 2021[20] to 69% in 2030**.

With the **Hydrogen Accelerator** proposed in the REPowerEU Action Plan, the Commission has provided an estimate of the investment needs and additional costs with specific focus on replacing natural gas use. In her State of Union address before the European Parliament in September, the President of the Commission announced the setting up of the **European Hydrogen Bank**. The Hydrogen Bank aims to move the hydrogen market from niche to scale by accelerating the production and the use of renewable hydrogen and connecting these by developing the necessary infrastructures in a coordinated manner.

As regards **nuclear energy** contribution to the security of electricity supply in the coming years, Member States need to take timely decisions regarding investments in the long-term operation of existing nuclear power plants, and appropriate safety and efficiency improvements, including in climate adaptation measures. Moreover, to help **mitigate the risks** in some Member States[21] related **to security of supply of Russian nuclear fuel and nuclear fuel cycle services**, as well as equipment and technology, the Commission and the Euratom Supply Agency (ESA) are stepping up efforts in collaboration with Member States and their authorities to ensure the availability of alternative fuel supplies from the EU and reliable international partners.

2.3 ENERGY DEMAND

Improving energy efficiency and reducing energy demand is key to shield against potential supply disruptions and minimise their impacts and costs. This can often be the cheapest, safest, and cleanest way to reduce our reliance on fossil fuel imports from Russia,

[17] https://www.iea.org/news/renewable-power-is-set-to-break-another-global-record-in-2022-despite-headwinds-from-higher-costs-and-supply-chain-bottlenecks

[18] https://www.eurobserv-er.org/pdf/20th-annual-overview-barometer/

[19] Global Market Outlook For Solar Power 2022-2026 - SolarPower Europe

[20] European Electricity Review 2022 | Ember (ember-climate.org)

[21] Out of 13 EU Member States generating nuclear energy, four Member States are fully and one partially 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.

while contributing to reducing GHG and air pollutant emissions, contributing to fight climate change.

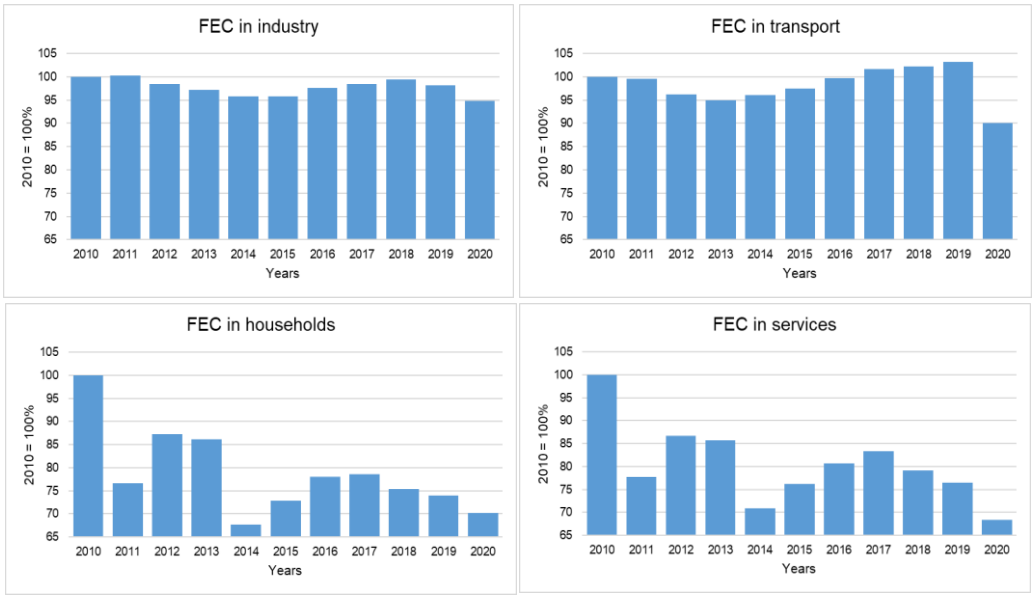

Figure 2: Reduction in Final Energy Consumption in industry, transport, households, and services. Source: Eurostat, 2022.[22]

In May 2022, the Commission proposed a set of initiatives starting with the **EU 'Save Energy' plan** to guide Member States to design the best tailored measures to cut energy consumption. The Commission also proposed a **new legislative tool** and a **European Gas Demand Reduction Plan** in July 2022 in order to reduce gas use in Europe by 15% by next spring and Council adopted the Regulation on reducing gas demand on 5 August 2022[23]. Member States are now implementing demand reduction measures, which will be factored into the **update of National Emergency Plans due at the end of October 2022**.

In line with the objectives of the **REPowerEU** plan and the **Save Gas for a Safe Winter** package, **most Member States have adopted measures to encourage energy savings** in buildings, industry and transport in the short-term. Many introduced communication campaigns. **Several Member States implemented measures to set maximum heating and minimum cooling temperatures** in specific categories of buildings and recommendations to lower the highway speed limit. Some **Member States have also adopted more comprehensive and structural measures**, which will already have an effect in the upcoming winter season, **either by strengthening existing regulations or topping up the existing support schemes** for buildings, industry, and transport.

Additionally, **the Commission proposed an increased EU 2030 energy efficiency target of 13% to raise private financing for energy efficiency**. In 2023, it will also launch a high-level European Energy Efficiency Financing Coalition with the financial sector.

[22] The graphs for households and services have been corrected to take into consideration climate conditions. The climate correction factor is obtained by dividing the Heating Degree Days (HDD) measured in each year with the average HDD in the 1980-2004 period.

[23] https://www.consilium.europa.eu/en/press/press-releases/2022/08/05/council-adopts-regulation-on-reducing-gas-demand-by-15-this-winter/

With REPowerEU, the Commission also proposed to **ensure that all new buildings are designed to optimise their solar energy generation potential** as part of the ongoing revision of the Energy Performance of Buildings Directive (EPBD). This revision aims at **fully decarbonising the European building stock by 2050**, minimum energy performance standards to trigger energy efficient renovation of buildings, increasing the rate of renovations by 2030, phase-out fossil fuel based heating, and maximising the potential for solar energy in buildings. Such measures will be important for vulnerable households, especially in the current context of high energy prices.

Reviewing and updating existing regulations for energy-related products constitutes the main body of work of the **ecodesign and energy labelling working plan[24], with heating and cooling appliances being the priority**. At the same time, an ambitious revision of the Ecodesign Directive is ongoing[25].

2.4 JUST TRANSITION, AFFORDABILITY AND SUSTAINABILITY

Just transition and affordability

The policy framework to advance the just energy and climate transition targets regions, sectors and businesses with high GHG intensities or high dependency on the extraction of solid fossil fuels. **Coal, peat and oil shale and carbon intensive regions most affected by the transition to climate neutrality can receive funding from the Just Transition Mechanism**. The Commission aims to adopt all Territorial Just Transition Plans by the end of 2022 and supports all regions through the Just Transition Platform and the Coal regions in transition initiative. The Council Recommendation on ensuring a fair transition towards climate neutrality, adopted on 16 June 2022, provides an additional joint framework for comprehensive and coherent employment, skills and social policies to ensure no one is left behind, in line with the European Pillar of Social Rights.

The **impact of high and volatile energy prices on consumers, SMEs and industries** across all the EU Member States **is deeply worrying**. Between 2019 and 2022 on average across EU Member States, the energy expenditure share[26] increased by more than one third, with the share having almost doubled in some countries.[27] **There is a risk that a larger group** of households could not be able to pay their energy bills, affecting not only low-income households, but also lower middle-income households and potentially beyond in some Member States. This risks aggravating a situation of energy poverty in which 35 million EU citizens (approximately 8% of the EU population) were unable to keep their homes adequately warm in 2020. Therefore, it has become even more urgent for Member States to address both the immediate and "root causes" of energy poverty, combining targeted emergency measures with longer-term actions, such as energy efficiency measures, and lowering any possible negative impacts from climate and energy policy. In May 2022, the Commission set up a Coordination Group[28] on energy poverty and vulnerable consumers which will help Member States to exchange experiences addressing energy poverty.

Moreover, high energy prices are unevenly impacting businesses and industry, in addition to households, creating significant energy affordability issues for some enterprises and sectors.

[24] C/2022/2026, OJ C 182, 4.5.2022, p. 1–12
[25] https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en
[26] This does not include transport fuel costs.
[27] European Commission (forthcoming) Energy prices and costs report 2022.
[28] https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3849

In line with REPowerEU, the amendment of the **Temporary Crisis Framework for State Aid** refers to the possibility of granting aid for fuel switching. In particular, the Temporary Crisis Framework is extended to cover measures that accelerate the rollout of renewable energy, and facilitate the decarbonisation of industrial processes. The latter entails that Member States can support investments in industry, to phase out fossil fuels and create a less volatile business environment, through electrification, energy efficiency, and the switch to the use of renewables and electricity-based hydrogen.

A wide range of **support measures** have been put in place by Member States, including measures based on the Energy Prices Toolbox. Among others, Member States provided direct income support, reductions in taxes, levies and rebates on consumers' energy bills, and measures to support energy efficiency and on-site renewable production. Member States also intervened in retail prices for electricity and gas. As part of the March 2022 REPowerEU Communication[29], the **Commission provided Guidance on the application of State intervention into price setting**, for the supply of electricity, ensuring they benefit consumers during this current crisis and enhance competition to the benefit of consumers over the longer term. In addition, as set out in the Communication on Short-Term Market Interventions and Long-Term Improvements to the Electricity Market Design, the Commission presented legislation to allow retail price regulation for SMEs and households below cost. This was politically agreed at the extraordinary meeting of the Energy Council on 30 September.

As regards **international engagement and outreach**, the EU has made important progress in the implementation of the Global Methane Pledge and the Just Energy Transition partnership with South Africa, as a follow-up to the announcements made at COP26.

Sustainability

Further **reducing air pollution** is imperative to reach the ambition set out in the Zero Pollution Action Plan and to respond to the continued high number of premature deaths linked to air pollution. **The REPowerEU** as well as the update of the National Energy and Climate Plans **plan provide an opportunity to further cut emissions of air pollutants** when bringing forward improvements in energy efficiency and through the shift towards non-combustible renewable energy sources, notably solar and wind. At the same time, diversifying supply and energy sources, even if only on a temporary basis, entails risks linked to increased reliance on coal and bioenergy, which would result in higher air pollution.

The overall effect on air quality is likely to vary geographically, and this will be looked at in the **Third Clean Air Outlook report[30]** as part of the wider **Zero Pollution Monitoring and Outlook report**. Such analysis can help guide Member States in their implementation choices to avoid that short term needs undermine long-term public health objectives.

Work is well underway on the revision of the **Ambient Air Quality Directives**, to align European air quality standards more closely with the revised air quality guidelines adopted by the World Health Organization in 2021, and a legislative proposal is expected to be adopted by the end of the year. This will bring further improvements in air quality everywhere in the EU and make close coordination across policy fields more necessary than ever, to ensure that different policies are mutually reinforcing.

[29] COM(2022) 108 final

[30] to be adopted by the end of 2022.

Whilst a shift from steam turbine technologies to renewable power generation from solar and wind resources will reduce the overall consumption of freshwater, there will be additional fresh water needs due to the enhanced roll-out of renewable hydrogen production, especially at local level. It is therefore important to comply with the Water Framework Directive in considering the location for the roll-out of additional electrolyser capacities.

3. PROGRESS WITH THE ENERGY UNION – STOCKTAKE ACROSS ALL DIMENSIONS OF ENERGY AND CLIMATE POLICY

3.1. Decarbonisation and greenhouse gas emissions

The latest reports by the Intergovernmental Panel on Climate Change (IPCC) confirm that fast and transformative action must be taken at global level if we are to meet the goals of the Paris Agreement and avoid dangerous climate change. The EU has firmly committed to limit global warming and is setting tangible policies in line with the 2030 targets and the goal of climate neutrality by 2050. The EU also put in place financing mechanisms to ensure a sustainable, socially just and cost-efficient transition, as well as an ambitious climate adaptation strategy.

The EU has substantially overachieved its 2020 reduction target of 20% **greenhouse gas (GHG) reduction** compared to 1990[31]. Total GHG emissions[32], excluding land use, land use change and forestry and including international aviation, decreased by 32% in the EU compared to the 1990 base year: a reduction of 1.55 billion tonnes of CO_2 equivalent by 2020. However, provisional estimates show that EU GHG emissions are expected[33] to rebound in 2021 compared to their exceptionally low 2020[34] level as the economy recovers from the pandemic and exceptional high gas prices have caused a temporary switch from gas to coal.

Progress with European climate action

The EU has made substantial progress in delivering the **European Green Deal**. In July 2021, the Commission proposed a **comprehensive package of climate and energy legislation (**further strengthened by the most recent **REPowerEU Plan),** which is currently being negotiated by the European Parliament and the Council, to ensure that the EU policy framework is fit for the EU's increased 2030 climate target. The **European Scientific Advisory Board on Climate Change** was appointed in 2022 to provide independent scientific advice on EU measures and climate target. The Commission has also adopted **climate proofing guidance** and updated its **better regulation instruments** to ensure it takes the same approach when assessing whether draft measures are consistent with climate-neutrality and progress on adaptation, as set out in the Climate Law.

In 2022, the EU also strengthened its policy action in key sectors with a legislative proposal for a new **F-gases Regulation** to achieve additional cumulative emission savings by 2050. A

[31] https://unfccc.int/sites/default/files/resource/European%20Union-BR4_C_2019_8832_and_SWD_2019_432_2.pdf

[32] Within the Copernicus Programme, the Copernicus Atmospheric Monitoring Service (CAMS) provides near-real-time emissions monitoring data and products, assisting in the assessment of emission reductions, and distance to target with respect to EU regulations and International legally binding policy instruments (Paris Agreement).

[33] The 2021 approximated estimates for GHG Emissions will be published by the EEA at the end of October 2022 and reported in the EEA report on "Trends and projections in Europe 2022" and in the Climate Action Progress report.

[34] As set out in the EU's 2022 GHG inventory submission to the UNFCCC. Provisional data will be provided together with the Climate Action Progress Report 2022, to be published by end of October 2022.

further legislative proposal to strengthen **CO_2 emissions standards for heavy duty vehicles** is due by the end of 2022.

Renewable energy

In 2020, the **EU reached a share of 22.1% of renewable energy sources (RES) in gross final energy consumption, exceeding the target level of 20%** set for 2020[35]. The overall renewables (RES) share increased by 2.2 percentage points from 2019 to 2020, facilitated by lower energy consumption due to the COVID-pandemic. The RES shares in 2020 vary widely across Member States. Sweden achieved the highest share in 2020 (60.1%), followed by Finland (43.8%) and Latvia (42.1%). Considering national deployment and currently notified statistical transfers, all Member States except France achieved their 2020 national target[36]. Belgium, Ireland, Luxembourg, Netherlands, and Slovenia used statistical transfers to achieve their RES target in the RES Directive.

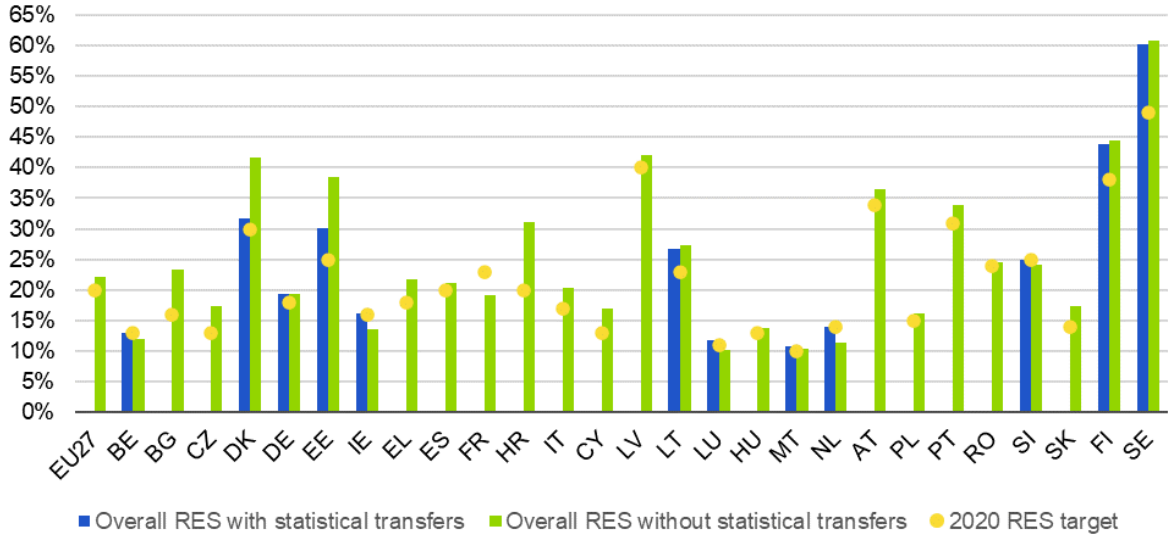

Figure 3: Overall RES shares with and without statistical transfers vs. 2020 RES targets. Source: Eurostat SHARES; RED I Directive

With a contribution of 37.5% in 2020, the relative share of renewables is largest in the **electricity** sector. The share of renewables in the **heating and cooling** sector reached 23.1% in 2020. For the **transport** sector, the shares are relatively lower and reached 10.2% in 2020. **Bioenergy** continues to be the main source of renewable energy in the EU, with a share of 58.1% of the total in 2020. In Europe, bioenergy remains largely the main renewable energy source (around 60%). In view of decreasing carbon sinks and the need to preserve biodiversity, the Commission proposal to revise the Renewable Energy Directive in the Fit for 55 package reinforces the sustainability criteria for the use of biomass for energy and includes an obligation to Member States to apply the cascading principle in their support schemes.

The proposal on **increasing the overall ambition for RES to 45%** and **speeding up permitting procedures** is currently being discussed in the Council and the European Parliament. A swift adoption as part of the RED II revision would be a key element to boost

[35] By Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.

[36] France achieved 19.1%; missing its target by 3.9% percentage points.

the further deployment of renewable energy. To achieve the new, higher proposed target of 45% from REPowerEU, a steep increase in the deployment of renewable energy will be required, almost tripling the average annual increase over the last decade. For the decarbonisation of transport advanced biofuels[37] can contribute in a sustainable way together with Renewable Fuels of Non-Biological Origin to achieve such a target. **RED II sets a 3.5% target in 2030 for the share of advanced biofuels**. Since 2016, EU production has more than doubled to 1224 ktoe in 2020. In addition, the RED II revision also proposed a target for Renewable Fuels of Non-Biological Origin of 2.6% in 2030.

For transport, the Sustainable and Smart Mobility Strategy lays the foundation for how the EU transport system can achieve its green transformation. Several actions of the Strategy have been completed - the Commission proposed to boost the production and uptake of sustainable aviation and maritime fuels through the **FuelEU Maritime** and **ReFuelEU Aviation** initiatives, and to increase the deployment and use of renewable and low-carbon fuels and related infrastructure through the Alternative Fuels Infrastructure Regulation.

Urgent and full transposition of the 2018 Renewable Energy Directive RED II is key for the success of the energy transition, since it lays the foundation for a wider rollout of RES. The Commission is currently checking transposition and has launched infringement procedures against all Member States, which are at different stages.

3.2. Energy efficiency

Bearing in mind the unique situation of COVID-19, **the 2020 targets for both primary and final energy consumption were achieved by the EU**. Primary energy consumption in the EU amounted to 1236 Mtoe, 5.8% lower than the 2020 target. Primary Energy Consumption decreased for the third consecutive year and was 8.7% lower than in 2019 reaching 907 Mtoe. Final Energy Consumption was 5.4% lower than the 2020 target, with a decrease of 8% compared to Final Energy Consumption in 2019. This was the second consecutive year of decrease after six years constantly increasing. For primary energy consumption all Member States achieved their 2020 national contributions except Belgium, Bulgaria, and Poland. For final energy consumption Belgium, Bulgaria, Germany Lithuania, Austria, and Sweden did not achieve their national contributions.

As regards Article 7 of the Energy Efficiency Directive, the cumulative energy savings over 2014-2020, available from 24 Member States, amounted to 197.5 Mtoe, which is equivalent to 103% of the sum of the cumulative end-use energy savings obligations for 2014-2020 (191.7 Mtoe) – and 97.5% (202.5 Mtoe) for 27 Member States. Depending on the final achievements by the three missing Member States, the sum of cumulative savings required for the 27 Member States could be met. Out of the 24 Member States that submitted the complete data regarding their final achievement, 14 Member States fulfilled their energy savings obligation, whereas ten Member States did not meet their energy savings obligation.

[37] Feedstock included in Annex IX of the Renewable Energy Directive.

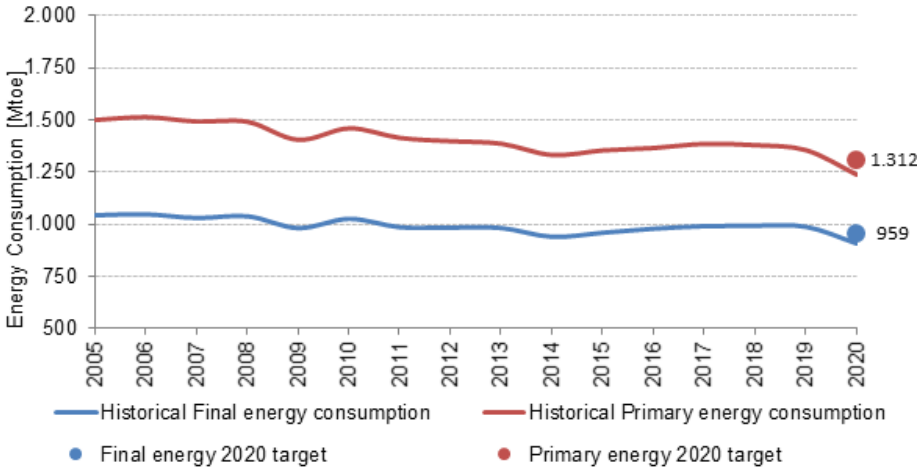

Figure 4. Evolution of the EU Final and Primary Energy Consumption from 2005 to 2020 (the dots represent the 2020 EU Energy Efficiency Targets). Source: Eurostat, JRC, 2022.

Energy consumption in 2020 was undoubtedly influenced by the COVID-19 pandemic. This exceptional situation led to a slight growth in energy consumption in the residential sector due to the increased time spent by people at home (lockdown and teleworking) and a decrease in energy consumption in the transport, industry and service sectors. The transport sector had the most accentuated decrease in consumption driven by the steep decline in activity, mainly due to travel restrictions during the Covid-19 pandemic.

In the period from 2005 to 2020, EU energy consumption followed a general downward trend, as depicted in Figure 4**.** The decrease in energy consumption was accompanied with an overall drop in energy intensity and energy consumption per capita, reflecting a possible increase in competitiveness.

Regarding progress towards the 2030 targets, the EU's primary energy consumption was 7.2% above (and final energy consumption was 9.6% above) the 2030 energy consumption targets levels. This represents a **reduction of 32.5% compared to the 2007 reference scenario baseline**. Nevertheless, far more effort is needed if we are to achieve a structural reduction in energy consumption and meet the new target of 13% proposed in REPowerEU.

Buildings and products

Several actions under the **Renovation Wave action plan** have already been completed or significantly advanced with the aim of **at least doubling the annual energy renovation rate of buildings by 2030** and promoting deeper energy renovations.

Member States have submitted their **national long-term renovation strategies**, with concrete policy measures for easier access to financing, promotion of advisory tools such as one-stop-shops, tackling energy poverty, improving the energy performance of public buildings and better information.[38] Since the beginning of 2021, **nearly zero-energy became the official norm for new buildings in the EU**.

The publication of the official **Communication on the New European Bauhaus (NEB)**[39] marked the transition between the co-design phase and the delivery of the Bauhaus initiative and introduced activities that will further support its objectives. One of the key instruments is

[38] With a view to sharing best practices among Member States, the Commission developed a Staff Working Document (SWD) analysing national long-term renovation strategies in Member States.
https://energy.ec.europa.eu/system/files/2021-12/swd-on-national-long-term-renovation-strategies.pdf

[39] https://new-european-bauhaus.europa.eu/about/about-initiative_en

the **NEB Lab** aiming to connect people to work around concrete and tangible projects. Since April 2022, eight measures have already started under this framework, including the **NEB Labelling Strategy**, financing schemes, education, and regulation.

Eco-design and energy labelling delivers a vital and growing contribution to European Green Deal and Fit for 55 objectives, as well as to consumers faced with high energy prices whose bills would otherwise be much higher. **The total estimated energy savings generated by all eco-design and energy labelling measures amounted to 1037 TWh/y (or 89 Mtoe/y) in 2020, corresponding to 7.2% of the total EU primary energy consumption in 2020**. Compared to the estimate for 2020 published in the latest edition of the eco-design impact accounting report[40] (EUR 60 billion), the reduction in consumer expenditure is estimated to have roughly doubled in 2021 (reaching more than EUR 120 billion) and may well be even higher in 2022[41]. On 30 March 2022, the Commission adopted an updated working plan for eco-design and energy labelling for energy-related products[42], the implementation of which represents a significant savings potential in the coming years.

3.3. Energy security

Europe's security of energy supply has been robust despite exceptional challenges thanks to the resilience of the existing framework, strengthened preparedness based on a spirit of solidarity between Member States, prompt policy support over the last year and a strong outreach to our international partners. The TEN-E Regulation has contributed significantly to this robust security of supply by interconnecting Member States' energy systems through Projects of Common Interest (PCIs).

The EU has been **preparing for different possible disruption scenarios**, by making a comprehensive preparedness overview and putting in place measures at national and EU level to reinforce preparedness and security of energy supply. In these difficult times, **regional cooperation and solidarity will remain essential to guaranteeing the resilience of the EU** and ensuring that flows and access to storage across borders remain possible in all situations. In this regard, the high-level groups, under the TEN-E Regulation, strategically coordinate and oversee joint implementation of cross-border Projects of Common Interest (PCIs).

The sectoral **European coordination groups** (for electricity, gas and oil) have met regularly and played a key role in monitoring security of supply, exchanging information and coordinating measures, to be ready for all possible scenarios.

Regarding the implementation of the **security of supply rules for gas**[43], all Member States have put in place national emergency plans to prevent or mitigate the impact of gas supply disruptions. Member States have made progress in concluding bilateral solidarity arrangements. In the electricity sector, the implementation of the **Risk Preparedness Regulation**[44] has produced the first set of national risk-preparedness plans. Concerning the security of the **oil supply**[45], 18 Member States (including two Member States who are not members of International Energy Agency) participated in collective action initiated by the

[40] https://op.europa.eu/en/publication-detail/-/publication/568cac02-5191-11ec-91ac-01aa75ed71a1/language-en

[41] See section 6 of SWD/2022/0101 final

[42] C/2022/2026, OJ C 182, 4.5.2022, p. 1–12

[43] Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010

[44] Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk preparedness in the electricity sector

[45] Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products

Agency on 1 March and 1 April, to make emergency oil stock available. In June, the Commission issued a Recommendation[46] for Member States not to replenish the emergency stocks to the level required by the Oil Stocks Directive at least until 1st November, to avoid putting additional stress on the oil market.

The future energy system will require more flexibility tools, such as demand response or energy storage. The Commission has been working on identifying key EU actions to support the development of future-proof **energy storage** as a key flexibility tool.

As a follow-up to the study[47] published in October 2021, the Commission has been closely monitoring potential bottlenecks in the **raw materials supply chains** for energy technologies that are critical for energy security and the clean energy transition.

3.4. Internal energy market

Against the background of drastically rising energy prices, the European Commission had tasked the European Union **Agency for the Cooperation of Energy Regulators (ACER)** with assessing the **benefits and drawbacks of the EU's current wholesale electricity market design**. In April 2022[48] **ACER concluded that the current energy crisis is in essence a gas price shock**, which also impacts electricity prices.

ACER also concluded that, over the last decade, **cross-border trade and the major efforts undertaken to further integrate electricity markets in Europe have delivered significant benefits for consumers**. These are estimated to amount to around EUR 34 billion a year, by enabling cross-border trade between Member States and improving security of supply across a larger geographical area. ACER's report highlights that those benefits have materialised even in the current crisis, when an integrated market has helped us avoid electricity curtailment or blackouts in certain regions.

Market coupling, which means that electricity and the interconnector capacities to transport it can easily be traded on a common EU trading platform, has further improved, in both the day-ahead and the intraday markets. The day ahead market coupling has been successfully extended to all borders between EU Member States. To further optimise the use of interconnectors, the Commission is working towards extending market coupling to the Energy Community.

Against the background of drastically increased electricity prices, the Commission has published a Communication on **Short-Term Market Interventions and Long-Term Improvements to Electricity Market Design[49]**. Acknowledging that there may be scope for further optimising the functioning of the electricity market design, the Commission has launched an impact assessment process and is discussing possible improvements with Member States. It is necessary to develop more resilient and efficient long-term markets, both to drive the energy transition and to better shield consumers and small businesses from price volatility. This process will also be used to assess the REMIT framework[50], with a view to mitigating the risks of market abuse more effectively by improving transparency, and market data quality and ensuring better enforcement where rules are breached.

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[46] Commission Recommendation (EU) 2022/867 of 1 June 2022 on the release of emergency oil stocks by Member States following the invasion of Ukraine (OJ L 151, p. 72).

[47] Study on the resilience of critical supply chains for energy security and clean energy transition during and after the COVID-19 crisis' ISBN 978-92-76-38453-3

[48] https://www.acer.europa.eu/events-and-engagement/news/press-release-acer-publishes-its-final-assessment-eu-wholesale

[49] COM(2022) 236 final of 18 May 2022

[50] Regulation (EU) No 1227/2011 on Wholesale Energy Market Integrity and Transparency

Efforts to optimise the functioning of the electricity market design should not slow down efforts to implement the existing framework[51]. This includes, improving consumers' rights; working towards the target that in 2025 at least 70% of interconnector capacities are available for trade; structuring the market so that it provides the right signals to where investment is needed; identifying and eliminating regulatory distortions and market failures, and fostering demand-side response and storage.

To reduce the need for **capacity mechanisms**, the huge potential of demand side flexibility needs to be better used. The Commission therefore called on ACER to do preparatory work for developing a **network code on demand side flexibility**.

In the current geopolitical situation, **the liquid and competitively organised internal gas market has played an important role in attracting gas to Europe**. We also witness gas flowing from Western to Eastern Europe at maximum capacity these days, showing that price signals and the increasingly interconnected gas markets which Europe has developed over the last decade are helping to distribute gas supplies where most needed.

3.5. Research & innovation and competitiveness

The EU is facing **technological and non-technological challenges related to high energy prices, critical raw materials supply chain disruptions, natural resources stress (e.g. land and water) and skills shortages**. As half of the 30 critical raw materials listed by the EU are imported in proportions above 80% in volume, surging prices[52] are affecting the competitiveness of clean energy technologies. Over 70% of EU businesses involved in manufacturing the equipment have faced materials shortages in 2022, and 30% have also experienced labour shortages in 2022. These trends show the growing risk of disruptions to the clean energy supply chain.

To make **EU clean energy sector more competitive**, the EU will have to secure supplies and build up strategic reserves where supply is at risk. For this reason, the Commission announced a European Critical Raw Materials Act[53], which will also identify strategic projects all along the supply chain (extraction, refining, processing and recycling) and ensure that these project attract private and public investments.

Reducing the EU's dependency on raw materials, making more efforts on the circular economy, and overcoming the shortage of skilled workforce will shape the more resilient, independent, secure and affordable energy system needed to deliver the REPowerEU Plan. Considering that about half of the greenhouse gas emissions reductions expected by 2050 require technologies which are not yet ready for the market[54], **Research and Innovation (R&I) activities** are crucial to deliver on the European Green Deal objectives.

The EU is at the forefront of clean energy research. However, **more public and private investments in R&I**, and scaling up and deployment activities are needed. In 2022 the EU has confirmed its **leading position in the global wind sector R&I**, as well as its position as one of the largest markets for **PV**, where competition remains fierce in several segments of the value chain. The EU is also at a crossroads for several technologies. For example, the **Heat Pumps** sector will have to accelerate its already fast-growing deployment and EU suppliers will have to ramp up production. On **batteries,** despite initiatives which are

[51] Notably Regulation (EU) 2019/943 and Directive (EU) 2019/944
[52] Prices of lithium and cobalt more than doubled in 2021.
[53] As announced in the 2022 State of the Union address on 14 September 2022.
[54] European Commission, Directorate-General for Research and Innovation, Research and innovation to REPower the EU, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/74947.

underway[55], the lack of EU domestic raw materials and advanced materials productions represent a challenge for the EU competitiveness. Even though the EU can rely on its strong comprehensive approach to pull demand and supply, surge in electricity prices and reliance on critical raw materials are also main challenges for the EU **hydrogen production through electrolysis.**

A **stronger R&I ecosystem** supported by the EU funding programmes, **enhanced cooperation** between Member States[45], and a continuous **monitoring of national R&I** activities, are crucial in order to define a successful R&I pathway, to bridge the gap between research and innovation and market uptake, exploit the opportunities of the EU clean energy technologies and reinforce EU competitiveness.

4. EU FINANCING FOR REPOWEREU, ACCELERATING THE CLEAN ENERGY TRANSITION AND THE EUROPEAN GREEN DEAL

4.1. Main investment needs and available EU financing for REPowerEU

According to the **Commission investment needs analysis**[56], implementing the full potential to reduce dependence on Russian fossil fuel imports to zero would require EUR 300 billion, from now until 2030. This investment needs to complement the Fit-for-55 proposals and include[57]: solar photovoltaic and wind (EUR 86bn), renewable hydrogen (EUR 27bn), energy efficiency and heat pumps (EUR 56bn), adapting industry to use less fossil fuels (EUR 41bn), increasing biomethane production (EUR 37bn), investing in the power grid to enable greater electrification (EUR 29bn), investment in new LNG infrastructure and gas pipeline corridors (EUR 10bn), and oil infrastructure necessary to ensure security of oil supply (EUR 1.5-2bn).

The **Recovery and Resilience Facility (RRF) will play a critical role in addressing these needs** via different measures, including the REPowerEU chapters, as part of the national Recovery and Resilience Plans (RRPs). Both REPowerEU and the REPowerEU chapters in the national RRPs should be also reflected in the update of the National Energy and Climate Plans (NECPs) (to be submitted by mid-2023). The Commission will provide guidance on these updates. The Commission proposed additional funds for the RRF, and has initiated bilateral discussions with Member States to identify reforms and investments that could potentially be eligible for financing under the new REPowerEU chapters.

When preparing their REPowerEU chapters, Member States will need to take into account the **Country Specific Recommendations (CSR) identified in the European Semester exercise**, which this year included **energy-specific CSRs** focusing, in particular, on additional reform and investment needs related to the need to reduce energy dependencies and to accelerate the energy transition. The European Semester framework will play a central role in monitoring the REPowerEU measures. The REPowerEU objectives are supported by the clean energy transition, and will also be financed from other EU programmes, and supported via several EU initiatives (see Section 4.2). The EU funding complements other available public and private financing, which will play a key role in delivering the investment needed for REPowerEU.

4.2. EU financial support for clean energy transition

EU support for clean energy transition is provided through various **programmes**:

[55] E.g. the European Batteries Alliance and Important Projects of Common European Interest (IPCEI).

[56] (SWD(2022) 230 final) of 18 May 2022

[57] Estimated values obtained by the modelling investment needs analysis

- **Recovery and Resilience Facility**: the climate-related investment in the 26 approved RRPs[58] are approximately EUR 200 billion[59], above the 37% obligation set by the RRF Regulation.[60] The largest part of the climate investments allocation is dedicated to clean energy, energy efficiency and building renovation measures (around EUR 88bn). Another significant part is dedicated to sustainable transport (around EUR 70bn). Approximately EUR 10 billion is allocated for renewable and low-carbon hydrogen.
- **Cohesion policy** also provides significant support to energy efficiency, renewable energy and energy infrastructure. During 2014-20, EUR 27.5 billion was allocated for investment recognised as a priority under REPowerEU. For 2021-27, the Commission expects Member States will allocate further EUR 34-36 billion to such priorities. In June 2022 a new model financial instrument to support the REPowerEU was prepared with the European Investment Bank (EIB).
- **InvestEU programme**: By July 2022, already around EUR 1.6 billion of the EU guarantee under the "Sustainable Infrastructure Window" was allocated, including for investment in solar photovoltaic, wind energy and energy efficiency. Key initiatives under the InvestEU Advisory Hub, cover the areas of energy efficiency and hydrogen:
  - Since 2011, the ELENA facility supports the development of energy efficiency and clean mobility projects. With a leverage factor of 33, it has an impressive capacity to attract ('crowd-in') private financing. In 2021, EUR 35.8 million was allocated to 18 new projects. These are expected to generate around 500 GWh of energy savings per year.
  - The Commission is cooperating with the EIB to develop an advisory facility supporting the renewable power purchase agreement projects, including to support hydrogen uptake and electrification in industrial sectors.
- The **Horizon Europe programme** allocated EUR 15 billion to support research and innovation in renewable energy technologies, energy efficiency, electrification of heating and cooling and digitalisation of the energy system.
- **CEF Energy** is financing the better interconnection of energy networks towards a single EU energy market and the clean energy transition. Since 2014 CEF Energy had supported 154 projects with a total of EUR 5.7 billion. In March 2022, the Commission launched the first CEF call for renewable energy cross-border projects. In May 2022, the Commission launched a new call for key cross-border energy infrastructure projects for projects included in the 5th EU list of Projects of Common Interest.
- **LIFE Clean Energy Transition (CET)**: in May 2022, the LIFE CET Call for proposals was published, making available EUR 98 million for energy efficiency and clean energy projects. This Call covers REPowerEU objectives, such as reduction in fossil fuel consumption for heating and accelerated deployment of energy efficiency solutions in housing, businesses and public sector.
- In 2022, the first ever cross-border tender will take place under **the Renewable Energy Financing Mechanism**. The tender will focus on solar photovoltaic projects. The mechanism will help unlock the EU's full renewable potential, and help Member States achieve the decarbonisation objective in a more cooperative manner.

[58] AT, BG, BE, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, IE, IT, LT, LU, LV, MT, NL, PL, PT, RO, SE, SI, SK

[59] The expenditures reported for the RRF are estimates produced by the Commission, based on the information on climate tracking published as part of the Commission's analyses of the recovery and resilience plans. The data reported cover the 25 national recovery and resilience plans that had been assessed and approved by the Commission by 17 June 2022. See: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/recovery-and-resilience-plans-assessments_en

[60] In line with conditions in the annexes to the Council implementing decisions approving national RRPs.

- Carbon prices increased during 2021, and so did the total revenues from the EU ETS, amounting to about EUR 31 billion in total. This money will support the **Innovation Fund** and **the Modernisation Fund**.
- The **Common Agricultural Policy (CAP)** also supports energy efficiency, renewable energy and energy infrastructure through the **European Agricultural Fund for Rural Development (EAFRD)**. Depending on the needs identified and the strategy developed in the current Rural Development Programmes or future CAP Strategic Plans, Member States have the possibility to support investments in the production of renewable energy or in the improvement of energy efficiency for agricultural holdings but also for rural businesses.

The Commission also supports the Member States through the **Technical Support Instrument**, providing tailor-made technical expertise to design and implement reforms, including on the clean energy transition. In particular, the Commission is helping Member States to identify reforms and investments to phase out fossil fuel imports from Russia.

Active **EU initiatives** play an important role in mobilising financing for the clean energy transition: These include:

- the **Sustainable Energy Investment Forums** initiative - a highly successful initiative facilitating dialogue between public and private stakeholders, aiming to mobilise private financing for energy efficiency and sustainable energy investments;
- the **Energy Efficiency Financial Institutions Group**, whose key mission is to identify barriers to energy efficiency financing and to provide recommendations to policymaking bodies and financial institutions on how to address them;
- the **Investors Dialogue on Energy**, launched in 2022 as a stakeholder platform bringing energy and financial experts together to identify investment barriers for the energy sector, assess financing policies and instruments, and propose relevant solutions.

Climate mainstreaming

At least 30% of the EU budget for 2021-2027 is allocated to climate (up from 20% in 2014-2020). Specific programmes have 30% or higher climate spending targets - European Regional Development Fund (30%), Horizon Europe (35%), Cohesion Fund (37%), RRF (37%), Connecting Europe Facility (60%), LIFE (61%) and the Just Transition Fund (100%). In 2021, Member States RRPs earmarked 40% for climate investment, well beyond the 37% regulatory obligation.

4.3. Energy subsidies in the EU

Energy markets underwent unexpected and sudden developments over the last two years, which have had a significant impact on the consumption and prices of energy products, amid COVID-related lockdowns, the post-pandemic recovery and the current period of extremely high and volatile energy prices. The energy subsidies report[61] to be published in October will (i) present the final, more precise numbers on the evolution of energy subsidies during COVID-stricken 2020, and (ii) make estimates for the impact of the global economic recovery and high energy prices on energy subsidies in 2021.

[61] Stemming from the Governance Regulation, the Commission reports every year on the evolution of energy subsidies, particularly fossil fuel subsidies in the Member States, and on what measures countries have undertaken to present a roadmap on their gradual phase-out.

Fossil fuel subsidies, after falling by more than 5% in 2020 in the EU, owing to lockdowns and travel restrictions for people and business, **remained fairly stable in 2021**, as the increase in transport and industry was compensated by the decreasing in fossil subsidies in the energy sector. Subsidies on *oil products*, especially in the transport sector, fell by 12% in 2020, whereas subsidies on *coal* were up 7% amid a slight decrease in gas subsidies (by 2%) year-on-year, being affected by their role in power generation. **In 2021 subsidies on oil, coal and gas showed a slight increase**, and the s**ubsidy to fossil fuel electricity generation fell**. Since autumn 2021, in parallel with increasing energy prices in European markets, several EU Member States have taken measures to alleviate the impact of energy bills on citizens and businesses, which have resulted in larger subsidies for energy consumption.

Subsidies on *renewable energy* were up 7% in 2020, as long-standing support schemes still had a measurable impact, but they fell back slightly in 2021. Energy efficiency subsidies fell in 2020, but rebounded in 2021. A further rise in subsidies was observed for *nuclear* energy, on account of payments for the early closure of nuclear power plants in two Member States.

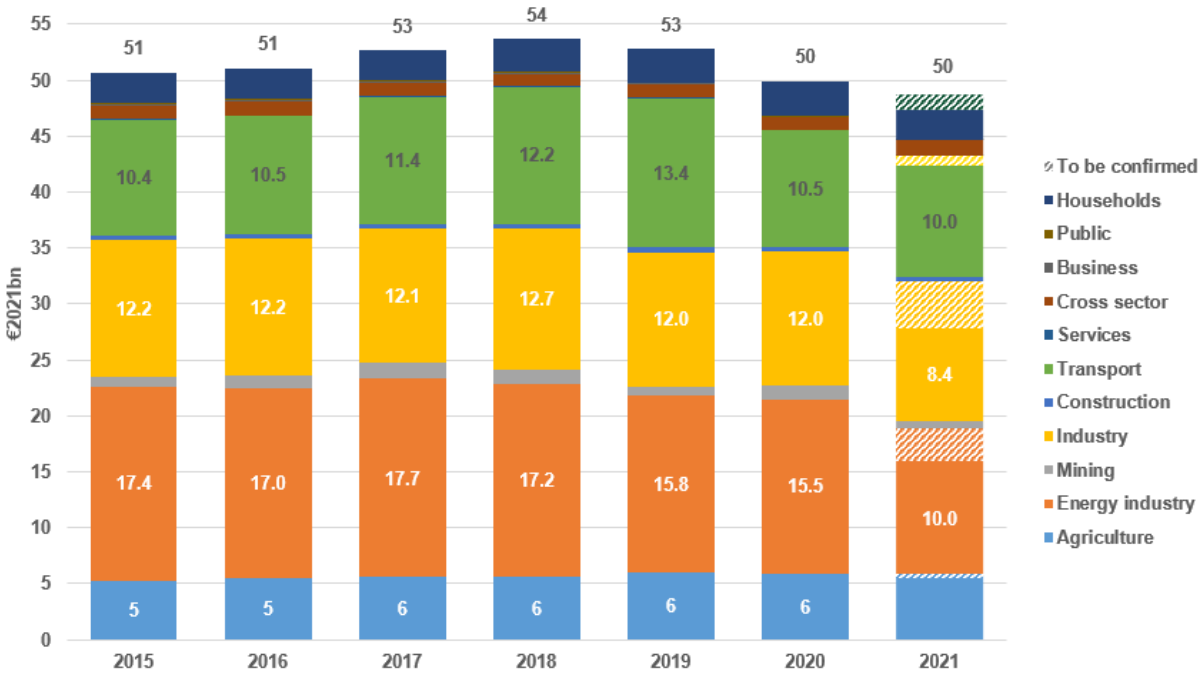
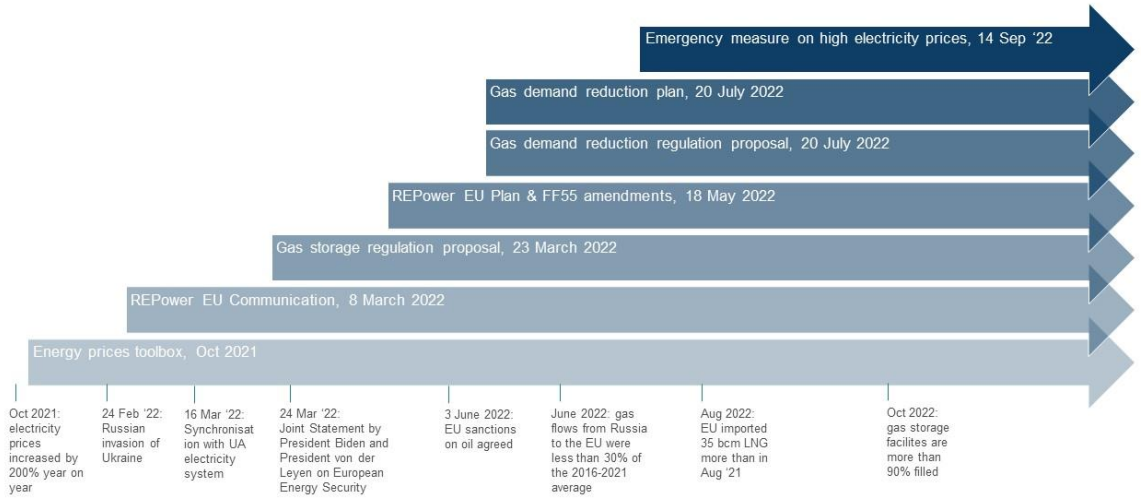


Figure 5. Fossil fuel subsidies in different sectors in the EU. Source: Study on energy subsidies and other government interventions in the European Union 2022.

Annex I - Actions taken in view of the rising energy prices since October 2021



1. Energy prices toolbox, 13 Oct 2021

- **Support consumers** including through **emergency income support** for energy-poor consumers**;** temporary, targeted **reductions in taxation rates** for vulnerable households; authorisation of temporary **deferrals of bill payments**; putting in place safeguards to **avoid disconnections from the grid;**
- **Provide aid to companies or industries**, in line with EU state aid rules;
- **Enhance international energy outreach** to ensure the transparency, liquidity and flexibility of international markets;
- **Investigate possible anti-competitive behaviour** in the energy market and enhance monitoring of developments in the carbon market;
- Facilitate a **wider access to renewable power purchase agreements** and support them via flanking measures.

2. REPowerEU Communication, 8 March 2022

- **Consumers:** Guidance confirming the possibility to **regulate prices in exceptional circumstances**, and setting out how Member States can **redistribute revenue** from high energy sector profits and emissions trading to consumers;
- **State aid rules:** Commission consultation with Member States on the needs for and scope of **a new State aid Temporary Crisis Framework** to grant aid to companies affected by the crisis, in particular those facing high energy costs;
- **Announces** a legislative proposal for the **Gas Storage Regulation, the RePowerEU Plan,** and assesses options to **optimise electricity market design**.

3. **Gas storage regulation proposal, 23 March 2022**

- **Legislative proposal** introducing a minimum **80% gas storage level obligation** for next winter;
- **Communication** setting out the **options for market intervention** at European and national level, and assessing the benefits and limitations of each option;
- **Regulation** adopted by EP and Council **27 June.**

4. **EU Energy Platform, 7 April 2022**

- Voluntary participation of Member States for **joint purchasing of gas** to ensure more equal access across EU Member States and support security of supply;
- Establishment of **an industry advisory group and five Regional Task Forces** to help to get a better understanding of potential demand to be introduced to the joint purchasing mechanism.

5. **REPowerEU Plan, 18 May 2022**

- **Accelerating the roll-out of renewables:**
  - Increases the headline 2030 target for renewables from 40% to 45%;
  - **Recommendation to speed up permitting for major renewable projects;**
  - Targeted **amendment to the Renewable Energy Directive** to recognise renewable energy as an overriding public interest;
  - **EU Solar Strategy**;
  - **Solar Rooftop Initiative**;
  - **Doubling of the rate of deployment of heat pumps**;
  - Sets target of **10 million tonnes of domestic renewable hydrogen** by 2030;
  - **Biomethane Action Plan**.
- **Saving energy:**
  - Increases the binding 2030 Energy Efficiency Target from 9% to 13%;
  - **EU Save Energy Communication** encourages strengthening of energy savings.
- **Diversifying energy supplies and supporting international partners:**
  - **EU External Energy Strategy** reinforces the EU's engagement with international partners and strengthens its energy diplomacy ensuring diversification of energy supply and boosting the green and just energy transition.

6. **Save Gas for a Safe Winter, 20 July 2022**

- **Gas demand reduction regulation (proposal), 20 July 2022**
  - Sets a target for all Member States to **reduce gas demand by 15%** between 1 August 2022 and 31 March 2023;
  - Gives the Commission the possibility to declare, after consulting Member States, a **'Union Alert' on security of supply**, imposing a mandatory gas demand reduction on all Member States;
  - **Regulation** based on 122 TFEU, and was adopted by Council **27 July.**
- **Gas demand reduction plan, 20 July 2022**

- Sets out measures, principles and criteria for **coordinated gas demand reduction;**
- Provides **guidelines for Member States** to take into account when planning curtailment;
- Encourages **substitution of gas with other fuels**, preferably cleaner energy sources;
- Incentivises **overall energy savings in all sectors.**

7. Emergency market intervention on high electricity prices (proposal), 14 Sep 2022

- Proposes that Member States aim to reduce overall electricity demand by at least 10% until 31 March 2023;
- Sets a temporary **revenue cap on inframarginal** electricity producers;
- Sets a temporary **solidarity contribution** on excess profits generated from activities in the oil, gas, coal and refinery sectors, redirected to energy consumers;
- Allows **below cost regulated electricity prices** for the first time, and expand regulated prices to also cover small and medium-sized enterprises;
- Regulation based on 122 TFEU, and was adopted by Council on **30 September.**