



Brussels, 26.10.2021  
COM(2021) 950 final

**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 2021 – Contributing to the European Green Deal and the Union’s  
recovery**

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

{COM(2021) 952 final} - {COM(2021) 960 final} - {COM(2021) 961 final} -  
{COM(2021) 962 final} - {SWD(2021) 298 final} - {SWD(2021) 307 final} -  
{SWD(2021) 308 final}

## 1. INTRODUCTION AND HIGHLIGHTS

The State of the Energy Union report marks, each year<sup>1</sup>, the moment to **take stock** of change and of progress in the implementation of **the European Union (EU) energy and climate policies**, including the Energy Union across its five pillars, on the road to **climate neutrality by 2050**.

The current year heralds a decade widely considered to be decisive for the fight against climate change, biodiversity loss and pollution, driven by natural resources depletion. It also marks an important passage from the Covid-19 crisis to economic recovery and from setting out the European Green Deal and its accompanying strategies to moving decisively to implementation.

This year's State of the Energy Union report thus takes stock of the Commission's intense work with the other European institutions, Member States and its international partners on the EU **response to the double challenge of achieving a fast, sustained recovery** from the impacts of the COVID-19 crisis **and of climate change**<sup>2</sup>. Investing in the transformation of the energy system is **part of the solution on the path to climate neutrality and a response to the impacts of the COVID-19 crisis**.

This year's report is also published against the background of a **sharp spike in gas and electricity prices** in the European Union as in many other areas of the world. Primarily due to global demand for gas soaring as economic recovery is picking up without higher demand being matched by higher supply, these increases are a high concern for citizens, businesses, the European institutions and governments all over the EU. To help and support addressing the negative impact on households and businesses, the Commission's recent communication "Tackling rising energy prices: a toolbox for action and support"<sup>3</sup> outlines a **toolbox of short and longer term measures**. These aim to allow a rapid co-ordinated approach to protect those most at risk without fragmenting the European single energy market or jeopardising investments in the energy sector and the green transition. In the medium term, the suggested policy response should focus on making the EU more efficient in the use of energy, less dependent on fossil fuels and more resilient to energy price spikes, while providing affordable and clean energy to end-users. The findings of this report help informing the discussion on how the Energy Union will best contribute to this.

Finally, the report is also published on the eve of the **26<sup>th</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 26)** in Glasgow. This comes during a year when many regions suffered from extreme weather

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<sup>1</sup> In accordance with Article 35 of the Governance Regulation, i.e. Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328 21.12.2018, p.1), the Governance Regulation.

<sup>2</sup> The July 2021 Eurobarometer survey shows that European citizens believe climate change is the single most serious problem facing the world. More than nine out of ten people surveyed consider climate change to be a serious problem (93%), with almost eight out of ten (78%) considering it to be very serious.

<sup>3</sup> COM(2021) 660

events and the Intergovernmental Panel on Climate Change (IPCC)<sup>4</sup> pointed to the increased risk of such events in the future and clearly attributed climate change to human activities. As shown by the International Energy Agency's (IEA) World Energy Outlook 2021<sup>5</sup>, **combatting climate change** requires urgent action during the current decade and will require a **profound transformation of consumption and production patterns**, notably the way energy is produced, transported and consumed<sup>6</sup>. This Communication presents a state of play on this transformation helping identifying future areas for action and increased efforts. Inter-related accompanying reports allow a deeper analysis on the following:

- Energy Subsidies in the EU (annex to this Communication)
- Climate Action Progress Report 2021<sup>7</sup>
- Progress on the competitiveness of clean energy technologies<sup>8</sup>
- The fuel quality report<sup>9</sup>, and
- The report on the functioning of the carbon market (emissions trading system)<sup>10</sup>

#### ***State of the Energy Union - key findings***

- *In 2020, EU greenhouse gas (GHG) emissions (including international aviation) were **down 31 %** compared to 1990 due to the impact of the pandemic on energy consumption but also due to continued decarbonisation trends;*
- *In 2020, for the first time, renewables overtook fossil fuels as the EU's main power source (38 % of EU electricity, fossil fuels 37 % and nuclear 25 %). The share of **renewable energy** sources in the overall EU energy mix is **expected** to have reached **at least 22 %** although some Member States are at risk of failing to meet their national binding target;*
- *Latest available data indicate that EU primary energy consumption declined by 1.9 % and final energy consumption by 0.6 % in 2019 compared to 2018;*
- *EU net energy import dependency reached 60.6 % in 2019 compared to 58.2 % in 2018 and 56 % in 2000; the **highest level in the past 30 years**;*
- *While fossil fuel subsidies fell slightly in 2020, down to EUR 52 billion from EUR 56 billion in 2019, this was due to falling consumption amid the COVID-19-related restrictions. Without Member States action, fossil fuel subsidies are likely to rebound as economic activity picks up;*
- *To date, **nine Member States have phased out coal**, 13 have made national commitments to do so by a certain date, four are considering possible dates and only one has not yet started national discussions on a phase-out;*
- *Energy prices seesawed violently as the economy contracted due to the Covid-19 crisis and then begun to recover. Due to cheaper fuels, subdued demand and rapidly expanding renewable generation, wholesale energy prices fell sharply in 2019. Negative electricity prices became widespread in 2020. This downtrend was*

<sup>4</sup> <https://www.ipcc.ch/report/ar6/wg1/>

<sup>5</sup> <https://www.iea.org/reports/world-energy-outlook-2021>

<sup>6</sup> The IEA<sup>6</sup> has, however, also demonstrated that about half of the solutions for the transformation on the path to climate neutrality are already available and the others are at pilot or development stage. ([https://iea.blob.core.windows.net/assets/beceb956-0dcf-4d73-89fe-1310e3046d68/NetZeroBy2050-ARoadmapfortheGlobalEnergySector\\_CORR.pdf](https://iea.blob.core.windows.net/assets/beceb956-0dcf-4d73-89fe-1310e3046d68/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf).)

<sup>7</sup> COM(2021) 960

<sup>8</sup> COM(2021) 952

<sup>9</sup> COM(2021) 961

<sup>10</sup> COM(2021) 962

*abruptly reversed: wholesale electricity prices have increased by 230 % on a yearly basis with a more moderate impact on retail prices until September 2021 (+11 % EU average)<sup>11</sup>. This was largely driven by rising gas prices which had an effect on the electricity price nine times bigger than the effect of the observed carbon price increase over the same period<sup>12</sup>;*

- *More than 98.6% of EU electricity consumption is coupled<sup>13</sup>. Traded volumes on natural gas hubs rose to an all-time high in 2019. This trend continued into 2020;*
- *Public clean energy R&I spending in Member States continues to be lower than in 2010, but national and EU recovery funding that targets clean energy R&I can partially compensate this;*
- *Energy poverty affects up to 31 million people in the EU as of 2019<sup>14</sup>, with persisting differences across Member States and income levels. This underlines the importance of shielding the vulnerable from the current price spike and ensure a just transition towards climate neutrality.*
- *Most, albeit not all, trends are therefore positive but nevertheless still fall short of what is needed to drive the required transformation to achieve the objectives of the Energy Union. An acceleration is required not just to achieve a socially fair transition to climate neutrality by 2050 but also as an insurance against the sort of price shocks the EU is facing today.*
- *The adoption of the European Climate Law<sup>15</sup> and of the “Delivering the European Green Deal” package<sup>16</sup> proposed by the Commission in mid-2021 marked two major steps towards putting in place a credible framework to ensure the above.*
- *Member States’ Recovery and Resilience Plans are expected to provide a boost to climate-related investments by at least EUR 177 billion<sup>17</sup> and to foster necessary reforms to support the climate and energy transition.*

## **2. DELIVERING ON CLIMATE CHANGE GOALS, RECOVERY AND RESILIENCE**

### **2.1. Progress in implementing the European Green Deal with focus on energy and climate policy**

2021 marked a shift from setting out a comprehensive vision for the transition to climate neutrality, and its supporting sectoral strategies<sup>18</sup>, to proposing and implementing the

<sup>11</sup> This varies in Member States and depends on regulation and structure of retail prices and energy mix.

<sup>12</sup> Source: COM(2021)660

<sup>13</sup> The term ‘market coupling’ refers to the aim to form an interconnected (European) market for electricity. Market coupling is intended to link control areas and market areas in order to harmonise different systems of electricity exchanges and, in particular, to reduce price differences.

<sup>14</sup> It is a downward trend, since energy poverty affected 34 million people in 2018.

<sup>15</sup> Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (‘European Climate Law’) (OJ L 243, 9.7.2021, p. 1).

<sup>16</sup> COM(2021) 550 final, COM(2021) 551 final, COM(2021) 552 final, COM(2021) 563 final, COM(2021) 554 final, COM(2021) 555 final, COM(2021) 556 final, COM(2021) 557 final, COM(2021) 558 final, COM(2021) 563 final, COM(2021) 568 final, COM(2021) 567 final, COM(2021) 571 final. Further legislative proposals will be adopted as part of that package later this year.

<sup>17</sup> The expenditures reported for the RRF are estimates processed 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 22 national recovery and resilience plans assessed and approved by the Commission by 5 October and will evolve as more plans are assessed.

resulting initiatives. Key moments in this regard were the adoption of the **Climate Law** in June and the presentation of the “Delivering the European Green Deal” (so-called ‘fit for 55’) package in July 2021.

The adoption of the **European Climate Law** established a clear binding framework to achieve climate neutrality by 2050 which fully enshrines the 2030 target of at least 55% greenhouse gas reductions presented in the **2030 Climate Target Plan**<sup>19</sup> and **relies on** Member States’ **National Energy and Climate Plans (NECPs)**<sup>20</sup>.

Supporting the path set out in the Climate Law, the pioneer “Delivering the European Green Deal” package **presented a set of interconnected proposals across the economy**<sup>21</sup> increasing the 2030 ambition, among others, by setting new targets for GHG emissions reduction and for renewables and energy efficiency (chapters 3.1 and 3.2)<sup>22</sup>. In that context, the Commission proposed to raise the EU 2030 target for renewables from the current at least 32 % to at least 40 % of the Union’s gross final consumption of energy while setting up a complete framework for renewable energy deployment, addressing all sectors of the economy. The Commission also proposed raising energy efficiency targets at EU level and making them binding, so as to ensure overall **reductions of 36% for final energy consumption and of 39% for primary energy consumption** by 2030<sup>23</sup>.

The effort to increase building renovation rates as provided in the **Renovation Wave Strategy**<sup>24</sup> was boosted by several developments. The “Next Generation EU” recovery instrument provided additional financial resources towards building renovation as a tool to underpin the economic recovery and increase energy and resources efficiency. The proposal to revise the Energy Efficiency Directive<sup>25</sup> aims to make the public sector play a leading role by introducing an annual renovation obligation of 3 % for public buildings. The proposal also follows the ‘energy efficiency first principle’<sup>26</sup> and revises the primary energy factor<sup>27</sup>. The forthcoming revision of the Energy Performance of Buildings Directive<sup>28</sup> (EPBD) will also be instrumental in making the EU legal framework fit for the Renovation Wave objectives, including through a phased introduction of minimum energy performance standards. The results of the first co-design phase of the **New**

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<sup>18</sup> Including, among others, COM(2020) 299, COM(2020) 301, COM(2020) 741 and, COM(2020) 662.

<sup>19</sup> COM(2020) 562 final.

<sup>20</sup> COM(2020) 564 final, SWD(2020) 900 to 926.

<sup>21</sup> Energy, industry, transport, buildings, agriculture, forestry and other sectors

<sup>22</sup> To be complemented by the revision of the Energy Performance in Buildings Directive and initiatives on hydrogen, gas market decarbonisation and methane.

<sup>23</sup> Indicators from the Eurostat’s energy balances in line with the methodology up to 2018 (FEC 2020-2030 and PEC 2020-2030) are used to monitor progress towards achieving the Europe 2020 energy efficiency targets

<sup>24</sup> COM(2020) 662 final

<sup>25</sup> COM(2021) 558 final

<sup>26</sup> The “energy efficiency first principle” means taking utmost account of cost-efficient energy efficiency measures in shaping energy policy and making relevant investment decisions. It is a far-reaching guiding principle that should complement other EU objectives, in particular sustainability, climate neutrality and green growth.

<sup>27</sup> Primary energy factors (PEF) are numerical coefficients determined as the converse of the ratio between one unit of energy delivered to the building and units of primary energy expended to deliver it.

<sup>28</sup> Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153 18.6.2010, p. 13).

**European Bauhaus (NEB)** initiative were also presented in a Communication on 15 September 2021<sup>29</sup>, which also puts on the table the first elements of a support framework for its delivery in the subsequent phase<sup>30</sup>. The NEB initiative aims to bring the European Green Deal to life in an attractive, innovative and human-centred way. Its core values are sustainability (including circularity), aesthetics and inclusiveness.

To pursue the **energy system integration**, the proposal to amend the Renewables Directive<sup>31</sup> provides a strong path towards renewables-based electrification and helps addressing hard-to-decarbonise sectors, including with renewable hydrogen. It introduces the target needed to deliver the 2030 greenhouse gas emissions reductions. With a new target of 40% of renewables in gross final consumption of energy by 2030, the European Union is delivering the tools to support the fundamental transformation of its energy system. The proposal also facilitates the integration of electric vehicles (EVs) and batteries in the energy system, and supports the further deployment and integration of district heating systems.

The **offshore renewable energy strategy** adopted in 2020 sets the ambition to deploy at least 60 GW of offshore wind energy and 1 GW of ocean energy by 2030 with a view to reaching, by 2050, 300 GW of offshore wind and 40 GW of ocean energy capacity<sup>32</sup> without negative impacts on the environment and to allowing the different sea uses through Maritime Spatial Planning<sup>33</sup>. Anticipating the resulting increasing amount of electricity that will be generated in all European sea basins, the strategy sets out a new approach to grid infrastructure. The implementation of the **offshore renewable energy strategy** is progressing with the identification of bottlenecks. The work will now focus on scaling up, ensuring that renewable energy developers have the right market incentives to deploy wind farms, and on supporting breakthrough innovation in the sector with calls for research in innovative areas through Horizon Europe.

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<sup>29</sup> COM(2021) 573 final. This exercise has allowed to identify the first elements of a support framework, consisting of a first package of short-term dedicated actions worth around EUR 85 million for 2021/2022. Many other EU programmes have integrated the New European Bauhaus as an element of context or priority without a predefined dedicated budget.

<sup>30</sup> [https://europa.eu/new-european-bauhaus/index\\_en](https://europa.eu/new-european-bauhaus/index_en)

<sup>31</sup> Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (OJ L 328 21.12.2018, p.82).

<sup>32</sup> Based on data from 2020, the EU counts with 14.6 GW of installed offshore wind capacity (JRC based on GWEC, 2021). The current national targets as expressed in the NECPs suggest that the offshore wind energy target for 2030 can be exceeded and offshore wind projected capacity is expected to reach 84 GW by 2030. In Malta's National Energy and Climate Plan (NECP), neither offshore nor onshore wind energy are included as a viable renewable technology option contributing to Malta's renewable energy objectives for the EU's 2030 target despite untapped potential.

<sup>33</sup> Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning (MSP) lays down a series of minimum requirements for the planning process and the plans, including stakeholder and transboundary consultation requirements. Member States had to establish their plans by 31 March 2021 and send copies to the Commission by 31 June 2021. The Commission is assessing the compatibility of the plans with the MSP Directive's obligations, including how they combine environmental protection and other objectives, such as those identified in the NECPs. The assessment also covers the role and effect of the MSP Directive in a broader maritime policy context, especially the key objectives of the European Green Deal related to biodiversity and offshore renewable energy. By March 2022, the Commission will report to the European Parliament and the Council on the implementation of MSP Directive.

In line with the **hydrogen strategy's**<sup>34</sup> **objective** to deliver 40 GW of renewable hydrogen electrolyzers in 2030 laid down in the **hydrogen strategy**<sup>35</sup>, the Commission proposed to include, in the Renewables Directive, binding targets for the use of renewable hydrogen in transport and industry. According to industry projections, the majority of these projects is expected to be implemented by renewable electricity resulting in an estimated volume of 6.7 Mt of renewable hydrogen and of 2.3 Mt of low-carbon hydrogen by 2030 within the EU. The Recovery and Resilience Plans will contribute to scaling up investments in renewable and low-carbon hydrogen by approximately EUR 9.3 billion based on the 22 plans approved to date. Supporting and boosting the production and greater use of hydrogen in transport, is a priority reflected in the new proposal for ReFuelEU Aviation and maritime.

The proposed revision of the regulation on guidelines for the Trans-European Networks for Energy (TEN-E)<sup>36</sup> aims at **further improving the infrastructure planning and streamlining the permitting processes** for interconnection projects, in particular in the offshore sector. The proposed revision of the Renewables Directive enhances cross-border cooperation and provides instruments to speed up permit procedures. Additional work will need to be carried out in the next months to support Member States' planned projects. The Recovery and Resilience Plans submitted by Member States include **reforms to facilitate investments in renewables and related grid infrastructure**<sup>37</sup>.

In addition, in its **Industrial Strategy update in 2021**<sup>38</sup> the Commission reiterates the need to better understand the challenges and opportunities for the European industry in its move towards a climate-neutral economy, and how EU policies can support this process.

The **2021-27 EU budget** will provide significant support to implement the European Green Deal and the energy transition across the Union. In particular, the **European Regional Development Fund (ERDF) and the Cohesion Fund** will allocate at least 30% and 37% respectively of the available funding for the achievement of the Union's climate objectives. The **Just Transition Mechanism**<sup>39</sup> (JTM, section 4.3) will allocate 100% of its support to the achievement of the Union's climate objectives and will alleviate the socio-economic situation in the regions most affected by the transition to climate neutrality. InvestEU focuses primarily on supporting the green transition with its EUR 9.9 billion Sustainable Infrastructure Window. The Commission has also supported Member States in the development and implementation of reforms in view of the achievement of EU energy and climate goals in 2021 through more than 65 technical support projects<sup>40</sup>.

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<sup>34</sup> COM(2020)301 final

<sup>35</sup> COM(2020) 301 final

<sup>36</sup> COM(2020) 824 final

<sup>37</sup> Greece, for example is establishing new special spatial planning provisions for renewables, industry, tourism and agriculture.

<sup>38</sup> COM(2021) 350 final

<sup>39</sup> The Just Transition Mechanism comprises the Just Transition Fund, the Invest EU Just Transition scheme and a Public Sector Loan Facility. In total, the Just Transition Mechanism is expected to mobilise at least EUR 150 billion of public and private investment (2021-2027).

<sup>40</sup> Regulation (EU) 2021/240 of the European Parliament and of the Council of 10 February 2021 establishing a Technical Support Instrument OJ L 57, 18.2.2021, p. 1–16

## 2.2. Recovery and resilience support accelerating the green transition

As the centrepiece of NextGenerationEU<sup>41</sup>, the RRF<sup>42</sup> supports the twin green and digital transitions. In this context, the timely implementation of the national recovery and resilience plans (RRPs) **can help Member States achieve the more ambitious targets for 2030** in line with the European Green Deal Package<sup>43</sup>.

The RRF requires Member States to dedicate at least **37% of their total allocation** to measures contributing **to climate transition**, and at least 20% to the digital transition, while ensuring consistency of the national recovery and resilience plans with NECPs<sup>44</sup>. All spending must comply with the principle of ‘do no significant harm’ (DNSH) to avoid any negative impact on climate and environment objectives.

The analysis of the 22 RRFs approved by the Commission by 5 October 2021<sup>45</sup> shows that the Member States in question are planning to go beyond the requirement to dedicate at least 37% of their RRF allocation to the climate transition and have significantly built on the ‘flagship initiatives’ put forward by the Commission<sup>46</sup> in relation to the green transition, in particular the ‘Power up’, ‘Renovate’ and ‘Recharge and refuel’ flagship initiatives.

The planned combined **climate-related investment** is around **EUR 177 billion**<sup>47</sup>, representing 40% out of a total of EUR 445 billion of RRF funds allocated to these Member States. **Almost EUR 76 billion** is allocated to investments and reforms in energy efficiency and clean energy (Figure 1)<sup>48</sup>. Nearly all Member States are using the RRF funds for investments in building renovation and clean transport, and many are using it to invest in renewable energy.

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<sup>41</sup> The recovery instrument NextGenerationEU (NGEU) together with the multi-annual budget for 2021-2027 is the largest stimulus package ever financed in Europe with a total support of EUR 2.018 trillion in current prices (totalling over EUR 1.8 trillion in 2018 prices) to help rebuild a post-COVID-19 Europe. In 2018 prices and over seven years, the EU budget amounts to EUR 1 074 billion and the NextGenerationEU to EUR 750 billion.

<sup>42</sup> Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility, OJ L 57, 18.2.2021.

<sup>43</sup> The Commission has already disbursed EUR 52.4 billion in pre-financing from the RRF to Austria, Belgium, Croatia, Cyprus, Czechia, Denmark, France, Greece, Italy, Latvia, Lithuania, Luxembourg, Portugal, Slovenia, Slovakia and Spain, equivalent to 13 % of the grant and (where applicable) loan component of those Member State's financial allocation, except for Germany where it corresponds to 9%.

<sup>44</sup> In accordance with Article 3 of the Governance Regulation, every ten years each Member State shall notify to the Commission an integrated national energy and climate plan.

<sup>45</sup> AT, BE, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, IE, IT, LT, LU, LV, MT, PT, RO, SI, SK.

<sup>46</sup> Annual Sustainable Growth Strategy 2021, COM(2020) 575 final, 17 September 2020, section IV.

<sup>47</sup> The expenditures reported for the RRF are estimates processed 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 22 national recovery and resilience plans assessed and approved by the Commission by 5 October 2021 and the amount will evolve as more plans are assessed. See: [https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/recovery-and-resilience-plans-assessments\\_en](https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/recovery-and-resilience-plans-assessments_en).

<sup>48</sup> Energy efficiency measures cover energy efficiency projects in SMEs or large enterprises, energy renovations in private buildings and public infrastructure and construction of buildings. Clean energy measures cover in particular production of renewables, energy networks and infrastructure.

The RRP approved to date also include **relevant reforms to support the green transition**, which will contribute to creating an enabling environment for the climate and energy transition. For instance, Member States have put forward in their RRP reforms to foster increased energy efficiency through the phasing out of outdated heating systems or the development of one-stop shops for the energy renovation of buildings; reforms of energy markets to facilitate the deployment of renewable energy; and reforms to encourage sustainable mobility through the promotion of intermodality or tax incentives for clean vehicles.

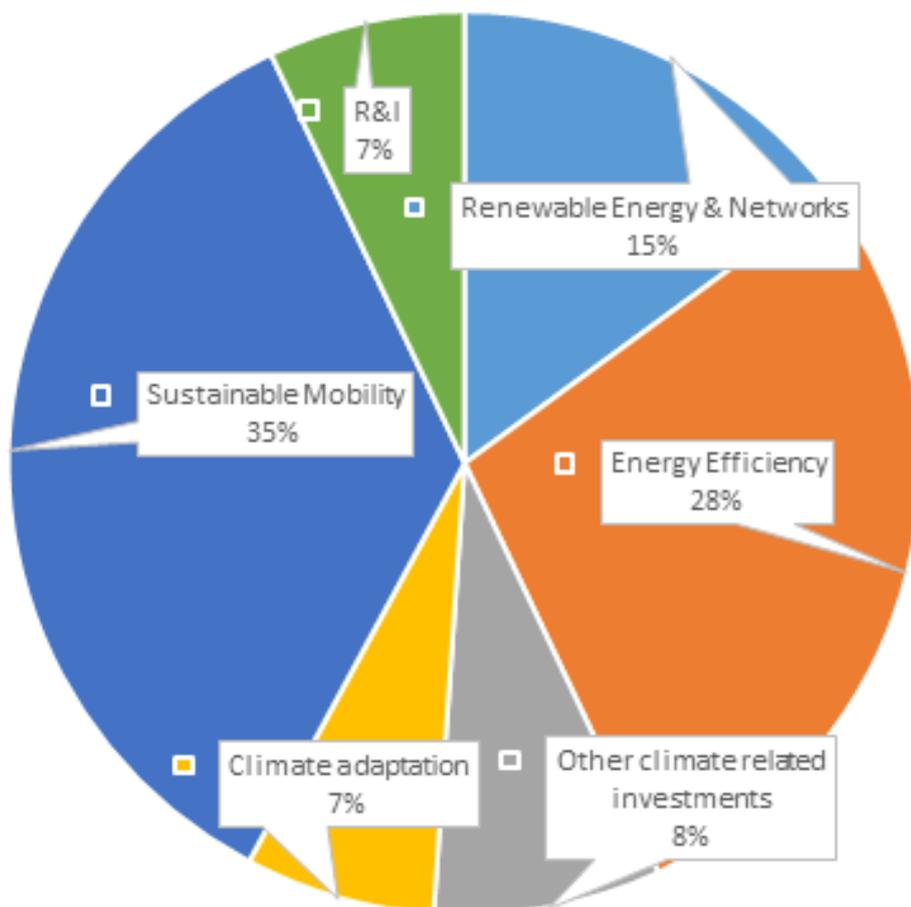


Figure 1: Distribution of climate-related investments in MS' RRP.  
 Source: Preliminary assessment of 22 RRP approved by the Commission (by 5 October 2021).

### 3. ENERGY UNION – ESSENTIAL FOR DECARBONISATION

#### 3.1. Accelerating decarbonisation and renewables

In 2020, **GHG emissions<sup>49</sup> reached their lowest level in 30 years**, down by 31 % from 1990 and 10 % from 2019 levels. When emissions and removals from land-use, land-use change and forestry (LULUCF) are accounted for, this results in a net reduction of GHG emissions of 34 %. Main drivers were reduced energy consumption due to the pandemic but also continued decarbonisation trends such as the switch from fossil fuels to renewable energy.

<sup>49</sup> The separate Climate Action Progress Report published together with the State of the Energy Union pursuant to the provisions in Article 29 sets out climate-related aspects in more detail.

Even before the COVID-19 crisis, the **EU had surpassed its UNFCCC target** of reducing GHG emissions by 20% by 2020. Projections submitted by Member States in 2021<sup>50</sup> point to a 34 % reduction in GHG net emissions by 2030 with existing measures and to 41 % with additional measures for the EU, compared to the reduction of at least 55 % GHG reduction laid down in the European Climate Law.

The **Carbon Market Report 2021** shows that the EU Emissions Trading System (EU ETS) has contributed significantly for the EU to meet its 2020 emissions reductions target. Since the introduction of the EU ETS in 2005, emissions in the power and heat generation as well as energy-intensive industrial sectors have dropped by around 43%. The total auction revenues generated by the EU ETS between 2013 and 2020 exceeded EUR 68 billion, with a large part (75%) being used for climate action. To maintain the environmental integrity of and certainty in the EU ETS, the Commission presented a proposal for its revision in line with the increased 2030 emissions reductions target of at least 55% below 1990.

Stable and reliable **long-term strategies** are essential to help coordinated and cost-effective movement towards the long-term goal set by the Paris Agreement. By October 2021, 20 Member States<sup>51</sup> have submitted their long-term strategies to the Commission<sup>52</sup>. 13<sup>53</sup> out of these clearly stated that they aim to achieve climate or carbon neutrality<sup>54</sup> by 2050 or before<sup>55</sup>. The remaining Member States aim to be largely climate neutral<sup>56</sup> or project emission reductions ranging from 80% to 95% compared to 1990 by 2050. However, as national strategies received do not yet allow the collective achievement of the objectives and targets of the Energy Union, Member States are encouraged to consider updating them, where possible, increasing their ambition<sup>57</sup>.

Moreover, quick action to address methane emissions stemming mainly from agriculture, energy and the waste sector is well highlighted in the Commission Strategy on methane<sup>58</sup> and confirmed by the IPCC in its latest report on climate change<sup>59</sup>. To

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<sup>50</sup> Pursuant to Regulation (EU) 2018/1999, Article 18, Member States report every two years their national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks.

<sup>51</sup> Belgium, Czechia, Denmark, Germany, Estonia, Greece, Spain, France, Croatia, Italy, Latvia, Lithuania, Hungary, Netherlands, Austria, Portugal, Slovenia, Slovakia, Finland, Sweden. Lithuania and Hungary submitted an update of their initial strategies in July and September 2021, respectively. In July 2021, the government of Luxembourg adopted a draft national long-term strategy. A public consultation will be carried-out before its final adoption.

<sup>52</sup> In accordance with Article 15 of the Governance Regulation.

<sup>53</sup> Denmark, Spain, France, Italy, Latvia, Lithuania, Hungary, Austria, Portugal, Slovenia, Slovakia, Finland, Sweden.

<sup>54</sup> While neutrality means by definition that residual emissions are compensated by removals, not all Member States provided the respective share of emission reductions and removals and the level of ambition for actual reductions varies across Member States.

<sup>55</sup> As in the case of Finland, by 2035, and Sweden, by 2045.

<sup>56</sup> The German long-term strategy, however, as submitted to the Commission in January 2020, reflects the goal of the Climate Action Plan 2050 adopted in November 2016. According to the Climate Change Act, as amended in July 2021, Germany now aims at achieving climate neutrality by 2045.

<sup>57</sup> See the technical information accompanying the Climate Action Progress Report for more detailed information

<sup>58</sup> COM(2020) 663 final

<sup>59</sup> The IPCC report of August 2021 singles out methane as responsible for almost one third of the overall global warming. According to the report, leaks of methane from fossil fuel drilling sites, coalmines and pipelines represent 36 % of total emissions. The report points out that methane emissions could be

tackle methane emissions in the energy sector<sup>60</sup> the Commission will put forward, still in 2021, a proposal on reducing methane emissions<sup>61</sup>.

Increasing ambition and delivering on decarbonisation is also about achieving the existing 2020 target for renewables<sup>62</sup>. Member States are to submit by 30 April 2022<sup>63</sup> data on whether the 2020 renewable energy targets were achieved. The latest available data (2019, see Figure 2) and existing external analyses<sup>64</sup> indicate that the **EU as a whole, and the majority of Member States individually, were on track** to achieve the targets, thanks partly to the lowering prices for key technologies such as wind<sup>65</sup> and solar<sup>66</sup> over the years. However, some Member States, notably France and Poland, appear at risk of failing to achieve their national binding target without making use, for instance, of statistical transfers with Member States with a surplus of renewable energy compared to their national target. The Commission has helped and will continue to help Member States concluding such agreements.

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almost halved by 2030 at reasonable cost, underlining that 60 % cuts could be made from fossil fuel operations.

<sup>60</sup> Methane has a much shorter atmospheric lifetime than CO<sub>2</sub> (around 12 years compared with centuries for CO<sub>2</sub>), but it is a much more powerful greenhouse gas. The EU uses a 100 year time period to measure and assess GHG, but on a 20-year period, methane is 84 times more potent at global warming than carbon dioxide, as highlighted in Table 8.7 from the Working Group I's contribution to the IPCC's Fifth Assessment Report (2013).

[https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5\\_Chapter08\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf)

<sup>61</sup> The Commission legislative proposal to be adopted by the end of the year aims to measure, report and verify methane emission, put limits on venting and flaring, and impose requirements to detect leaks, and repair them.

<sup>62</sup> As regards the overall EU target for 2020 (20.6 %), the EU had already reached a 19.7% share of renewable energy sources in energy consumed in 2019; this includes 34.1% for electricity generation (out of this: hydro 35%, wind 35%, solar 13%, solid biofuels 8%, and all other renewables 9%), 22.1 % for heating and cooling (biomass accounts for around 75% of heating and cooling) and 8.9 % in the transport sector. 14 Member States were above their 2020 national binding targets and 7 still fell relatively far short. See also <https://ec.europa.eu/eurostat/web/energy/data/shares>. Under Directive 2009/28/EC, Member States had to achieve binding targets to raise the share of renewable energy in their energy consumption by 2020. The national targets taken together would enable the European Union as a whole to reach 20.6 % renewable energy target for 2020 (the figure deviates from 20% for EU and UK following the withdrawal of the UK from the European Union).

<sup>63</sup> By 30 April 2022 pursuant to the Governance Regulation (EU) 2018/1999.

<sup>64</sup> According to a technical assistance report (Technical assistance in realisation of the 5th report on progress of renewable energy in the EU final update report. Task 1 & 2. <https://op.europa.eu/en/publication-detail/-/publication/bcfbe724-27e2-11ec-bd8e-01aa75ed71a1/language-en>), a renewables share of 22.4-22.6 % can be expected in 2020 with current renewable policy initiatives. France and Poland are particularly at risk of falling short of their national target. Early estimates by the European Environment Agency (EEA), albeit based on a different methodology, also confirm that the EU as a whole is likely to achieve its target. The Commission has helped Member States to conclude statistical transfer agreements between those with a surplus of renewable energy sources and those at risk of not meeting their target.

<sup>65</sup> Offshore wind: decline from range EUR 100 - 180/MWh in 2010 to today's values ranging from EUR 67 per MWh to EUR 140 per MWh; onshore wind: decline from EUR 55-105/MWh in 2010 to EUR 34 per MWh to EUR 74 per MWh in 2019. Source: Beiter P., Cooperman A., Lantz E., Stehly T., Shields M., Wiser R., Telsnig T., Kitzing L., Berkhout V., Kikuchi Y. (2021) Wind power costs driven by innovation and experience with further reductions on the horizon, WIREs Energy Environ. 2021;e398. <https://doi.org/10.1002/wene.398>.

<sup>66</sup> The cost of PV modules has decreased dramatically in recent years. Analysing the global evolution of module price vs. cumulative production, a price decrease of 25% is inferred for each doubling of cumulative production. In the period from 2011 to 2020, an 85% price decrease has been recorded.

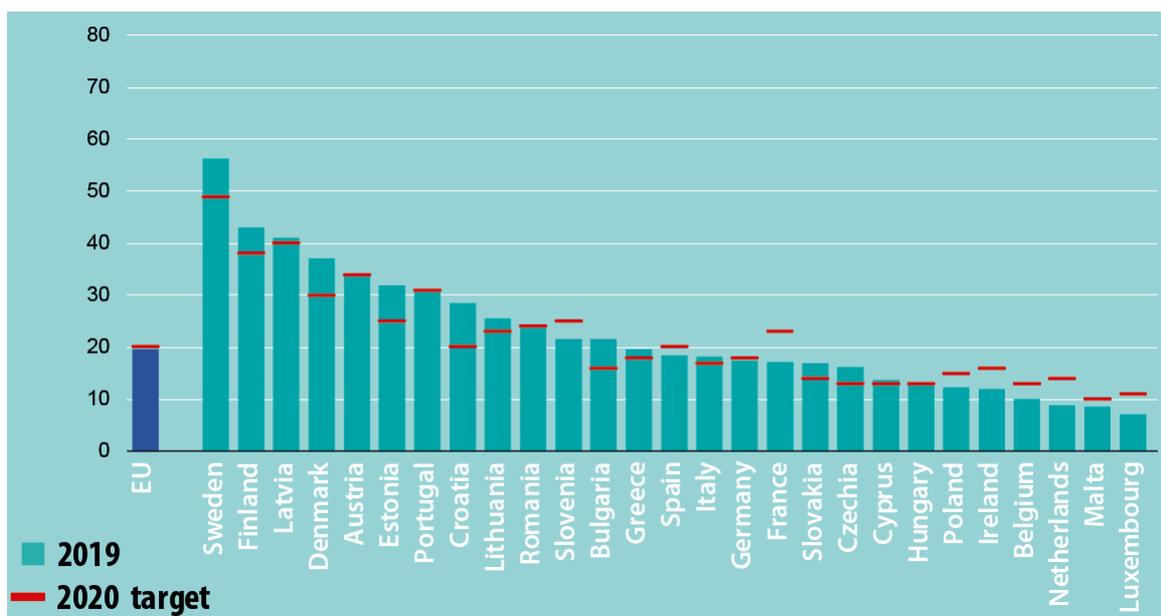


Figure 2: Overall share of energy from renewable sources (% of gross final energy consumption, 2019).  
Source: Eurostat

Work is also progressing on the EU **Renewable Energy Financing Mechanism**<sup>67</sup> as a further option to support renewable energy projects and thereby encourage a greater uptake of renewable energy sources across the EU.

Member States' **NECP pledges correspond to a collective EU capacity that exceeds the current 2030 renewables target** (33.1-33.7 % above the current target of at least 32 % renewable energy in gross final energy consumption by 2030). The **updates of NECPs** under the Governance Regulation, due by 30 June 2023 (draft updates) and by 30 June 2024 (final updates), **should reflect the higher target and ambition for 2030**, in line with the proposed revision of the Renewables Directive. The Commission will issue guidance on those updates in line with the legislative proposals made.

Overall **investment in renewables** grew substantially in the EU to **EUR 48.8 billion in 2020**, from EUR 32.9 billion in 2019<sup>68</sup>. However, the picture varied across the different technologies: annual additional capacity declined from 8.4 to 7.1 GW for onshore wind, but increased from 1.5 GW to 2.5 GW<sup>69</sup> for offshore wind and from 16.3 GW to 18.6 GW<sup>70</sup> for solar photovoltaic (PV) energy. To further support innovation and deployment in renewables, the Commission will work in 2022 on an **EU Solar Energy Strategy**. The work will focus on the existing barriers that are hampering the deployment of solar energy capacity required by 2030 and by 2050 and the conditions that will enable such deployment.

The Commission **supports the uptake and deployment of renewable hydrogen** and facilitates the **European Clean Hydrogen Alliance** and supports the deployment of renewable and low carbon hydrogen through the Innovation Fund, the establishment of

<sup>67</sup> [https://ec.europa.eu/energy/topics/renewable-energy/eu-renewable-energy-financing-mechanism\\_en](https://ec.europa.eu/energy/topics/renewable-energy/eu-renewable-energy-financing-mechanism_en)

<sup>68</sup> BNEF (2021) Energy Transition Investment database

<sup>69</sup> IRENA, Renewable Capacity Statistics 2021

<sup>70</sup> <https://www.irena.org/publications/2021/March/Renewable-Capacity-Statistics-2021>

the Clean Hydrogen Joint Undertaking, and the Member States leading the process on Important Projects of Common European Interest (IPCEIs).

The main renewable energy source remains bioenergy, representing around 60% of all renewable sources. The current Renewable Energy Directive includes sustainability criteria for the use of bioenergy. The Commission has worked intensively with Member States to finalise the implementing acts setting out operational guidance for Member States on the forest sustainability criteria. In addition, in the context of the forecast increase of renewables, the Commission adopted a series of measures aiming at closing existing loopholes, strengthening sustainable harvesting and ensuring the highest economic and environmental added-value of woody biomass<sup>71</sup>.

### 3.2. Scaling up energy efficiency

As with the share of renewable energy sources, the Commission will assess next year whether the 2020 energy efficiency targets were achieved. In 2019, **primary energy consumption decreased** for the second consecutive year. It was 1.8 % lower than in 2018 **although still 1.8 % above the linear trajectory to reach the 2020 energy efficiency target**<sup>72</sup>. **Final energy consumption declined** in 2019 for the first time in six years, but given the accumulated gap, the yearly decline of 0.6 % in 2019 was **not sufficient to reach the target**: actual consumption was 2.3 % above the linear trajectory towards the 2020 target<sup>73</sup>.

The **EU reduced its primary energy intensity** by over 3 % compared to the previous year. With winter of 2019 being warmer than in 2018, weather was a factor driving the reduction in energy consumption, but so was the shift to renewables. The year-on-year improvement in final energy intensity was 2 %. In 2020, the impacts of the COVID-19 crisis led to a substantial drop in energy consumption and early EEA estimates indicate that it had dropped low enough to meet the targets for both primary and final energy consumption.

**As regards progress towards the current 2030 targets, EU<sup>74</sup> primary and final energy consumption in 2019 were 19.7% and 16.3 % respectively above 2030 target levels.** The pace of decline in 2019 towards the 2030 targets was satisfactory for primary energy consumption only. Far more efforts are needed to reduce the existing final energy consumption target and the higher ambition set out in the proposed revision of the Energy Efficiency Directive. This will require the updating and proper implementation of the **NECPs** with new measures being planned to bridge the collective ambition gap of the current NECPs. The Commission may issue guidance on those updates.

Buildings represent one area where such measures are more needed and offer greater potential. They are responsible for about 40 % of the EU's total energy consumption<sup>75</sup> and for 36 % of energy-related GHG emissions. Currently, about **75 % of the building**

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<sup>71</sup> Further delegated acts will assist the uptake of sustainable renewable fuels including methodologies applying for the production of renewable fuels of non-biological origin from electricity taken from the grid and the measurement of GHG emissions of such fuels.

<sup>72</sup> In the EU plus the United Kingdom (UK).

<sup>73</sup> In the EU plus the UK.

<sup>74</sup> The targets for 2030 apply to the EU without the UK.

<sup>75</sup> With residential buildings representing almost 65 % of this figure

**stock is considered energy inefficient**<sup>76</sup>, so effective action is needed, including the revision of the relevant regulatory framework, notably the revision of the Energy Efficiency Directive and the revision of the EU Emission Trading System proposed in July<sup>77</sup> and the forthcoming proposal to revise the Energy Performance of Buildings Directive.

The priority of energy efficient renovation of public and private buildings is also positively reflected in the investments planned under the 22 RRP approved by the Commission. The Commission analysed that this amounts to a 23% share of the total expenditure contributing to climate objectives in these plans. Besides, all Member States must establish **Long-Term Renovation Strategies (LTRS)** to support the renovation of their national building stock into a highly energy efficient and decarbonised building stock by 2050. The Commission will assess all LTRS by the end of 2021<sup>78</sup>.

The **EU energy labels** have been a driver for helping consumers choose products which are more energy efficient and encouraging manufacturers to drive innovation by using more energy efficient technologies. Since March 2021, the energy label rating system uses A to G rankings only, instead of the previous A+++ to D ratings. Four product groups<sup>79</sup> were required to introduce the rescaled labels from 1 March 2021, with new labels for light bulbs and lamps applicable from 1 September 2021.

### 3.3. Enhancing energy security and safety

As witnessed in the last few months, a continued high reliance on imports of fossil fuels exposes the Union's economy to global price fluctuations. Improving resilience requires enhancing energy security and safety while phasing out fossil fuels and integrating more decentralised renewable energy. The recent Communication "Tackling rising energy prices: a toolbox for action and support" outlines key mid- and long-term steps to ensure this.

In 2021, two large-scale technical incidents were resolved within one hour<sup>80</sup>, proving the resilience of the EU's energy system despite COVID-19. They also demonstrated that effective **preparedness for possible shocks is an ongoing need** at Member State and EU level. This is particularly important also in the context of increased **net energy import dependency**, which **reached 60.6 % in 2019**, the highest level for the last 30 years. This level is explained by the combination of a slight increase in energy demand and reduced domestic production of fossil fuels and domestic renewable capacity that remains still insufficient.

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<sup>76</sup> [https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave\\_en](https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en)

<sup>77</sup> COM(2021) 551 final

<sup>78</sup> An in-depth preliminary assessment of the first 13 strategies was published on 31 March 2021

<sup>79</sup> Refrigerators, dishwashers, washing machines and televisions

<sup>80</sup> One incident occurred on 8 January 2021 in the high voltage electricity grids of the Continental Europe Synchronous Area. It affected the continental grid, which ties together the electricity transmission grids of the countries of Continental Europe, and resulted in its separation in two areas (with an area in the South-East of Europe being temporarily operating in separation from the rest of Continental Europe). The second incident was the outage of a French-Spanish interconnection on 24 July 2021 which affected the Iberian Peninsula and a small part of the French transmission system. Both incidents could be resolved within less than an hour. Ex-post investigations are on-going.

The sectorial **European coordination groups** (for electricity, gas and oil) played a particularly important role in 2020 and 2021, in monitoring security of supply, e.g. by addressing the impact of delays in the maintenance of power plants due to COVID-19 related measures and **discussing possible reactions to extreme weather events**.

In the **electricity** sector, the implementation of the risk preparedness regulation<sup>81</sup> is in the run-up to the first set of national risk-preparedness plans. These plans will set out Member States' measures to prevent, prepare for, and mitigate potential electricity crises in mutual cooperation, taking account of increasing electrification.

In the context of the latest security of supply rules for **gas**<sup>82</sup>, all but two Member States have put in place national plans to prevent or mitigate the impact of gas supply disruptions. Member States made progress to conclude bilateral solidarity arrangements aimed at securing cross-border supply to vulnerable customers in the event of severe crisis<sup>83</sup>. The Commission plans a revision of the gas security of supply regulation in December 2021, which could facilitate access to storage capacity across borders, including for renewable and low carbon gases. In addition, gas storage levels and the proper functioning of the gas market will continue to be monitored ahead of the winter season.

Continued **improvements in electricity and gas interconnectivity** have also enhanced regional cooperation and reinforced the security of supply at EU, Member States and regional level.

The EU is prepared for potential temporary disruptions in **oil supply**<sup>84</sup>. In order to ensure the **safe operations of the existing EU offshore oil and gas installations**, the Commission and the Member States have cooperated closely to update external emergency plans.

Recent incidents, such as the May 2021 cyberattack on the US Colonial pipeline, have shown how cybersecurity threats and vulnerabilities can affect the energy system. The Commission has started work on a network code<sup>85</sup> to ensure the **cybersecurity of cross-border electricity flows**<sup>86</sup>. It plans to adopt the code by end of 2022.

In December 2020, as part of the **EU Security Union strategy**<sup>87</sup>, the Commission proposed two new directives on the resilience of critical entities and on the security of network and information systems, to improve the resilience of the energy sector. It also

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<sup>81</sup> Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector

<sup>82</sup> 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

<sup>83</sup> [https://ec.europa.eu/energy/topics/energy-security/secure-gas-supplies\\_en](https://ec.europa.eu/energy/topics/energy-security/secure-gas-supplies_en)

<sup>84</sup> 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

<sup>85</sup> Network codes are a set of rules drafted by the European Association for the Cooperation of Transmission System Operators (TSOs) for electricity (ENTSO-E), with guidance from the Agency for the Cooperation of Energy Regulators (ACER), to facilitate the harmonisation, integration and efficiency of the European electricity market.

<sup>86</sup> In line with Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

<sup>87</sup> COM(2020)605

re-launched the **Thematic Network on Critical Energy Infrastructure Protection**, a forum for regular discussions among operators and owners of critical energy infrastructures.

In an **update of the Industrial Strategy**<sup>88</sup> in May 2021, the Commission emphasised the need to accelerate the green and digital transitions while strengthening the EU's resilience and strategic capacities. Industrial alliances are a key tool to facilitate stronger cooperation and joint action between all interested partners in sectors of strategic importance. In October 2021, the Commission published a study<sup>89</sup> identifying **potential bottlenecks in the raw materials supply chains for energy technologies** that are critical for energy security and the clean energy transition.

As regards the nuclear sector, the Commission is working closely with Member States' nuclear safety regulators<sup>90</sup> to **monitor potential impacts of the pandemic on the safety of nuclear installations**. The sector has shown good robustness in the face of such conditions through its established practice of risk assessment and mitigation. No adverse impacts on safety or reliability have been reported. Nevertheless, the Commission is funding a study to review how the sector managed the pandemic, and ensures its resilience in such conditions.

More generally, in terms of addressing **potential risks relating to extreme natural hazards, such as those from flooding or severe weather**, the robustness of EU nuclear power plants against external events was reviewed and strengthened as part of the post-Fukushima stress tests conducted in cooperation with the Commission. The Nuclear Safety Directive<sup>91</sup> requires licence holders to conduct periodic safety reviews with a view to identifying further safety improvements, taking account of operating experience.

### 3.4. Strengthening the internal energy market

#### 3.4.1. Progress in the electricity and gas markets

While **electricity prices** were expected to increase given the record lows reached by wholesale prices during the pandemic and as economic activity picked up, a combination of factors pushed prices to **all-time high levels over the last months**<sup>92</sup>. This had impacts on businesses and consumers, notably the vulnerable ones, at a time when many have been fragilised by loss of income from the pandemic. Beyond higher **global gas demand** due to the global economic recovery, key drivers were seasonal conditions and, to a much lesser extent, carbon prices. The effect of the gas price increase on the electricity price is nine times bigger than the effect of the carbon price increase<sup>93</sup>.

Most Member States are affected by high gas and electricity prices, but to different degrees and at different times. The extent to which wholesale prices are passed through

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<sup>88</sup> COM(2021) 350 final

<sup>89</sup> 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

<sup>90</sup> European Nuclear Safety Regulators Group, [www.ensreg.eu](http://www.ensreg.eu)

<sup>91</sup> Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, as amended by Directive 2014/87/Euratom.

<sup>92</sup> In September, average wholesale electricity prices reached more than EUR 125 per MWh, gas prices reached almost EUR 65 per MWh and EU ETS allowances reached more than EUR 60 per tCO<sub>2</sub>.

<sup>93</sup> Source: COM(2021) 660

to retail prices also varies in each Member State, depending on the energy mix, regulation and the structure of retail prices. About two thirds of the retail price are, on average, typically determined by transmission and distribution costs, taxes and levies; one third by the wholesale price element<sup>94</sup>. The speed at which the increases in wholesale gas prices translate into retail prices also depends on the contract terms (i.e. contract length, fixed or variable prices, etc.).

In the recent communication “Tackling rising energy prices: a toolbox for action and support”<sup>95</sup>, the Commission outlines **help and support to address undesirable negative impacts of higher energy prices** on households and businesses, on the recovery, its fairness and inclusiveness, and on confidence in the energy transition.

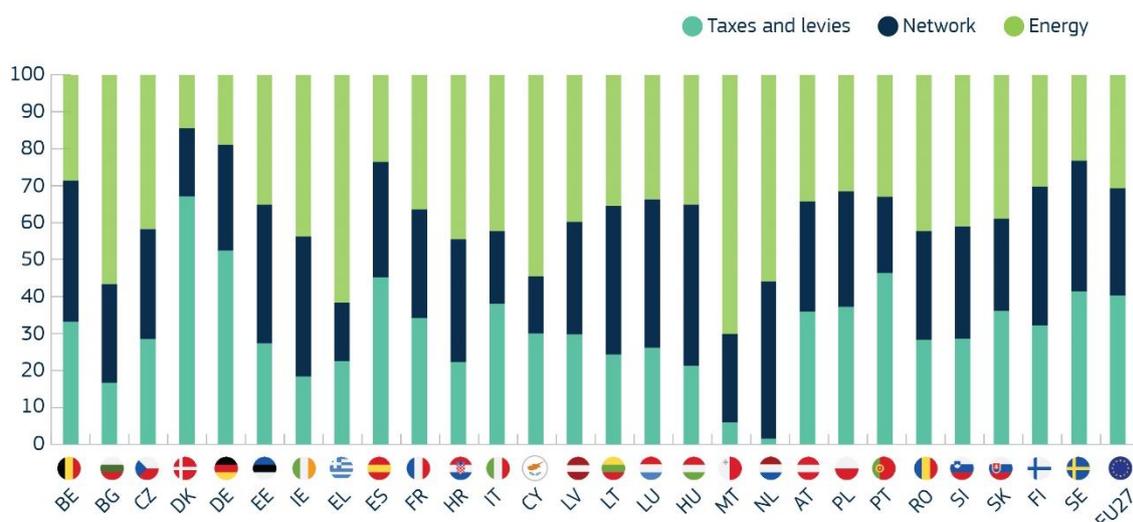


Figure 3: Household price components in 2020 (in %). Source: Eurostat.

At this stage, there is no clear evidence that an alternative market framework than the marginal pricing method and the pay-as-clear market<sup>96</sup> would provide cheaper prices and better incentives. In the light of the recent volatility, the **Commission tasked the Agency for the Co-operation of Energy Regulators (ACER) to assess** benefits and drawbacks of the **current wholesale electricity market design**, including its capacity to address situations of extreme price volatility in gas markets.

Steps taken over the last year have also further improved the functioning of the internal energy market. The transposition of the **Electricity Directive**<sup>97</sup> into national law by 31 December 2020, has created new opportunities for companies and consumers to participate in electricity markets, for example by adjusting their demand to help relieve congestion in the grid or to balance demand and supply. Such **demand side flexibility** is developing in the European electricity market, although to a varying degree. Demand side flexibility increases the flexibility of the electricity system and contributes to ensuring cost-effectiveness of electricity markets<sup>98</sup>.

<sup>94</sup> This ratio is slightly different for households (Figure 3) and industry according to consumption size.

<sup>95</sup> COM(2021) 660

<sup>96</sup> These mean that everybody receives the same price for electricity at wholesale level

<sup>97</sup> Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU

<sup>98</sup> [https://smarten.eu/wp-content/uploads/2019/11/EU\\_Market\\_Monitor\\_2019\\_short\\_final.pdf](https://smarten.eu/wp-content/uploads/2019/11/EU_Market_Monitor_2019_short_final.pdf)

At the same time, significant progress has been made in harmonising national rules on energy trading and system operation. The most tangible example is **EU market coupling**, which connects all Member States and creates a **common EU trading platform for electricity**. Market coupling forms part of an affordable model for the energy transition, ensuring that least-cost electricity can be dispatched around the EU for the benefit of consumers<sup>99</sup>. The borders between Poland, Czechia, Slovakia, Romania and Hungary were successfully included in the EU-wide coupling on 17 June 2021. It is planned that, in a next step, the **last two borders will be included** in the **Single Day-Ahead market coupling** (Romania – Bulgaria by the end of October 2021 and Croatian – Hungarian in March 2022). The overall welfare gains from extending the SDAC to all EU internal borders are estimated over EUR 115 million a year<sup>100</sup>.

Significant progress has been made on the **single intraday coupling**, with 22 Member States coupled from 2019. Coupling of Italy, Greece and Slovakia are planned. The **additional welfare benefits from a more efficient use of intraday electricity trade capacity across Europe are estimated at over EUR 50 million annually**. Completion of the single intraday coupling is a priority for further integration of renewables as it helps to reduce electricity price divergences across regions.

Accomplishing market coupling in all timeframes across internal borders, including close to real-time balancing, would generate additional **welfare benefits of more than EUR 1.5 billion per year**<sup>101</sup> and **reduce the need for backup fossil fuel** power plants, thus saving significant GHG emissions.

Volumes traded on natural gas hubs rose to an all-time high in 2019. This trend continued into 2020, with the COVID-19 crisis further driving the trading activity and demand for gas.<sup>102</sup> In spite of falling liquefied natural gas (LNG) imports,<sup>103</sup> storage withdrawals intensified in 2020. While **current gas storage levels are tight but adequate if there is a winter similar to the previous one**<sup>104</sup>, storage is not available in all EU Member States and a more integrated European approach could help cushion volatility in energy prices.

**Delayed or incomplete implementation of existing acquis**, including network codes, appears to be a barrier to wholesale market improvements. Price correlation is high<sup>105</sup> between hubs in North Western Europe and the Dutch Title Transfer Facility (TTF), which is becoming into a benchmark for internationally traded LNG, pooling around three quarters of all European gas trade. However, the level of market development, liquidity and competition still differ across the Union. There are price differences of

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<sup>99</sup> The Single Day-Ahead Coupling allocates one day before delivery of electricity scarce cross-border transmission capacity in the most efficient way by coupling wholesale electricity markets from different regions through a common price coupling algorithm to calculate electricity prices across Europe and to implicitly allocate auctions based on cross-border capacity.

<sup>100</sup> ACER Market Monitoring report, 2019

<sup>101</sup> ACER Market Monitoring report, 2019

<sup>102</sup> Gas traded volumes on the European hubs were up by 21% (plus 3 439 TWh) in Q4 2020 year-on-year, after the temporary decrease in the previous quarter.

<sup>103</sup> EU LNG imports fell by 27% year-on-year in Q4 2020, owing to increasing Asian wholesale gas market price premiums to Europe, which resulted in cargo redirections towards the Asian markets.

<sup>104</sup> Current EU gas storage levels are at 75% below the 90% seen on average over the past 10 years. As of the 3th of October 2021.

<sup>105</sup> Below 1 €/MWh for 90% of trading days in 2019 (ACER MMR 2020, Gas Wholesale Markets Volume, p. 43)

EUR 1 to 3 per megawatt hour (MWh) or above during the year between TTF and North Eastern markets (Poland, Baltics and Finland) or the South West (Spain, Italy).

### 3.4.2. Energy infrastructure for greater decarbonisation

**Infrastructure** is key for the energy market to function properly and efficiently and integrate more renewables. Most of Member States have already achieved the 2030 interconnectivity level of 15 % required under the Governance Regulation and replacing the previous target of 10 % by 2020<sup>106</sup>. **Projects of Common Interest (PCIs)**, key cross border infrastructure projects that link the energy systems of EU countries, have a significant role in meeting this target. Since the last State of the Energy Union report, several PCIs have been commissioned or completely constructed.<sup>107</sup>

Between 2014 and 2020, more than EUR 4.7 billion of EU funding under **the Connecting Europe Facility (CEF)** was allocated to works and support studies related to PCIs, triggering a total investment of EUR 9.5 billion. Two thirds of that budget was allocated to electricity and smart grid projects to support the integration of renewable energy sources in the power system<sup>108</sup>.

The **5<sup>th</sup> list of PCIs** is planned to be adopted in November 2021 under the existing regulation on TEN-E guidelines<sup>109</sup>.

In December 2020, the Commission proposed a revision of the **TEN-E** Regulation, currently being negotiated, to reflect the key role of energy infrastructure in the green transition. A new approach to infrastructure planning will support the role of electrification in the future energy mix, help to decarbonise the gas sector through renewable and low-carbon gases, including hydrogen, and develop a more integrated energy system. The proposal **excludes fossil fuel infrastructure** (including natural gas)

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<sup>106</sup> The agreed cross-border capacity ratio corresponds to the import capacity over installed generation capacity for Member States. It should be noted that the 15% for 2030 interconnection target in the Governance Regulation has been complemented by a number of urgency indicators. This is against the background of the significant increase of installed capacity in the EU (mostly due to new variable wind and solar capacities with much lower load factors compared to other generation sources) while new interconnection capacities have not increased in the same proportions. Consequently the analysis of the level of interconnectivity should also consider, besides the 15% interconnection target, indicators of the urgency of action based on price differential in the wholesale market, nominal transmission capacity of interconnectors in relation (1) to peak load and (2) to installed renewable generation capacity. The Regulation also stipulates that each new interconnector is subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs.

<sup>107</sup> For example, an electricity interconnection between Estonia and Latvia (PCI number 4.2.1). A new electricity connection between Estonia and Latvia was launched on August 25 2021. This is the third electricity connector between the two countries and a further step in synchronising the Baltic with the continental European network. The same is valid for PCIs in Estonia (PCI number 4.2.2), in Latvia (PCI number 4.2.3) and in Lithuania (PCI number 4.8.17). For gas, PCIs in Croatia (PCI number 6.5.1), Greece, Italy and Albania (PCI number 7.1.3), have been commissioned.

<sup>108</sup> For example, the Celtic Interconnector between Ireland and France, which received a CEF grant of EUR 530 million in 2019. It will be the first direct electricity connection between Ireland and mainland Europe and support the achievement of Ireland's new target of at least 70% renewable electricity by 2030.

<sup>109</sup> Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39).

and introduces **mandatory sustainability criteria** for all PCIs. The revised framework will need to enter into force in time for the selection process of the 6<sup>th</sup> Union list of PCIs.

The revised **Connecting Europe Facility** Regulation<sup>110</sup> provides for a new window for cross-border projects in the field of renewable energy<sup>111</sup>, including new offshore floating windfarm projects to explore further this vector of renewable sources. The first call for proposals for pre-feasibility studies has been published on 22 September 2021 for a total amount of EUR 1 million. The first call for technical studies and works for cross-border projects that were selected in the dedicated EU list will be published in third trimester of 2022 for a total amount of EUR 100 million.

### *3.4.3. Phasing out fossil fuel subsidies*

**Total energy subsidies** in the EU amounted to **EUR 176 billion in 2019**. As further detailed in the annex on energy subsidies, recent data show that despite EU's commitments to phase out **fossil fuel subsidies**, they are **not declining sufficiently**. **Fossil fuel subsidies have already increased in 11 Member States** since 2015.

**Fossil fuel subsidies**, which represent around 30% of total energy subsidies, **dropped slightly in 2020 to EUR 52 billion** (from EUR 56 billion in 2019), due to lower energy consumption in the wake of the COVID-19 pandemic<sup>112</sup>. Considering that GDP and energy consumption dropped in 2020 at similar pace, there is no clear trend for a decrease in the level of fossil fuel subsidies in spite of the EU's international commitment. Accordingly, as the economy picks up and fossil fuel consumption rebounds, the EU needs to **step up efforts to avoid returning to pre-pandemic subsidy levels**.

Phasing out of coal from electricity generation has been incentivised by plant closure subsidies in many Member States.

Renewable energy received a total of EUR 78 billion in subsidies, up by 8% since 2015<sup>113</sup>. Energy efficiency subsidies continued to grow, to EUR 16 billion in 2019 and EUR 17 billion in 2020, up by almost 50% since 2015.

At the same time, financial support to vulnerable households can be appropriate in certain instances. Particularly in a context of post-COVID economic recovery, **specific social payments** to those most at risk can be an appropriate means to help them afford their energy bills in the short term or to support energy efficiency improvements, while ensuring **effective** market functioning. Funding subsidies for renewable generation by

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<sup>110</sup> Regulation (EU) 2021/1153 of the European Parliament and of the Council of 7 July 2021 establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014 (OJ L 249, 14.7.2021, p. 38)

<sup>111</sup> In the energy sector (with an overall budget of EUR 5.84 billion), the programme aims to contribute to further integration of the European energy market, improving the interoperability of energy networks across borders and sectors, facilitating decarbonisation, and ensuring security of supply. Funding will also be available for cross-border projects in the field of renewable energy generation.

<sup>112</sup> Considering that GDP and energy consumption dropped in 2020 for almost the same amount (around 7%), subsidies were given out in 2020 at the same pace as in 2019 (only the volume of activity was lower). There is therefore no clear trend for a decrease in the level of subsidies in spite of the EU's international commitment.

<sup>113</sup> Mostly subsidising solar – EUR 29 billion, wind - EUR 21 billion and biomass - EUR 17 billion.

public revenues other than electricity bills can have, in certain Member States, the benefit of relieving vulnerable consumers from a significant part of their energy bill.

In parallel, the **EU Taxonomy**<sup>114</sup> will help guide private investors and public funds by identifying environmentally sustainable economic activities and channelling more funding into them, thus **reducing investment in fossil fuels capacity and associated subsidies**.

The Climate Law amend the Governance Regulation so as to ensure **more uniform reporting across Member States on the phasing out of energy subsidies, in particular for fossil fuels**, the reporting arrangements are to be set out by means of implementing act in 2022, currently in preparation.

### 3.5. Research & innovation and competitiveness

While most of the reductions in CO<sub>2</sub> emissions through 2030 will come from technologies already on the market today, the International Energy Agency (IEA) projects that almost half of the reductions needed by 2050 will come from technologies that are currently at demonstration or prototype phase<sup>115</sup>. The EU is well-placed in terms of global market shares in certain value chain segments of **clean energy technologies**<sup>116</sup>, but increased investments in R&I and further efforts in technology transfer would ensure the EU seizes the opportunity of the energy transition to reinforce its competitiveness in the clean energy sector.

The **second competitiveness progress report**<sup>117</sup> shows that the EU remains at the forefront of clean energy research. At global level, it has a greater share of ‘green’ inventions in climate change mitigation technologies than other major economies<sup>118</sup>.

Nevertheless, the **EU’s rate of public investment** in clean energy technologies needed for decarbonisation **is the lowest of the major economies**<sup>119</sup> (0.027 % of GDP in 2019).

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<sup>114</sup> The EU taxonomy is a classification system, is based on the Taxonomy Regulation - Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.

<sup>115</sup> IEA, Net Zero by 2050. A Roadmap for the Global Energy Sections. Flagship Report, May 2021.

<sup>116</sup> For example, the EU is a global leader in several parts of the photovoltaic value chain: research and development, polysilicon production, equipment and machinery for PV manufacturing (source: BNEF, Solar PV Trade and Manufacturing, A Deep Dive, 2021). In wind energy, EU holds a considerable market share, but European Original Equipment Manufacturers (OEMs) were surpassed by Chinese ones for the first time in 2020 (when analysing the Top10 OEMs in terms of market share. Source: GWEC, Global Offshore Wind Report 2020, 2020). Similarly, when considering ‘mainly-heating heat pumps’, EU Member States are leading exports, followed by Asia (source: UN-COMTRADE 841861 ‘heat pumps, excluding air conditioning machines of heading 8415’). However, over the last 5 years, the EU market growth of ‘mainly-heating heat pumps’ has been captured by the imports from Asia, growing at an average annual rate of 21% from 2015 to 2020. Increased investments in clean energy R&I and further efforts in technology transfer would ensure the EU seizes the opportunity of the energy transition to reinforce its competitiveness in the clean energy sector. For example on the PV sector, manufacturing, cell, and module design tend to become increasingly complex, requiring further investments to remain at the cutting edge

<sup>117</sup> COM(2021) 952

<sup>118</sup> For example, EU is first when it comes to filing high-value patents in the field of renewables and energy efficiency. EU ranks third for smart systems. (Source : JRC SETIS [https://setis.ec.europa.eu/publications/setis-research-and-innovation-data\\_en](https://setis.ec.europa.eu/publications/setis-research-and-innovation-data_en))

**Public clean energy R&I spending in Member States is still below 2010 levels**, but national and EU recovery funding that targets clean energy R&I can partially compensate this. Moreover, spending has been increasing since 2016, a sign of a partial recovery from the previous economic crisis. The long-term impact of COVID-19 on the innovation ecosystem remains to be seen. The EU private sector experienced a 7 % reduction in overall energy R&I spending. Global public spending on energy R&I showed there was continued, albeit slower growth in 2020. Spending in renewable energy R&I specifically was more resilient and continued to grow<sup>120</sup>.

The EU is the global leader in the **wind sector**, but competition remains fierce. In 2020, the European offshore wind market represented 71 % (24.8 GW) of the global market in terms of cumulative installed capacity. The Member States' global market share accounts for about 42 % (14.6 GW). The size of the home market is key in this respect. In **solar PV**, the EU's trade deficit grew to more than EUR 5.7 billion in 2019 and the EU has a comparably small market share in cell and module manufacturing. However, it maintains a cutting edge position in other parts of the value chain, including research and development notably on product performance, sustainability and circularity.

The EU is at a crossroads for several technologies expecting market expansion. Its **heat pump, renewable fuels, smart grids** and **renewable hydrogen** industries are well placed to benefit from the growing future demand stemming from the policy driven expansion of relevant markets. At the same time, the EU **batteries** industry is catching up through a combination of investment in battery production, increased demand in EVs, the shift of the EU car industry, and a focus on circularity to address the raw materials issue, also guided by the Batteries Directive<sup>121</sup>.

## **4. WIDER BENEFITS IN A EUROPEAN GREEN DEAL PERSPECTIVE**

### **4.1. Sustainability, economic growth and employment**

#### *4.1.1. Air quality and other environmental impacts*

The move towards further decarbonisation of the EU economy has positive implications for aspects of the environment beyond climate alone. In particular, air pollution is reduced as a result of **increased energy efficiency, the replacement of fossil fuels** and the **development of non-combustible renewable energy sources** (such as **wind** and **solar**) or the **move towards cleaner transport modes that lead to less air pollution**<sup>122</sup>. This will help us to reach the **Zero Pollution Action Plan**<sup>123</sup> target of reducing the health

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<sup>119</sup> Energy Union R&I priorities (based on COM(2015)80): renewables, smart system, efficient systems, sustainable transport, CCUS and nuclear safety.

<sup>120</sup> IEA, World Energy Investment, 2021.

<sup>121</sup> Directive 2006/66/EC of the European Parliament and the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

<sup>122</sup> Since 2005, the increasing substitution of polluting fossil fuels for renewable energy across the EU led to a 6 % drop in total sulphur dioxide (SO<sub>2</sub>) and a 1 % drop in nitrogen oxide (NO<sub>x</sub>) emissions in 2017. However, it also led to a 13 % EU-wide increase of PM<sub>2.5</sub> emissions and a 4 % increase in VOCs emissions, following the increase in biomass use (EEA, 2019): <https://www.eea.europa.eu/themes/energy/renewable-energy/renewable-energy-in-europe-key>

<sup>123</sup> COM (2021) 400 final

impacts of air pollution (expressed as premature deaths) by more than 55% in the EU in 2030 compared to 2005.

In 2019<sup>124</sup>, **air pollution** was still **responsible for about 400 000 premature deaths** in the EU, with regional variations often reflecting energy consumption patterns such as the use of coal or biomass for domestic heating. The health effect of air pollution follows the same regional pattern as for exposure to air pollution by fine particulate matter, where, in 2018, the highest population exposures were across a number of EU Member States, principally Bulgaria, Croatia, Czechia, Greece, Italy, Poland and Romania<sup>125</sup>.

Potential trade-offs between the transition to a decarbonised energy system and the reduction of air pollution need to be addressed. For instance, increasing bioenergy use in devices without adequate emissions abatement technologies needs to be avoided. Monitoring related developments is important after the World Health Organisation has adopted updated Air Quality Guidelines in September 2021, which will inform the forthcoming revision of the Ambient Air Quality Directive<sup>126</sup>.

In parallel, the deployment of renewable energy is also guided by European environmental legislation, including where this is developed further in the context of the European Green Deal.

#### *4.1.2. Jobs and growth*

The **gross value added of the clean energy sector** has seen average **annual growth of 5%** since 2010 and reached EUR 133 billion in 2018<sup>127</sup>. **Energy efficiency activities** have displayed a particularly strong average annual growth of **9 % in the same period**, while that of **renewable energy production averaged 2 %**. Both have increased more than the rest of the economy.

The latest data available date back to before the Covid-19 crisis and indicate that reduced energy intensity showed **signs of economic growth decoupling from energy consumption**<sup>128</sup>. However, the latter has not been decreasing in absolute terms<sup>129</sup>.

The latest available data from before the COVID-19 crisis show that **direct employment in the clean energy sector represented 1.7 million full-time jobs in 2018**<sup>130</sup> with

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<sup>124</sup> Latest data available

<sup>125</sup> Eurostat regional yearbook 2021 edition, p.187

<sup>126</sup> [https://ec.europa.eu/environment/air/quality/revision\\_of\\_the\\_aaq\\_directives.htm](https://ec.europa.eu/environment/air/quality/revision_of_the_aaq_directives.htm)

<sup>127</sup> Based on Eurostat 'env\_ac\_egss2' - year for which the latest data is available.

<sup>128</sup> Source: ESTAT, nrg\_ind\_ei, Energy intensity of GDP in chain linked volumes (2010), Kilograms of oil equivalent (KGOE) per thousand euro.

<sup>129</sup> Over the period 2005-2019, both primary energy intensity and final energy intensity in industry have continued to decrease at an average annual rate of around 2%. Over the same period the GHG intensity has also been decreasing consistently, enabled – among others – by the increasing share of renewable energy in energy consumption.

<sup>130</sup> 2018 is the latest year available due to the statistical delay for Eurostat environmental goods and services sector data. Mandatory data reporting at the end of year n covers the reference period n-2 to n-4. Voluntary data reporting covers early estimates for reference year n-1 and the period before 2014. The availability of voluntary reporting items varies considerably across countries. Provisional estimates for the EU-27 as a whole are compiled by Eurostat each year (n), covering the period from year 2000 until year n-2.

average annual growth of 2 %<sup>131</sup>, **twice the rate in the overall economy (1 %)** in 2010-2018.

The rapid emergence of clean energy innovations requires **re-skilling and up-skilling** across all skills levels to further develop and deploy technologies and solutions across the EU. Demand for a wide range of occupational categories relevant to the clean energy transition is expected to increase in the period to 2030<sup>132</sup>. The EU's Pact for Skills<sup>133</sup> supports this process building partnerships with industrial ecosystems such as construction and energy intensive industries.

Renewables and energy efficiency are expected to drive future job creation in the EU in relation to the energy transition. **Wind energy and solar PV** (installation and production of panels) **are key jobs drivers**. It is expected that the wind sector will create over 420,000 new full-time jobs by 2050 and solar PV up to 140,000 full-time jobs<sup>134, 135</sup>.

On the demand side, green jobs are created mainly in the construction sector, especially with regards to **building renovation**, where **13 to 28 jobs per million euros invested** are estimated to be created in the EU<sup>136</sup>. Certain measures in the national RRP's such as prioritising renovation to improve buildings' energy and resources performance are a good example of correlations between economic stimulus and the clean energy transition. Renovation works are labour-intensive, create jobs and investments, often rooted in local supply chains, generate demand for highly energy and resource-efficient equipment, and add long-term value to properties<sup>137</sup>. In turn, job losses are expected to occur primarily in coal industries, machinery manufacturing and conventional transport equipment sectors.

Looking ahead, the increased climate and energy targets will lead to new investment needs. Over the next ten years, on average, **additional investments of EUR 390 billion per year** will be needed compared to the average annual amounts invested over the last ten years. More specifically, achievement of increased 2030 climate and energy targets represents an increase of some EUR 100 billion per year compared to investment needs projected for the implementation of the NECPs<sup>138</sup>.

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<sup>131</sup> This is based on Eurostat 'env\_ac\_egssl'. According to IRENA estimates, investments in clean energy creates close to three times more jobs than fossil fuels.

<sup>132</sup> CEDEFOP, Skills forecast: trends and challenges to 2030, 2018.

<sup>133</sup> European Commission, The Pact for Skills – mobilising all partners to invest in skills, 2020.

<sup>134</sup> This is according to EUCO3232.5 scenario, which is based on energy efficiency target of 32.5% and a renewable energy target of 32% by 2030. The climate target has now been revised upwards to at least 55% by 2030 and proposals made for higher ambition on energy efficiency and renewable energy.

<sup>135</sup> Derived using EurObserv'ER (<https://www.eurobserv-er.org/category/all-annual-overview-barometers/>) and Kapetaki, Z., Ruiz, P. et al., Clean energy technologies in coal regions: Opportunities for jobs and growth: Deployment potential and impacts, Kapetaki, Z. (editor), EUR 29895 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-12330-9, doi:10.2760/063496, JRC117938.

<sup>136</sup> BPIE (2020). Building Renovation – A kick-starter for the EU Recovery. [https://www.renovate-europe.eu/wp-content/uploads/2020/06/BPIE-Research-Layout\\_FINALPDF\\_08.06.pdf](https://www.renovate-europe.eu/wp-content/uploads/2020/06/BPIE-Research-Layout_FINALPDF_08.06.pdf) using data from C40 (2019). The Multiple Benefits of Deep Retrofits – A toolkit for Cities. [https://www.c40knowledgehub.org/s/article/The-Multiple-Benefits-of-Deep-Retrofits-A-toolkit-for-cities?language=en\\_US](https://www.c40knowledgehub.org/s/article/The-Multiple-Benefits-of-Deep-Retrofits-A-toolkit-for-cities?language=en_US)

<sup>137</sup> IRENA (2020), Global Renewables Outlook: Energy Transformation 2050. Edition: 2020), International Renewable Energy Agency, Abu Dhabi. Global Renewables Outlook: Energy Transformation 2050 – Summary (irena.org).

<sup>138</sup> SWD(2021) 621 final

## 4.2. Priority for consumer choice

Proactive consumers and engaged prosumers will play a key role in the shift to a renewables-based and more integrated energy system. Such **prosumers are better shielded from price fluctuations**. At the same time, support for vulnerable consumers and enterprises will remain important in a context of high energy prices and potential vulnerabilities in the context of the post-Covid pandemic.

The hydrogen and gas market decarbonisation package planned for December 2021 will **address consumer provisions, also for gas markets**. In order to allow consumers to actively engage on the market, the Commission also will focus on implementing existing legislation that promotes **consumer choice and active participation**. For instance, the Renewables Directive and the Electricity Directive reflect the growing importance of renewable energy self-consumers (prosumers) and active consumers. This legal framework opens the possibility for the cooperation between distribution system operators and **renewable energy communities** as well as **citizen energy communities**. To further strengthen the role of consumers, the Commission is analysing<sup>139</sup> options for establishing a **Union-wide green label** with a view to promoting the use of renewable energy from new installations<sup>140</sup>.

Currently, at least 2 million people in the EU are involved in **more than 7700 energy communities**<sup>141</sup>. Energy communities have contributed to up to 7 % of nationally installed capacities, with estimated total renewable capacities of at least 6.3 GW. On a conservative estimate, they have invested a total of at least 2.6 billion EUR<sup>142</sup>. In autumn 2021, the Commission will launch an **Energy Community Repository and Advisory Hub for Rural Energy Communities** to further facilitate the development of citizen and renewable energy communities.

**Smart energy grid solutions**, in particular fit-for-purpose smart metering and seamless data flows with appropriate data protection, are key to empowering consumers. The Commission is developing transparent and non-discriminatory rules on access to data and a Digitalisation of Energy Action Plan.

## 4.3. Protecting the most vulnerable

Energy poverty continues to undermine social inclusion and people's ability to participate actively in and benefit from the green energy transition. This is recognised also by the European Pillar of Social Rights<sup>143</sup> that places energy services among the essential services everyone shall have access to; calling for support measures for those in need. In 2019, **energy poverty affected up to 31 million people in the European**

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<sup>139</sup> <https://op.europa.eu/s/pp0f>

<sup>140</sup> As required by Article 19(13) of the Renewables Directive.

<sup>141</sup> Schwanitz, V. J., Wierling, A., Zeiss, J. P., von Beck, C., Koren, I. K., Marcroft, T., Dufner, S. (2021, August 22). The contribution of collective prosumers to the energy transition in Europe - Preliminary estimates at European and country-level from the COMETS inventory.

<sup>142</sup> Ibid.

<sup>143</sup> Principle 20. The European Pillar of Social Rights Action Plan also sets out initiatives for 2022 to ensure no one is left behind that will contribute to addressing energy poverty, such as a proposal for a Council Recommendation on minimum income, guidance on ex-ante distributional impact assessments and a report on access to essential services. In addition, sustainable Development Goal 7 also concerns access to affordable, reliable, sustainable and modern energy for all.

**Union**, including a significant share of low-income households but also middle-income ones, with significant differences across Member States. To fight this situation, the “Delivering the European Green Deal” package is designed to mitigate potential distributional effects and adverse social impacts of the energy system transformation.

In addition, the support measures put forward with the recent communication “Tackling rising energy prices: a toolbox for action and support” reflect the fact that the energy poor and the low and lower-middle-income households are most impacted by the current price hikes because they spend significantly higher shares of their incomes on energy.

In the context of higher energy prices, the Commission will continue to monitor how EU legislation relating to energy poverty will be applied in Member States and how energy poverty develops. Building on last year’s **recommendations on energy poverty**<sup>144</sup>, the Commission will call for closer cooperation with the relevant competent authorities through the establishment of an energy poverty and vulnerable consumers coordination group. This will enable Member States to exchange best practices and engage in coordinated efforts, so that any analysis based on indicators at EU or national level could be complemented with related EU policies such as energy efficiency and the renovation wave. The **Affordable Housing Initiative**, a key component of the Renovation Wave strategy, aims at revitalising 100 neighbourhoods as lighthouse projects across the EU in the coming years. The start of those renovation projects is planned for the fourth quarter of 2021. The Commission also established an **Energy Poverty Advisory Hub** with the objective to become the centre of energy poverty experience and expertise in Europe. It will start with assisting 80 individual municipalities with direct support to scale up and broadly disseminate specific solutions to eradicate energy poverty at the local level.

At the same time, the Electricity Directive recognises the **importance of national social security systems**, which are well placed to channel support to those most affected by energy poverty and rising prices. Member States can target specific payments to those most at risk to help them cover their bills in the short term. Such measure can also be complemented by measures to avoid disconnections. However, it is important that such emergency measures are not seen as an alternative to addressing issues like housing with poor insulation or inefficient appliances.

The European Green Deal puts emphasis on supporting regions, sectors and individuals directly affected by the clean energy transition to ensure a **just transition**. The transition also has a significant impact on regions that are heavily dependent on carbon-intensive industries, such as steel, cement or chemicals, which will undergo major transformations. For this, the Just Transition Mechanism was set up. It includes the Just Transition Fund, which will invest EUR 19.2 billion<sup>145</sup> in the territories that are facing the most negative socio-economic impacts of the transition. Member States are now preparing their **territorial just transition plans**, which will give access to the three pillars of the Just Transition Mechanism.

In addition, the Commission put in place the Just Transition Platform to assist all stakeholders in accessing and using the resources of the Just Transition Mechanism. This Platform builds and expands the support of the **EU initiative for coal regions in transition**, which helps coal regions across 12 Member States to formulate low-carbon

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<sup>144</sup> SWD(2020) 960 final

<sup>145</sup> In current prices

transition strategies and address potential negative socio-economic impacts<sup>146, 147</sup>. Up to 315,000 jobs can be expected to be created by 2030 by deploying clean energy production technologies, which can reach 460,000 jobs by 2050; creating job opportunities in several coal regions along the transition path<sup>148</sup>.

#### 4.4. Tackling administrative and investment barriers

If we are to achieve the EU's climate objectives, we will need a suitable framework to facilitate the massive investments involved<sup>149</sup>. Overly **complex and lengthy administrative permitting procedures** constitute a major **barrier for the transition to a decarbonised energy system**, in particular to the deployment and integration of renewable energy. The obstacles include complex structures, a lack of legal consistency and insufficient policy and regulatory frameworks and guidelines.

The 2018 Renewables Directive<sup>150</sup> introduced provisions on the **organisation and maximum duration of the permit-granting process**, covering all relevant permits to build, repower and operate renewable energy plants and for their grid connection. It also requires Member States to establish a **single contact point** to guide applicants through the entire administrative process. The Commission is closely monitoring the transposition of relevant provisions of the Directive and is assessing whether further measures are needed. For this purpose, a review clause for articles dealing with administrative procedures was included in the Commission proposal to amend the Renewables Directive presented in July 2021. Member States are also asked to establish an enabling framework that tackles the remaining non-financial barriers to renewable energy projects, such as insufficient digital and human resources of authorities to process a growing number of permitting applications. To help Member States tackle administrative and investment barriers, the Commission will issue guidance in 2022 on streamlining permitting and administrative procedures for renewable energy deployment, drawing on the analysis of existing obstacles as well as best practices in Member States.

## 5. THE EXTERNAL DIMENSION, CLIMATE AND ENERGY DIPLOMACY

The EU continues to lead by example on achieving climate neutrality by 2050. While raising its own level of ambition and taking specific measures in line with the Paris Agreement, it also plays an active role in international forums. The EU and its Member

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<sup>146</sup> The European Commission. (2018). 5. Structural Support Action for Coal and Carbon Intensive Regions [https://ec.europa.eu/clima/sites/clima/files/docs/pages/initiative\\_5\\_support\\_en\\_1.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/initiative_5_support_en_1.pdf)

<sup>147</sup> SWD(2020) 176 final, section 6.5.1.

<sup>148</sup> Kapetaki, Z., Ruiz, P. et al. (2020). Clean energy technologies in coal regions: Opportunities for jobs and growth. Deployment potential and impacts. JRC. p.5. [2020-JRC-clean\\_energy\\_technologies\\_in\\_coal\\_regions\\_online.pdf](https://ec.europa.eu/jrc/en/publication/2020-jrc-clean_energy_technologies_in_coal_regions_online.pdf)

<sup>149</sup> Considering the higher renewables energy target of 40% instead of 32% by 2030, **the EU would need more than 420 GW and up to 480 GW of combined onshore and offshore wind power capacity, up from the current 180 GW installed wind capacity**. For Solar PV, capacities would need to be more than 38 0GW and up to 420 GW up from the current 140 GW. Such increase would also cater for electricity needed to produce renewable hydrogen to achieve the sub-targets for Renewable fuels of non-biological origin (RFNBOs). As a consequence, renewable power capacity deployment rate would have to significantly increase compared to the currently scheduled level.

<sup>150</sup> Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, Articles 16 and 17.

States make a substantial contribution to the developed countries' collective goal of providing **USD 100 billion per year to support climate action in developing countries**. The new financing instrument Global Europe (EUR 79.5 billion for the years 2021-2027) will ensure that at least 30% of funding supports climate action.

Throughout 2021, the EU has been leading the discussion on the energy transition also in multilateral fora such as the UN High Level dialogue. The EU cooperates closely with the G7 and G20 towards achieving net zero GHG emissions by 2050 and **phasing out international finance for unabated coal energy production and subsidies**. Moreover, the EU has been actively working towards a significant outcome also at COP 26. More and more partners are reaching out with more ambitious plans regarding energy efficiency and renewable energy uptake and targets towards low-carbon or net zero-carbon economies.

The EU, the United States and other participating countries agreed in September 2021 to set a **collective goal to reduce methane emissions by at least 30 % below 2020 levels by 2030**. The goal stretches across the economy to include methane emissions from fossil fuels energy production, namely released during oil and gas extraction and transmission, and from agriculture and waste. The **Global Methane Pledge** will be launched during the November climate conference in Glasgow<sup>151</sup>. Moreover, the Commission is supporting the United Nations Environmental Programme (UNEP) in establishing an independent International Methane Emissions Observatory (IMEO) to address the global data gap and transparency in this area, including through a financial contribution.

**EU bilateral and regional energy cooperation with international partners** continues to focus on systematic support for the transition to low-emission and climate-resilient economies and to ensure energy security and competitiveness. The revival of EU-US energy cooperation and the EU-Japan Green Alliance of May 2021 are examples of its approach. Similarly, it is prioritising clean energy cooperation with India, (the EU-India Clean Energy and Climate Partnership) and China (the EU-China Energy Cooperation Platform).

The EU has set out its objectives for **regional cooperation** for the 2021-2027 multiannual financial framework **with the neighbouring regions in the East, the South and the Western Balkans**, calling for new joint actions to reinforce sustainable energy security, collectively speed up a green energy transition and promote clean energy investment.

The Commission works intensively towards establishing the 2030 energy and climate framework including the relevant 2030 targets for the nine non-EU Contracting Parties of the **Energy Community** and the adoption of a Decarbonisation Roadmap that will support these Contracting Parties in their path towards mid-century climate neutrality. Moreover, efforts to modernise the Energy Charter Treaty<sup>152</sup> are ongoing.

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<sup>151</sup> With the current international commitments, 9 of the world's top 20 methane emitters are now participating in the Global Methane Pledge, representing about 30% of global methane emissions and 60% of the global economy. In addition, more than 20 philanthropies announced combined commitments of over \$200 million to support implementation of the Global Methane Pledge.

<sup>152</sup> The key objectives of the EU's proposal for the modernisation of the ECT are to update the investment protection standards in order to ensure that the ECT facilitates the EU's climate action and energy transition in line with the European Green Deal and the Paris Agreement.

EU Member States approved a new agenda for the **Mediterranean** based on a renewed partnership with the Southern Neighbourhood. In June 2021, all 42 member countries of the Union for the Mediterranean approved a declaration underlining their commitment to a clean energy transition pathway, and to step up regional cooperation on energy.

With developing countries, and in particular in sub-Saharan Africa, cooperation is prioritising access to affordable, reliable and sustainable energy and leveraging private sector investments. The EU supports the **African Union initiative to create an African Single Electricity Market (AfSEM)** enabling productive transformation and fuel economic development, create jobs, fight poverty and advance prosperity.

Ensuring **nuclear safety beyond its borders** has also been a key area of attention for the Commission. In late summer, technical experts from the European Nuclear Regulators Group (ENSREG) and the Commission completed a peer review of the implementation of Belarus' nuclear safety stress test action plan. ENSREG and the Commission's technical experts have also started preparations for a peer review of Turkey's stress test, planned for mid-2022. In addition, the EU has demonstrated its continuing commitment to the implementation of Annex III of the Joint Comprehensive Plan of Action (JCPOA) on civil nuclear cooperation with Iran.

To pursue a global energy transition, ensuring security of supply and clean technologies, the Commission started a reflection on a **European strategy on external energy engagement** to be adopted in 2022. With the aim to align the EU energy and climate diplomacy to the European Green Deal, the EU Foreign Affairs Ministers adopted **Council Conclusions on the topic**<sup>153</sup>. The Commission's work focuses on new opportunities in deploying a clean energy system, and promoting energy efficiency and safe and sustainable technologies while gradually moving away from fossil fuel use towards green energy solutions and promoting a just transition. Trade policy and energy diplomacy will need to work hand in hand to ensure undistorted trade and investment in:

- i. the raw materials that are needed for the energy transition in the EU,
- ii. the energy goods required for the energy transition, and
- iii. the technologies that both the EU and our trading partners depend on for the transition to climate neutral economies.

## 6. CONCLUSION

This 2021 stocktaking of the State of the Energy Union 2021 shows that **the implementation of EU energy and climate policies is contributing to the delivery of the European Green Deal and to the recovery from the impacts of the COVID-19 crisis**. Based on this analysis and on the Communication "Tackling rising energy prices: a toolbox for action and support", the Commission would highlight the following six areas for further action.

The Commission will **continue monitoring energy price developments to ensure its response to the current energy price surge** remains proportionate and focussed on those most affected.

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<sup>153</sup> <https://www.consilium.europa.eu/media/48057/st05263-en21.pdf>

The Commission will continue to put in place a legislative framework fit for our enhanced climate and energy targets. This will include the **revision of the Energy Performance in Buildings Directive and initiatives on hydrogen, gas market decarbonisation and methane**, to be adopted later this year. The Commission calls on the European Parliament, the Council and the consultative committees to make progress on the adoption of these proposal alongside the July package, and stresses the importance of maintaining its ambition, integrity and consistency.

Further public and private **investments in energy efficiency and renewable energy**, in particular in wind and solar, storage and decentralised electricity production, are crucial for the transition, increasing resilience and mitigating renewed electricity price increases. In 2022, the Commission intends to adopt an **EU Solar Energy Strategy**, covering the existing barriers that are hampering and conditions that will enable the deployment of solar energy capacity required by 2030 and by 2050.

**It is necessary to address barriers to investment in the transition** if businesses are to take a leading role and the EU and its Member States are to attract investment. In particular, **streamlined permit procedures** create the necessary predictability for investors in the energy sector and beyond. Phasing out **grid bottlenecks** and swiftly removing barriers to renewable energy integration while nurturing social acceptance of renewables can speed up the transition further. In 2022, the Commission plans to issue **guidance to Member States on streamlined permit and administrative procedures** for renewables deployment.

**Fossil fuel subsidies** should come to an end. With lower expenditures for fossil fuel subsidies and pollution related disease, national budgets will have a **greater margin for investments in innovative technologies, in green skills, and in mitigating potential distributional effects of the transition**. In 2022, the Commission intends to adopt an implementing act on NECP progress reporting; this should help to ensure more uniform reporting on the phasing out of energy subsidies, in particular for fossil fuels.

**Energy poverty will continue to require specific attention, in particular in a situation where higher energy prices affect low and lower-middle-income households** due to spending higher shares of their incomes on energy. The Commission is engaging with Member States and energy regulators to best protect vulnerable consumers and will propose rules for improving the energy performance of the European building stock. The Commission is closely monitoring the implementation of the existing legislation to ensure the empowerment and the protection of all European consumers with special focus on the most vulnerable. Consumers should be able to actively engage in the energy market and benefit from a high degree of protection and empowerment.

With the EU's share in global GHG emissions declining to 8%, **international cooperation** (in settings such as the UNFCCC, the UN High Level Dialogue on Energy, the G20, and the Energy Community) is **indispensable for effective climate action** and for seizing the full GHG emission reduction potential. This requires an **EU strategy on external energy engagement**, on which the Commission is currently working.

Dialogue with the European Parliament, the Council, international partners, and public and private stakeholders continues to be crucial, also in 2021. In the preparations for COP26 in Glasgow, this dialogue focuses on the significant contribution of the energy system can make to decarbonisation as outlined in this Communication and the Climate

Action Progress Report. In parallel with the legislative work on the proposals of the first part of the ‘Delivering the European Green Deal’ package of July 2021, stakeholder exchanges should take place on challenges, including administrative barriers, consumer empowerment and the implementation of related energy legislation.