



# RECOVERY AND RESILIENCE SCOREBOARD

## Thematic analysis

Clean Power

NEXT  
GEN  
EU

December 2021



This paper is part of a series of thematic analysis undertaken by the European Commission to illustrate the impact of the Recovery and Resilience Facility (RRF). The RRF is the European Union's largest ever funding instrument and is intended to support European economies and societies to recover from the Covid-19 pandemic and build resilience against future shocks. EU Member States commit to implement ambitious reforms and investments and receive funds from the RRF when they achieve these commitments.

## Recovery and Resilience Scoreboard

### Thematic analysis



## Policy Overview

**Renewable energy plays a central role in decarbonising the EU energy systems and achieving climate neutrality by 2050.** Energy production and use account for over 75% of total greenhouse gas (GHG) emissions in the EU. Renewable energy is essential to achieve climate neutrality and the intermediate step of reducing greenhouse gas emissions by 55% by 2030 compared to the 1990 level. In 2019, the overall share of renewable energy sources in the gross final energy consumption in the EU was 19.7%, up from 14.6% in 2010. At sectoral level, the highest share was accounted for in the power sector (including hydro, wind, solar, solid biofuels and others) with a share of 34.1% of the gross final energy consumption in this sector, followed by the heating and cooling sector with a share of 22.1% and 8.9% for the transport sector (including renewable electricity in road, rail and other transport modes)<sup>1</sup>.

**On July 14, 2021, as part of the Delivering the European Green Deal Package, the European Commission proposed to double the current share of renewable energy in the gross final energy consumption of the EU to reach 40% by 2030.** This is an 8-percentage point increase from the EU's current binding target of 32% by 2030. This overall target is complemented by a number of sectoral targets in the transport, heating and cooling sectors as well as by new indicative targets for the industry and building sector. In the transport sector, renewable hydrogen and synthetic fuels should reach a target of 2.6% of total energy consumption, while the overall GHG intensity should be reduced by 13%. Further, the package introduced a binding target of renewable energy use in the heating and cooling sector of 1.1% annual increase, and an indicative target of at least 49% renewables in the building sector. Beyond these targets, the proposal introduces measures to mainstream renewables across all relevant sectors.

**To ensure achievement of the policy targets, future-proof clean technologies should be frontloaded, and the development and use of renewables should be accelerated as well as their integration through modernised networks and enhanced interconnectivity.** The “Hydrogen Strategy” lays the foundation for lead markets developing hydrogen technologies in Europe and the related infrastructure. By 2030, it aims to support the installation of at least 40 GW of renewable hydrogen electrolyzers in the EU as well as the production and transportation of 10 million tonnes of renewable hydrogen (with intermediate targets of 6 GW and 1 million tonnes respectively by 2024). After 2030, renewable hydrogen should be deployed at a large scale, across all hard-to-decarbonise sectors (e.g., energy intensive industries).

**Achieving the EU's climate and energy ambition will require a sustained investment effort to accelerate the deployment of renewable energies and energy infrastructure within the Union.** The European Commission<sup>2</sup> estimated that on average around 98.5 billion euros should be invested each year in power plants and electricity networks over the period 2021-2030 to reach the 55% climate target by 2030<sup>3</sup>. This would more than double the historical trend of investments between 2011-2020, estimated at around EUR 45 billion per year. It would entail an increase in the share of investment in renewable power generation from 68% of the total in 2011-2020 to 74% in 2021-2030<sup>4</sup>. As a result, renewable power generation is projected to represent about 80% of the new power capacity investment when expressed in MW of installed capacity. The additional renewables power will be used to replace existing fossil-based power generation and expand the generation capacity, thus reducing emissions from the power generation sector.

**In order to accelerate decarbonisation and reduce pollution in many end-use sectors in the EU, fossil fuel consumption will need to be replaced with the direct use of renewable sources, or by electricity produced from**

<sup>1</sup> <https://ec.europa.eu/eurostat/web/energy/data/shares>

<sup>2</sup> EUROPEAN COMMISSION - IMPACT ASSESSMENT REPORT accompanying the Proposal for a Directive of the European Parliament and the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources. SWD(2021) 621 final PART 1/2.

<sup>3</sup> The majority of power plant investment is related to renewables.

<sup>4</sup> This represents an increase in annual investment in renewable power generation from EUR 21.9 billion in 2011-2020 to EUR 40.5 billion in 2021-2030.

## Recovery and Resilience Scoreboard

### Thematic analysis



**renewable resources.** Therefore, the investments and reforms related to the deployment of clean energy supported under the Recovery and Resilience Facility ('RRF') on the supply side will need to accompany effective measures to integrate and electrify, including promoting the use of hydrogen on the demand side (e.g., investment in electric vehicles and infrastructure). The electrification will concern in particular hard-to-abate sectors such as industry, transport, buildings and heating & cooling.

**A significant increase of renewables penetration will require a flexible and reliable European network.** Investment and reforms will be needed to cater for the increased need for system flexibility brought about by the higher share of variable electricity generation. Alongside interconnections, innovative energy storage solutions will play an important role in ensuring the integration of renewable energy sources into the grid in the EU at the lowest cost.

**Increasing the share of renewables will also require an ambitious reform agenda.** This includes in particular the need to establish an effective price signal that incentivises the uptake of renewable energy across the EU as well as the need to remove barriers to investment such as permitting and the need to efficient (cross-country) network planning. Reforms and standards aiming at facilitating the further penetration of renewable energy in end-use sectors such as in buildings, industry and transport will also be key, not only for the decarbonisation of these sectors but also to facilitate the integration of renewable energy. The sustainable production and use of bioenergy and renewable hydrogen will be also essential in ensuring a sustainable and resilient energy system. This environmental requirement is reflected in related reforms, including on bioenergy, in particular with regard to sustainability and greenhouse gas emission savings criteria as well as air quality standards, in accordance with the Do No Significant Harm principle. Administrative reforms can also play a key role to support the supply side of the transition through the reduction in the administrative costs associated with authorisation, licensing and permitting procedures for clean energy production.

## The RRP's support the development of hydrogen technologies

**Hydrogen is expected to play an important role in our efforts to reach climate neutrality by 2050.** It has large potential as an energy source for sectors that are hard to electrify (industry and some transport modes). In addition, hydrogen is effective and a good way to store energy, especially from variable renewable energy sources. Producing hydrogen can also increase the EU's energy independence. As a basis for industrial production, it has a significant potential for investment, research and jobs.

**In this context, the Commission's Hydrogen Strategy (July 2020) highlights that the priority for the EU is to develop renewable hydrogen,** produced using mainly wind and solar energy, although in the short and medium term, other forms of low-carbon<sup>5</sup> hydrogen may be needed. The Hydrogen Strategy defines the objective for the period 2020 to 2024 to kick-start the hydrogen ecosystem, by supporting the installation of at least 6 GW of renewable hydrogen electrolyzers in the EU, and the production of up to one million tons of renewable hydrogen. Producing one million tons of renewable hydrogen also requires additional power generation in the order of 50 TWh, or the equivalent of 43 GW of solar PV or 22 GW of onshore wind by 2025. Member States' Recovery and Resilience Plans ('RRP') will contribute to scaling up investments in renewable and low-carbon hydrogen and many of them have included measures dedicated, either partly or exclusively, to hydrogen in their RRP's.

<sup>5</sup> Low-carbon hydrogen in the EU Hydrogen Strategy encompasses "fossil-based hydrogen with carbon capture and electricity-based hydrogen, with significantly reduced full life-cycle greenhouse gas emissions compared to existing hydrogen production"

## Recovery and Resilience Scoreboard

### Thematic analysis



**The hydrogen production foreseen in the RRP will largely be based on an increased share of renewable energy sources. Some Member States will also aim to produce low-carbon hydrogen, including using electricity from the grid.** While electricity generation is not yet a climate-neutral activity across the EU, the deployment of on-grid hydrogen is required for the transition to a climate-neutral economy, in parallel to the development of the ambitious policy framework to decarbonise electricity generation and develop renewables in the EU. A limited number of measures in the RRP include promising research efforts on other low-carbon advanced technologies to develop hydrogen production with carbon capture or pyrolysis of methane.

**Many investments in the RRP address the whole hydrogen value chain – from production to transport, storage and finally end-use in hard-to-electrify industrial sectors and some transport modes.** Some Member States plan investments in electrolyzers dedicated to hydrogen production. Likewise, investments in networks to transport hydrogen are also supported but remain limited, where Member States generally place the focus on developing local integrated hydrogen clusters where hydrogen is produced and consumed in the same ‘Hydrogen Valley’. Finally, measures in the RRP often include actions to promote the development of industrial and transport applications. Industrial developments aim to both decarbonise energy-intensive industries and to support the development of a European supply chain of hydrogen components and systems, such as electrolyzers or fuel cells. Transport applications are also planned, with investments in hydrogen refuelling stations for road and railways as well as in transport technologies. Measures included in the RRP mostly focus on the research and innovation stages, illustrating the emergent nature of hydrogen, with projects ranging from demonstration projects to first industrial development (projects on commercial scale mostly focus on the production side and transport). These investments will contribute to the scaled-up production and improved market readiness of hydrogen technologies especially in hard to electrify sectors or processes.

**Several Member States aim to integrate their hydrogen-related investments in the context of the planned Important Projects of Common European Interest (IPCEI) on hydrogen.** This instrument can help overcome common societal challenges, by enabling State aid to address market failures for large cross-border integrated projects that significantly contribute to achieve climate goals.

**The RRP also include important reforms to create an enabling market framework for hydrogen.** Several reforms aim at establishing national hydrogen strategies and include amendments of national regulatory frameworks. Some reforms are also planned to facilitate the deployment of hydrogen solutions, such as simplifying or accelerating permitting procedures or putting in place support schemes or the introduction of tax measures. In a limited number of RRP, measures include the introduction of systems of guarantees of origin for renewable hydrogen.

## Recovery and Resilience Scoreboard

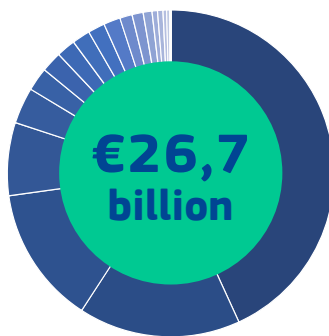
### Thematic analysis



# Clean Power in the recovery and resilience plans

## Overview of the plans

### Total clean power expenditure per Member State EUR in millions



Italy, €11507	Spain, €4274	Greece, €3636	France, €1925
Germany, €500	Finland, €475	Portugal, €447	Belgium, €440
Cyprus, €145	Slovenia, €141	Estonia, €95	Latvia, €80
Romania, €955	Croatia, €619	Czechia, €545	
Austria, €329	Lithuania, €293	Slovakia, €232	
Luxembourg, €24	Malta, €5		

## Investments

**The 22 recovery and resilience plans approved so far show that a significant share of the Recovery and Resilience Facility will be dedicated to the green transition, going beyond the requirement of at least 37% of climate investment.** At this stage the overall climate tagging is 39.9% of the total allocation of the plans positively assessed by the Commission, or EUR 177 billion<sup>6</sup>. Overall, total estimated expenditure in clean power – renewables and networks – total around EUR 26.7 billion<sup>7</sup> of which 99.2% is climate-tagged.

**The largest amount of the total investment in clean power is represented by investments in renewable energy generation** (EUR 18.1 billion), broken down in 61 measures. The plans will support investments in the already mature renewables technologies as well as in innovative solutions. The measures relate to the construction of offshore or onshore wind energy farms (and associated infrastructure such as energy islands), photovoltaic panels, and the construction of industrial sites using renewable energy. Biomass based renewable schemes are also foreseen, as well as biofuel and biomethane facilities. Some plans will finance investments in innovative or value-added renewable energy generation, such as technologies integrated into buildings and production processes. The schemes foreseen by the Member States will also reach remote areas (e.g., Azores, Madeira, Åland).

<sup>6</sup>Based on the 22 plans have been positively assessed by the Commission, and subsequently approved by the Council. In addition to the EUR 177 billion of climate tagged measures, the plans include a further EUR 16 billion of additional environmental expenditure, bringing the total amount for green investments to EUR 194 billion, equivalent to 44% of the total allocation. To derive this total green expenditure, both the climate and environmental coefficients included under Annex VI of the Regulation are considered for each measure and the maximum coefficient is taken.

<sup>7</sup>The figures for clean power presented in this thematic analysis are based on the pillar tagging methodology for the Recovery and Resilience Scoreboard and correspond to the measures allocated to the policy area "Renewable generation and networks" as primary or secondary policy area. The additional hydrogen investments include relevant expenditure on hydrogen that is not already captured under this policy area.

# Recovery and Resilience Scoreboard

## Thematic analysis



**Energy networks and infrastructure related measures represent a further amount of EUR 8.5 billion**, broken down in 36 measures, included in 17 of the approved national plans. These measures cover a wide scope of infrastructure: deployment of energy storage, district heating networks, electricity interconnectors and smart grids. Investments in energy storage will support various electricity storage facilities that will contribute to better integration of RES and greater grid stability.

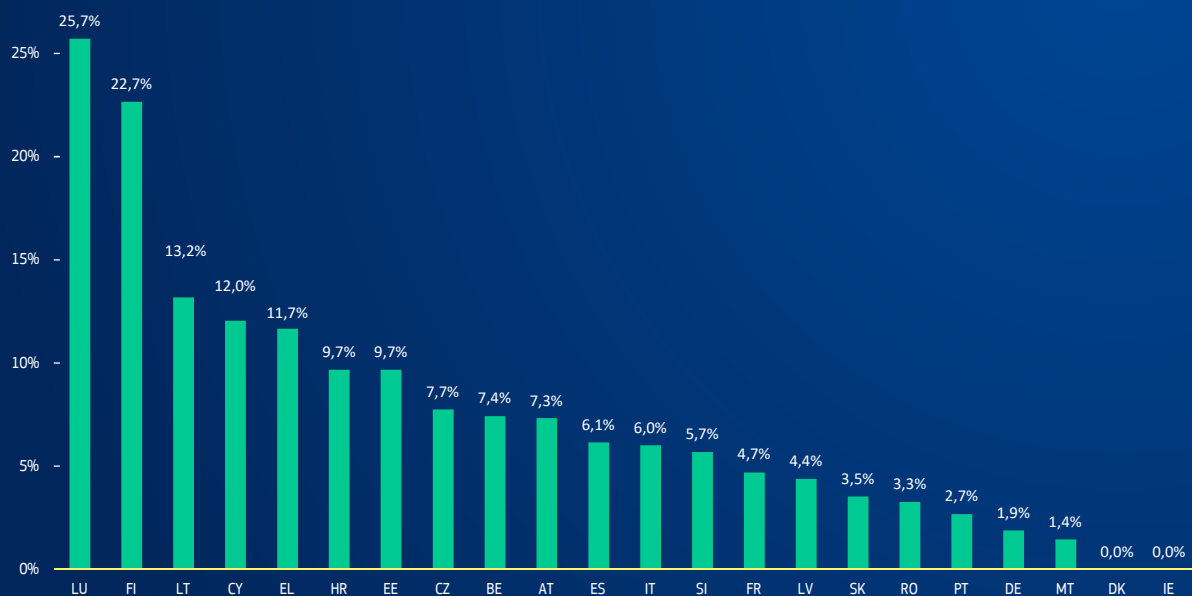
**Significant investments in hydrogen of at least EUR 9.3 billion are also proposed.** 15 Member States have included measures dedicated, either partly or exclusively, to hydrogen in their RRP. The measures cover the whole hydrogen value chain – from production to transport, storage and finally end-use in hard-to-electrify industrial sectors and some transport modes.

### Reforms

**The reforms dedicated to renewable energy proposed in the RRP address, in particular, key elements of the policy framework supporting renewable energy** such as the adoption of new or prolongation of existing support schemes or the simplification of administrative procedures such as permitting or spatial planning to facilitate deployment. Reforms included in the RRP aim generally at creating a stable regulatory environment and appropriate synergies between public and private investment. This includes for example setting up a digital One-Stop Shops to streamline the permitting of renewable projects. Several of the reforms under the RRP concern renewable energy in electricity and heating and cooling as well as the sustainable production and use of bioenergy and biofuels, as well as hydrogen. Measures included in the plans will also participate to the development of energy communities contributing to the low carbon economy and to resilience to climate change.

### Share of Clean Power expenditure

Expenditure on clean power, % of total estimated cost per Member State



## Recovery and Resilience Scoreboard

### Thematic analysis





**Dedicated reforms are also foreseen to facilitate the development of a more flexible energy system which is able to support a high share of renewable energy.** Reforms to streamline the efficient operation of the electricity markets and the development of new renewable plants to reach targets set out in the national energy and climate plans (NECP) through the implementation of monitoring mechanism will be put in place. Reforms of the electricity market legislation are included in several RRP to enable, in particular, the deployment of networks, energy storage and demand response, or improve market competition. There are also dedicated reforms to establish regulatory frameworks for promoting storage facilities in the electricity market and to promote alternative modes of production and consumption such as self-consumption, home renewal support scheme for smart control of heat pumps, electric storage heating and home batteries.

### Best practices

#### Renewables

 **Several of the RRP include investments aimed at providing direct support to renewable generation.** Member States will use the resources of the facility to finance important increase of their renewable generation capacity and accelerate their energy transition. The facility will contribute to the acceleration of the green transition in economies which remain highly dependent on fossil fuel. For example, the **Romania** plan will support the installation of new renewable power production capacity through an investment aid mechanism with the objective of installing 950 MW of renewables power production capacity by June 2024 and with the introduction of contracts for difference Romania will also install additional 1500 MW by June 2026.

 Accelerating the transition to a green energy sector requires speeding up the necessary reforms to prepare the network for a steady increase of renewables and a stable regulatory environment for investors. The **Greek** plan will put in place a new renewable licensing simplification reform and maritime spatial planning which will allow for more renewables in offshore and coastal areas. This reform is expected to further unlock Greece's potential for offshore wind production and facilitate Greece's transition from lignite to cleaner energy sources, while respecting environmental protection. Furthermore, indirect support to the development of renewable capacity will be provided by investment in the grids, aiming at improving its resilience, increasing the overall capacity and providing energy storage capabilities.

 **Reforms aimed at simplifying authorization procedures for renewable plants** are also included in the **Italian** plan, together with a new legal framework to sustain the production from renewable sources and an extension of current support schemes. In addition, innovative ways to address the potential trade-offs between different land use destinations are explored in the same plan, for example the development of agri-voltaic systems and the installation of measuring instruments to monitor the underlying agricultural activity to assess the microclimate, water saving, recovery of soil fertility, resilience to climate change and agricultural productivity for the different types of crops.

#### Infrastructure (Storage)

 **The increased penetration of renewables across Europe represents also a challenge for grid stability and capacity.** Investment in efficient and cost-effective storage solutions is key to maintain appropriate level of security of supply and to cater for the increasing need for system flexibility. The RRF will seek to contribute to addressing the need for greater storage capacity in several Member States. For example, the **Spanish** plan will support five innovative storage projects with an aggregate capacity of at least 600 MW by June 2026. The **Lithuanian** plan will support private businesses, farmers and renewable energy communities for the acquisition and installation of onshore solar and wind power plants, together with storage installations.

## Recovery and Resilience Scoreboard


### Thematic analysis



 **Alongside the various investments in storage, several reforms will create further opportunities for storage solutions to be developed. Cyprus'** plan will lead to the establishment of a regulatory framework for promoting the participation of storage facilities in the electricity market. This reform will facilitate the promotion of electricity generation from renewables, which is key for the efficiency and viability of the electric system of the country. The reform will amend the Transmission and Distribution Rules (TDRs) and the Trading and Settlement Rules (TSRs) to allow storage facilities to participate in the wholesale electricity market.


#### Infrastructure (Networks)

 **The facility will support the financing of network investment, notably increasing interconnection and energy solidarity across Europe.** The facility will directly finance an electricity interconnection between **Cyprus** and Greece which was identified as a Project of Common Interest. The Cypriot's plan includes financing a DC 1 000 MW converter station in Cyprus and related infrastructure in Cyprus and Crete, connected through 898 km of HVDC submarine cables with 1 000 MW capacity.


 **The facility supports reforms of the regulatory framework of the energy system to enable new activities and access of participants to the electricity market** (energy communities, aggregator, self-consumer, electricity storage). The Slovak plan envisages to increase overall flexibility of electricity system and to improve the possibilities for connecting of new renewables to the **Slovak** grid as well as to increase the technical capacities for electricity transmission within the domestic electricity system, facilitated through the increase in capacity of the electricity interconnection profile between Slovakia and Hungary.

#### Hydrogen

 The Facility will invest in building national and European hydrogen ecosystems through **Important Project of Common Interest (IPCEI)**. Within this framework, the **Austrian** plan will support the development of integrated projects **along the value chain** especially in the areas of **renewable hydrogen production and storage** in cooperation with other countries. As regards the production, the planned IPCEI is consistent with the Austrian national strategy to produce 5 TWh of renewable gases including hydrogen by 2030. The measure will also support projects dedicated to renewable hydrogen applications and its integration in **energy-intensive industrial and transport sectors** that are difficult to decarbonise. By supporting and creating good conditions for the development of both the demand and supply side, it is expected to **establish an integrated market for renewable hydrogen**.

 The **German** plan will support integrated hydrogen projects along the value chain, also within the framework of IPCEI. The measure is articulated around three areas: as regards production, 500 MW of electrolysis capability is expected to be built to produce renewable hydrogen in locations where sufficient renewable electricity is available. The second and third part of the planned IPCEI will focus on building German and European hydrogen transport and storage infrastructures.

Supporting the deployment of renewable hydrogen into the energy, industrial and transport sectors require **adequate reforms and regulatory frameworks** to provide the necessary visibility for project promoters that will stimulate further investments.


 The **Italian** plan foresees a reform defining safety rules for production, transport, as well as for the storage and use of hydrogen. In particular, technical and regulatory criteria will be introduced for the introduction of hydrogen into the natural gas networks by blending and for a future hydrogen pipeline network. At the same time, the authorisation procedures will be streamlined and simplified for small scale installation of hydrogen production facilities and for the installation of hydrogen refuelling stations along the main highways. Lastly, a system of guarantees of origin for renewable hydrogen will be introduced, in order to give price signals to consumers.



## Recovery and Resilience Scoreboard

### Thematic analysis



 **Romania** will amend the existing legislative and regulatory framework to support and facilitate the deployment of renewable hydrogen, with a focus on the transport and energy (gas and electricity) sectors. In particular, the reform foresees a National Hydrogen Strategy and a Strategy Action Plan, setting the timetable for the implementation of the measures. The reform will remove any legislative and administrative obstacles for the development of the renewable hydrogen technology and contribute to the achievement of the future national and European targets for the production, storage, transport and use of renewable hydrogen by 2030. By way of regulation, hydrogen-ready appliances (such as boilers) and equipment shall be mandatory as of 1 January 2026 for all new installations.

## Country overview

*The figures provided in the Country Overview are based on the pillar tagging methodology for the Recovery and Resilience Scoreboard and correspond to the measures allocated to the policy area “Renewable generation and networks” as primary or secondary policy area. The additional hydrogen investments include hydrogen investment not already captured under the allocation for “Clean power”. For all Member States, the listed relevant components are based on the Council Implementing Decision.*

### **Austria**

*Allocation: EUR 329 million for Clean Power + EUR 176 million additional for hydrogen. Relevant components: 1(1.A, 1.D), 2.D.3, 3.D.2.*

The Austrian plan entails consistent set of investment and reforms aiming at drastically boosting the deployment of renewable energy and renewable hydrogen. The new Renewables Expansion Law foresees an increase in the share of renewable energy in Austria's electricity supply to 100% by 2030, which shall require adding 27 TWh of electricity generation capacity from renewable sources by 2030 and to produce 5 TWh of renewable gases, including hydrogen. To support these massive investment efforts, the law introduces an overhaul of the national support systems for wind power, hydropower, solar energy, biomass and renewables gas including hydrogen (towards market premiums and investment support). Another reform includes the simplification of permitting for the deployment of PV installations by business. The plan contains also investment in the Hydrogen IPCEI aiming at promoting the production, storage and application of renewable hydrogen, focusing on energy intensive industries and to establish an integrated market for

green hydrogen. The plan aims at addressing the challenges related to fostering green transition of companies. Investment premiums will be granted to companies investing in grid coupled photovoltaic installations and electricity storage.

### **Belgium**

*Allocation: EUR 440 million for clean power + EUR 111 million additional for hydrogen. Relevant components: 1.1 and 1.2.*

The Belgian plan includes an investment for the development of heat networks in order to unlock the potential of green heat as well as waste heat. Another investment is dedicated to the development of a multifunctional offshore energy hub ('energy island') in the Belgian part of the North Sea to support the integration and import of renewable energy in and around the North Sea, including the connection of 3.5 GW of future offshore wind energy. Sizeable investments in hydrogen are included in the plan to support the development of industrial value chains in Belgium from research to industrial demonstration. Actions will cover the entire value chain, for instance, hydrogen production by electrolysis (to increase the capacity by 2025 to at least 150 MW) or by

## Recovery and Resilience Scoreboard

### Thematic analysis



methane pyrolysis or the direct use of hydrogen in industrial applications. Part of the investment is contributing to the Important Project of Common European interest (IPCEI) for hydrogen. As regards reform, the plan foresees the revision of the legislative framework governing the functioning of hydrogen market and future hydrogen networks.

#### Croatia

*Allocation: EUR 619 million. Relevant component: C1.2.*

The Croatian plan includes investments aimed to upgrade the electricity grid to enable additional 1,500 MW of RES capacity to be connected to the grid. The plan introduces a premium system for the support of investment in renewables, outlining a long-term investment plan and mapping of potential RES locations. Upgrades to the grid will be complemented by increased deployment of smart meters. Renewed connections of 6 islands to the mainland grid will improve their energy security. The plan also addresses the need to increase the share of renewables in the heating and cooling sector. The plan entails comprehensive reforms and investments to enable production of renewable hydrogen based on electrolysis; as well as introduction of hydrogen charging stations across the country. These investments will make a substantial contribution to Croatia's target to achieve a 14% share of renewables in the transport energy mix by 2030, while also contributing to the creation of green jobs in a lagging region.

#### Cyprus

*Allocation: EUR 145 million. Relevant component: 2.1.*

The Cypriot plan includes reforms relating to the introduction of green taxation, the independence of the Transmission System Operator from the incumbent electricity supplier to facilitate the opening of the electricity market to competition, as well as the establishment of digital one stop shops for licensing Renewable Energy Sources (RES) projects and facilitating energy renovations in buildings. The component includes investments relating to the mass roll-out of smart meters in Cyprus, as well as the 'EuroAsia Interconnector' project aiming to enhance the energy interconnection between Cyprus, Greece and Israel.

#### Czechia

*Allocation: EUR 545 million. Relevant components: 2.3 and 2.5.*

The planned phase-out of coal in Czechia by 2038 will contribute to increasing the share of renewable energy sources. The Czech plan entails investments aiming at replacing a part of the coal-fired energy sources by renewable energy sources. The plan includes important investment for the construction of photovoltaic power plants on the roofs of companies' buildings including shelters (such as shelters for cars, construction machines or storage of material) as well as accumulation of energy aiming at optimizing the generation of electricity. This is amounting to the construction of 270 MW of new-built capacity by 2026.

#### Denmark

*Allocation: no investments are tagged as "clean power". Relevant component: 7.*

The Danish Plan includes measures in the Green R&D component aim to provide the public and private sectors with incentives to boost research and development by ultimately creating research and innovation partnerships in innovative green technologies, including green fuels for transport and industry via Innovation Fund Denmark.

#### Estonia

*Allocation: EUR 95 million. Relevant components: 2 and 4.*

The plan is proposing a reform to contribute to decarbonising the energy production and consumption in Estonia by updating targets and actions of Estonian energy policy (including those related to the phase out oil shale) and by removing administrative barriers to renewable energy installations. This is accompanied by investments aimed at strengthening the electricity grid in Estonia but also at encouraging the production of renewable electricity in or near industrial areas by co-financing the necessary grid connection. Investments are also planned to support pilot projects on renewable energy storage solutions. The plan contains also investments to support the deployment and piloting of hydrogen integrated value chains from energy production and supply solutions to final consumption in

## Recovery and Resilience Scoreboard

### Thematic analysis



different application areas.

#### Finland

*Allocation: EUR 475 million. Relevant components: PIC1 and PIC2.*

The Finnish plan includes investments in energy infrastructure, new energy technologies, distribution of green hydrogen and low carbon gases and electrification of industrial processes. The measures should accelerate the transition of the energy sector, increase the already high share of renewables and capitalise on the innovative capacity of the Finnish economy. Finland is complementing these investments with the planned construction of an 800 MW electricity interconnector between Northern Finland and Northern Sweden with a length of approximately 370 km, partially funded by TEN-E.

#### France

*Allocation: EUR 1,925 billion + EUR 500 million additional for hydrogen. Relevant components: 4 and 3.*

The plan will support the development of a hydrogen economy in France, particularly in industry and the transport sector. The first measure will establish a mechanism to support renewable and low-carbon hydrogen production based on electrolyzers. The second measure will support the launch and implementation of the planned Important Projects of Common European Interest (IPCEI) on renewable and low-carbon hydrogen. In the context, France is expected to invest in the development of two giga-factories, one to manufacture electrolyzers and another one dedicated to the manufacturing of fuel cells and more generally tanks and materials to allow the development of hydrogen-based heavy vehicles. Investments will also focus on the conversion of industrial sites to renewable or low carbon hydrogen. The plan will also finance renovation of electricity networks in rural areas.

#### Germany

*Allocation: EUR 500 million + 2,047 billion additional for hydrogen. Relevant component: 1.*

The plan proposes to support the use of hydrogen produced with energy from renewable sources and to contribute as a primary goal to the reduction of greenhouse gas emissions

defined in the German National Energy and Climate Plan, with a focus on industry. A first measure will consist of a hydrogen IPCEI (Important Projects of Common European Interest). The measure consists of financial support that shall be given to integrated projects along the entire value chain through planned IPCEIs on hydrogen. Up to 500 MW of electrolysis capability is expected to be built. A second measure will support flagship projects for research and innovation in the context of the German National Hydrogen Strategy. The research projects will focus on water electrolyzers, the integrated direct offshore production of hydrogen and transport.

#### Greece

*Allocation: EUR 3,636 billion. Relevant components: 1.1 and 4.7.*

The Greek RRP will finance measures that aim to reduce energy costs, phase-out oil-fired power generation, and increase the potential of the islands to support electricity generation from renewables. The plan includes investments amounting to an additional RES capacity of 6.5 GW by 2025. As regards reforms, a new RES licensing simplification reform and a maritime spatial planning will allow for energy production from renewable sources in offshore and coastal areas. This reform is expected to further unlock Greece's potential for offshore wind production and facilitate Greece's transition from lignite to cleaner energy sources, while respecting environmental protection. Indirect support to the development of renewable capacity will be provided by investment in the grids, aiming at improving its resilience, increasing the overall capacity and providing energy storage capabilities.

#### Ireland

*Allocation: no investments are tagged as "clean power". Reform - Relevant component: 1.*

Ireland will reform the Climate Action and Low Carbon Development Bill to set an emissions reduction target for 2030 and the climate neutrality objective by 2050 into primary legislation, and to strengthen the governance framework for the achievement of these objectives. The bill will require, among others, putting the climate neutrality objective by 2050 on a statutory basis, the adoption of 5-yearly carbon budgets at sectoral and economy wide-levels, setting the first two carbon budgets in line with

## Recovery and Resilience Scoreboard

### Thematic analysis



the 51% reduction objective for 2030, and preparing annual updates of the Climate Action Plan and the realisation of annual climate reporting.

### Italy

*Allocation: EUR 11,507 billion + EUR 1,690 billion additional for hydrogen. Relevant component: M2C2.*

The plan rolls out ambitious investments in renewables (hydrogen, biomethane, offshore, photovoltaic), and smart grids. It contains also measures to simplify authorisation procedures for renewable onshore and offshore plants and to create a regulatory framework to support the uptake of bio-methane and hydrogen. The plan also envisages an ambitious reform of Italy's electricity markets with the phase out of electricity regulated prices for microenterprises and households as from 2023, as encouraged by the Commission's assessment of the National Energy and Climate Plan, together with flanking measures to improve competition in retail electricity markets. The plan also underlines Italy's intention to participate in the two potential hydrogen IPCEIs and to invest in the development of Italian value chains in hydrogen.

### Latvia

*Allocation: EUR 80 million. Relevant component: 1.*

The plan includes investment contributing to reaching climate neutrality objectives by creating a sustainable grid infrastructure and lifting regulatory obstacles so that wind power may be more easily deployed. The investment will provide for an upgrade of the electricity grid and develop IT solutions to increase the flexibility and security of the transmission system and distribution system. This investment will help providing adequate electricity supply infrastructure for electro-mobility and sustainable and efficient system operation. The measure is also expected to contribute to the synchronisation of the Baltic electricity systems with continental European networks.

### Lithuania

*Allocation: EUR 293 million. Relevant component: 2.*

The plan will boost the deployment of renewable energy in Lithuania. A major reform is proposed to promote the

production, transmission and consumption of electricity from renewable energy sources as well as to improve the institutional and legal mechanisms, and to provide investment incentives for businesses and citizens. This reform is accompanied by dedicated investments in wind and solar power plants and storage facilities. The plan will also promote alternative fuels in the transport sector, through a dedicated reform, which is also accompanied by investments in the development of renewable fuels such as bio-methane gas, second-generation liquid biofuels for transport and green hydrogen.

### Luxembourg

*Allocation: EUR 24 million. Relevant component: 2B.*

The plan will contribute to finance the sustainable energy concept of the former industrial 'Neischmelz' site conversion project, located in the municipality of Dudelange, to develop a new urban district, where electricity will be produced by photovoltaic panels installed on the large roofing surface on the rehabilitated old structure.

### Malta

*Allocation: EUR 5 million. Relevant component: 1.*

The recovery and resilience plan of Malta will increase the capacity of renewable electricity by supporting the construction of photovoltaic plants. Considering that Malta's small size limits the possibility of onshore energy generation, different options have been explored that go beyond the traditional roof-top investment. Investment will be prioritised in roads, footpaths and other public open spaces.

### Portugal

*Allocation: EUR 447 million + EUR 3.29 million additional for hydrogen. Relevant component: 14.*

The plan includes measures to promote the production of renewable energy and in particular renewable hydrogen and other renewable gases, to increase the production and storage capacity of energy produced from renewable sources, and to establish a local energy community. These measures should accelerate the transition of the energy-sector, increase the already high share of renewables in Portugal, and help use the country's favourable conditions

## Recovery and Resilience Scoreboard

### Thematic analysis



to produce renewable hydrogen. Portugal intends to complement these investments through cohesion funding to expand energy interconnections.

#### Romania

*Allocation: EUR 955 million + EUR 15 million additional for hydrogen. Relevant component: 6.*

The plan includes under its energy component measures to accelerate the decarbonisation of the energy sector by phasing-out lignite and coal fired-power plants by 2032 and by facilitating the deployment of renewables and alternative energy sources, such as green hydrogen. It also aims to increase the flexibility of the electricity grid, digitalise the energy sector, and reduce the energy intensity of industry. The component also intends to improve the corporate governance of state-owned enterprises in the energy sector. The energy sector is the largest source (66 %) of greenhouse gas (GHG) emissions in Romania.

#### Slovakia

*Allocation: EUR 232 million. Relevant component: C1.*

The plan includes investments in renewable energy capacity combined with a set of reforms to facilitate access to the grid of clean energy sources, which is necessary for Slovakia to achieve its 2030 renewables target. It will support investments in renewable energy capacities, including modernisation of existing installations. The investments are expected to boost Slovakia's new green installed capacity by total of 120 MW.

#### Slovenia

*Allocation: EUR 141 million. Relevant component: 1.*

The plan will accelerate the roll-out of renewable technologies in the electricity sector and support the national contribution to the Union renewables target. In particular, it includes investments in renewable energy power production and a reform aimed at lifting certain legal and administrative barriers for installing renewables in the area of spatial planning, and by establishing a single point of contact to assist customers in all procedures for the installation and operation of renewable energy sources. The plan will also support the modernisation of the electricity distribution network in line with the increasing amount of renewables electricity consumption and to enable the connection

of renewables generating installations, heat pumps and recharging points for electric vehicles with the construction and entry into operation of 980 new transformer stations.

#### Spain

*Allocation: EUR 4,274 billion + EUR 1,555 million additional for hydrogen. Relevant components: 7, 8 and 9.*

The Spanish plan includes investments and reforms in renewable energy generation and a flexible, decentralised and dynamic electricity system. The plan focuses on developing energy from renewable sources (including offshore wind), and in the sectoral integration of renewable energy. Spain will invest in the integrated renewable generation in buildings, industrial and transport sectors, and to promote renewable thermal energy. Spain will foster citizens' participation via renewable self-consumption and renewable/citizen energy communities. Support will be provided to solar technologies (for thermal needs of the residential, service and industrial sector), bioenergy for electricity and thermal applications, offshore wind and other marine energy. Measures in the plan will also promote smart electricity grids and deploy storage capacities. Spain also plans specific investment in the renewable hydrogen value chain.