European Commission

RECOVERY AND RESILIENCE SCOREBOARD

NextGenEU

Thematic analysis

Energy efficiency in buildings

January 2023

This paper is part of a series of thematic analyses 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.

Policy Overview

Saving energy is the cheapest, safest and cleanest way to reduce our reliance on fossil fuel imports and contribute to the clean energy transition. Especially in the current context of unprecedented high energy prices, saving energy through energy efficiency measures directly helps to reduce household energy bills. As such, energy efficiency measures are not only key to achieve the objectives of the European Green Deal and Fit for 55 package, but they also contribute to achieving the REPowerEU objectives[1] by strengthening our economy's resilience and reducing external dependence on fossil fuels.

To this end, making our buildings more energy and resource efficient is indispensable. The building stock is the largest single energy consumer in the European Union, accounting for around 40% of the EU's energy consumption and about 35% of its energy related greenhouse gas ('GHG') emissions[2]. To achieve the net 55% emission reduction target by 2030, the EU should reduce direct energy related GHG emissions of the buildings sector by 60%, its final energy consumption by 14% and energy consumption for heating and cooling by 18%[3]. However, around 75% of existing buildings in the EU are energy inefficient, most buildings were constructed before current energy requirements were in place, while it is estimated that about 85-95% of today's buildings will still be in use by 2050. Additionally, making use of resource efficient solutions during the renovation works, for instance reusing and recycling construction and demolition waste as well as using secondary materials, supports further the EU's climate and environmental goals.

Renovation works only very rarely address in a consistent way the improvement of buildings' energy performance. The weighted annual energy renovation rate remains low, at around 1%[4]. Although about 11% of the EU's existing building stock undergoes some level of renovation each year (either light, medium or deep renovation), the focus on reducing energy consumption, modernising technical building systems and installing renewables is still low and often lacking. Across the EU, deep renovations that reduce energy consumption by at least 60% are carried out only in 0.2% of the building stock. The pace of energy renovations needs to be significantly scaled up in order to meet the EU's climate objectives.

The challenges to scale up investments in energy efficient renovation include the (i) lack of available funding to overcome the high upfront investment costs; (ii) end-consumers' limited knowledge on the economic potential (and the wider benefits) for energy savings and policy measures available to them; (iii) a low renovation rate of energy inefficient government buildings; (iv) a potential future shortage of skilled professionals to conduct energy efficient renovations; and (v) current fiscal and regulatory measures are not enough providing the right incentives.

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[1] In response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine, the European Commission presented in May 2022 its REPowerEU plan. The main objectives of the plan are to strengthen measures to save energy, produce clean energy and diversify our energy supplies. The enactment of the REPowerEU legislation will allow Member States to amend their Recovery and Resilience Plans to include additional measures contributing to the RePowerEU objectives. Upscaling and reinforcing the energy efficiency measures in buildings (both in terms of investments and reforms) would directly contribute to the objectives of the REPowerEU plan by leading to additional energy savings, and less reliance on fossil fuels from Russia.

[2] EEA "Trends and projections report" published 26th October 2022

[3] Compared to 2015 levels, see SWD (2020) 176 final. Buildings are responsible for greenhouse gas emissions before, during and after their operational lifetime. The 2050 vision for a decarbonised building stock should progressively take into account the whole life-cycle emissions of the buildings, not only in new construction but also in renovations.

[4] Annual energy savings achieved from all renovations (light, medium and deep) compared to the energy consumption of the total building stock. See the 'Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU (2019)': https://ec.europa.eu/energy/studies/comprehensive-study-building-energy-renovation-activities-and-uptake-nearly-zero-energy_en?redir=1

Looking at the investment needs, the building sector is facing one of the largest investment gaps in the EU. The analysis underpinning the Renovation Wave strategy indicates that to achieve the proposed 55% climate target by 2030, around EUR 275 billion of additional investment in building renovations is needed every year[5]. To reach the REPowerEU objectives, an additional EUR 56 billion of overall investments in energy efficiency and heat pumps is needed until 2030.[6]

Investments in energy efficiency also help to reduce energy poverty. Before the current energy crisis, already more than 35 million Europeans (around 8% of all EU citizens) experienced energy poverty in the EU, which is likely to have significantly increased since. People living in energy poverty are unable to keep their home adequately warm[7]. This is the result of energy inefficient buildings and appliances, causing higher energy expenditures, combined with low household incomes. The financial gap in investment in social and affordable housing is estimated at EUR 57 billion per year up to 2026.[8] Building renovations have remained limited in these households due to financial obstacles and this part of the population should therefore receive extra attention when designing measures.

Scaling up investments and undertaking reforms in the construction sector can have wider economic benefits. Renovation can be very valuable for a sector that was hard hit by the economic impact of the COVID-19 crisis. Activity in construction fell by 15.7 % and energy efficiency investments have dropped by 12% between 2019 and 2020[9]. The construction sector employs approximately 24.9 million people in the EU and provides a value added of EUR 1 158 billion (9.6% of the EU total). The sector has total of 5.3 million firms, 99.9% companies of the sector are SMEs, which represent 90% of employment and 83% of the total value added[10]. Moreover, construction activities have significant spill-over effects throughout large parts of the economy[11]. As the sector is highly labour intensive, energy efficiency investments in buildings generate more jobs per million euros invested compared to other economic sectors (i.e., manufacturing, food and textiles, transport infrastructure and vehicles)[12], while also stimulating investments and benefitting in particular SMEs.

The Commission presented its 'Renovation wave strategy'[13] in October 2020 to boost energy efficient renovations. It aims to at least double the annual energy renovation rate of buildings by 2030 and to foster deep renovation, to meet the overall 55% GHG emission reduction target by 2030. This objective was also reflected in the European flagship 'Renovate'[14], in which the Commission encouraged Member States to include energy efficiency investments and reforms in their recovery and resilience plans. The three priority areas: decarbonisation of heating and cooling, tackling energy poverty and worst-performing buildings, and renovation of public buildings such as schools, hospitals and administrative buildings. To achieve this, the strategy proposes to break down existing barriers along the renovation chain, through stronger regulations and standards, ensuring accessible and well- targeted funding, increased capacity building to implement renovation projects, and expanding the market for sustainable construction products and services.

[5] COM(2020) 662 final
[6] SWD(2022) 230 final
[7] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211105-1
[8] Report of the High-Level Task Force on Investing in Social Infrastructure in Europe, January 2018.
[9] SWD(2020) 550 final
[10] Ares(2021)7679109) final
[11] such as local quarries and forests, sawmills, concrete products manufacturers, steel makers and glass, plastic and metal products manufacturers
[12] 12-18 local jobs per million Euros invested, IEA, Sustainable Recovery, June 2020.
[13] COM(2020) 662 final
[14] COM(2020) 575 final

In terms of relevant EU legislation under revision, in the context of the REPowerEU plan, the Commission proposed an increase of the binding EU energy efficiency target from 9% to 13% in the 'Energy Efficiency Directive' (EED), compared to the 2020 'reference scenario'. The proposed directive sets the rules and obligations to achieve this target. It provides the legal basis for the application of the guiding 'energy efficiency first' principle and requires the public sector to lead by example by extending the scope of public renovations and green public procurement to all levels of public administration. At the same time, the EED also includes provisions to protect vulnerable groups through energy savings and counteract possible adverse economic effects of climate policies on them.

The Commission also proposed a revised 'Energy Performance of Buildings Directive' (EPBD) to further incentivise the decarbonisation of buildings in line with the enhanced climate ambition of the European Green Deal. The Member States must establish strong Building Renovation plans aiming at decarbonising the national building stocks by 2050 and introduce minimum energy performance standards, clearly targeting the worst performing buildings. The proposed revised directive also requires that all new buildings as of 2030 must be zero-emission buildings (ZEB)[15], while this already applies to new public buildings as of 2027. In addition, the proposed directive requires that energy performance certificates (EPCs) must be issued when a building is sold or rented, and inspection schemes for heating and air conditioning systems are set out.

Energy efficiency in the recovery and resilience plans

Overview of the plans

Investments

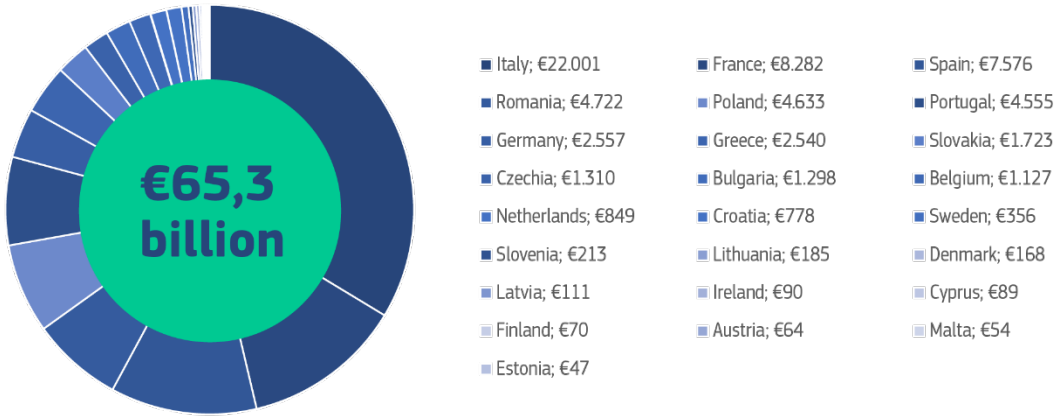
The 26 recovery and resilience plans approved so far include a significant amount of investments dedicated to energy efficiency and reflect the required priority to decarbonise the building stock. Total estimated investments in energy efficiency in the building stock amount to EUR 65.3 billion (corresponding to 13.4 % of the total expenditures in the plans), out of EUR 72.5 billion investments in energy efficiency overall[16]. A third of it will be invested by Italy, followed by France and Spain. Jointly these three countries represent nearly 60 % of all investments in energy efficiency in buildings. In relative terms, Portugal and Slovakia allocate nearly 30 % of the RRPs investments to energy efficient related measures, followed by Bulgaria and France, with over 20 %, reflecting the priority given to this policy area. Moreover, investments in energy efficiency in buildings represent 25 % of the total investments in the RRPs identified as contributing to the climate objectives (EUR 49.7 billion out of a total climate tagged amount of EUR 200 billion). Most of the spending on energy efficient renovations goes to schemes that have the objective to achieve, on average, medium-depth level renovation, which amounts to at least 30 % primary energy savings. Energy efficiency measures supported by the RRF will also ensure progress towards other environmental objectives such as reducing air pollution.

[15] A zero-emission building is defined as a building with a very high energy performance, with the very low amount of energy still required fully covered by energy from renewable sources and without on-site carbon emissions from fossil fuels.

[16] The figure on overall investments in energy efficiency of EUR 72.5 billion is based on the pillar tagging methodology for the Recovery and Resilience Scoreboard and corresponds to the measures allocated to the policy area 'Energy Efficiency' as primary or secondary policy area. This fiche however primarily focuses on measures on energy efficiency in buildings, which are a subset of the overall policy area 'Energy Efficiency', and amount to EUR 65.3 billion (see explanatory note under the Chart on "Total energy efficiency expenditure in buildings per Member State").

Total energy efficiency expenditure in buildings per Member State

Expenditure in EUR millions per Member State



Note: The overall investments in energy efficiency amount to EUR 72.5 billion based on the pillar tagging methodology for the Recovery and Resilience Scoreboard corresponding to measures allocated to the policy area 'Energy Efficiency' as primary or secondary policy area. This chart includes estimated expenditure on energy efficiency in buildings, which is a subset of the overall policy area 'Energy Efficiency'. To identify measures related to energy efficiency in buildings, the data in the chart is based on measures tracked with intervention fields 025/025bis/025ter/026/026bis, using Annex VI of the RRF Regulation, amounting to EUR 65.3 billion. The policy pillar 'Energy Efficiency' also includes energy efficiency measures related to firms (SMEs and large enterprises). These measures are not included in the chart.

The largest portion of such investments (EUR 31 billion) are in making private buildings more energy efficient. For example, this includes measures targeting vulnerable groups for whom the significant upfront costs make it almost impossible to invest in the energy efficiency of their homes. These investments also help to address energy poverty issues. The actions that are eligible to be financed by energy efficiency renovation schemes involve the replacement of windows and doors, wall isolation, green facades and roofs, and the replacement of boilers, oil burners and gas furnaces with cleaner alternatives[17]. The modernisation of district heating by electric or low-emission alternatives will also contribute to improving the local air quality.

Renovations of public buildings are also well represented across the plans (EUR 23 billion). Such renovations include schools, universities, sport halls and historical buildings. These are typically buildings that are often used on a daily basis and by a large number of people. In general, the focus is on the worse performing public buildings and/or buildings heated by oil burners and gas furnace. Similarly to investments in private buildings, renovations aim, in general, at achieving at least 30% primary energy savings. Moreover, several Member States will invest in improving the energy efficiency of public lighting systems.

In addition, EUR 10.6 billion will be invested in the construction of new highly energy efficient public and private buildings. Newly constructed buildings have to go beyond the latest energy efficiency standards, meaning that new buildings' primary energy demand must be is at least 20 % lower than the nearly zero-energy building (NZEB) requirement. The construction of new public buildings mainly includes new hospitals, schools, and early childcare facilities. Additionally, several Member States invest in new social houses for vulnerable groups.

[17] Some energy renovation schemes also finance seismic improvements, but these have not been tagged with a positive climate coefficient and therefore are not reflected in this fiche.

Reforms

The plans include several reforms tackling different barriers to conduct building renovation in all sectors: private and public buildings, residential and companies. Reforms aim at making financial support available for renovation more efficient and more environmentally friendly. The main categories of reforms include simplification or upgrading of the regulatory framework, elaboration of long-term renovation strategies, the creation of one-stop shops and the upskilling and reskilling of workers.

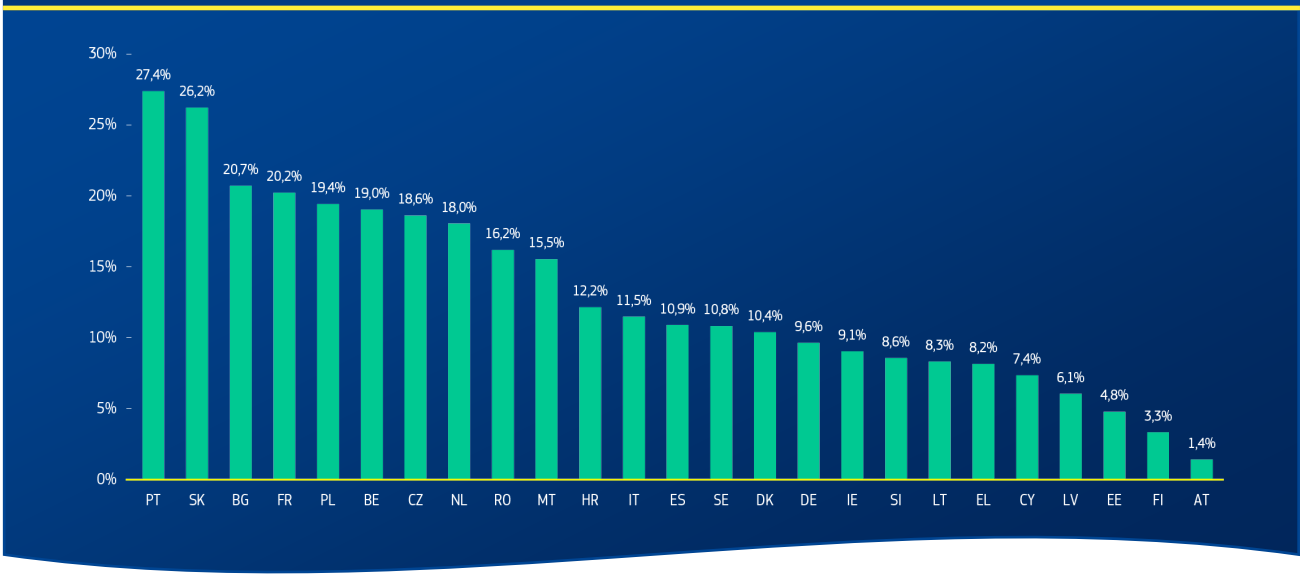
Amendments to the **regulatory framework** are mainly focused on fostering the **phase-out of outdated heating systems** and encourage their replacement by renewable energy or district heating. Several Member States aim at **simplifying the regulatory framework** to encourage energy efficiency related private investments, including tackling barriers for the renovation of multi-family apartment buildings. Energy poverty is also addressed in several plans though strategies designed to improve energy efficiency of residential buildings among economically vulnerable households.

In order to facilitate building renovations, several plans aim at **harmonising the support mechanisms by creating one-stop shops.** The aim is to offer a place (online or physical) where citizens and/or private entities willing to undertake renovations on their premises, can solve all their inquiries in the same space, from support schemes available (grants, tax reductions, bonuses) to legal and technical advice, so support is given at all stages of the renovation process.

Finally, some Member States, such as Croatia and Romania, have included in their reform plans **reskilling and/or upskilling** of construction workers. Given the new construction environmental requirements and new green technologies, measures combining both investments and reforms on reskilling and upskilling current construction workers are important to avoid a mismatch between demand and supply of rehabilitation services.

Share of Energy Efficiency expenditure in buildings

Expenditure on energy efficiency in buildings, % of national RRP's investments



Note: This chart shows estimated expenditure on energy efficiency in buildings by Member State as a percentage of the total RRP allocation. The corresponding measures are part of the policy area 'Energy efficiency' in Recovery and Resilience Scoreboard, and identified by only including the measures tracked with intervention fields 025/025bis/025ter/026/026bis, using Annex VI of the RRF Regulation. The policy pillar 'Energy Efficiency' also includes energy efficiency measures related to firms (SMEs and large enterprises). These measures are not included in the chart.

Good practices

Energy efficiency renovations in private buildings

At least 1.5% of all dwellings or 30 000 single-family buildings should be renovated thanks to the **Slovakian plan**. Projects aim to decarbonise the building stock by combining energy efficiency actions while also integrating renewables and climate adaptation solutions. These renovations are expected to deliver on average at least a 30% reduction of primary energy savings[18], and include incentives to motivate owners to conduct deep renovations and **a dedicated scheme for vulnerable groups, to be verified by energy performance certificates**. On the reform side, existing support schemes will be harmonised under one comprehensive support mechanism for the renovation of family houses and for the creation of a network of regional one stop-shops. Also new legislation will be introduced to increase the currently low recycling rate of construction and demolition waste along with green public procurement for the contracting of construction works in the national administration, both examples will increase the potential of the circular economy.

The measures in the **Spanish plan** are estimated to deliver on average **71 000 energy efficiency renovations of dwellings per yea**r. This is above the initial target that was set out by the Spanish national energy and climate plan (NECP) of 50 000 dwellings per year. Some measures link the level of grant support to the depth of renovation or the household income. Almost all measures require that on average at least 30% primary energy savings are achieved. These investments are complemented with reforms to improve the general uptake in renovations, such as the set-up of one-stop shops that will facilitate households in the sometimes very complex task to conduct a renovation.

The Low-Cost Residential Retrofit Loan Scheme in the **Irish plan** aims to encourage private investment in energy efficiency based on a loan guarantee to be provided by the state to participating retail banks and other credit institutions. The loan guarantee shall allow banks and other credit institutions to offer **loans with reduced interest rates to private homeowners and non-corporate landlords**, who wish to borrow to finance energy efficiency upgrades of their homes and rental properties. These upgrades should result in on average at least 30% primary energy savings. Hereby, the guarantees should create a multiplier effect which contributes to more efficient use of scarce public funding. The measure aims at leveraging a lending portfolio of between EUR 300 million and EUR 500 million.

Energy renovations in residential buildings are challenging due to the need to involve several owners. The amendments to the Condominium Ownership Management Act under the **Bulgarian plan** aim to tackle barriers to energy efficiency investments in multi-family apartment buildings. To this end, the objective of this measure is to facilitate the decision-making process related to building renovations, regulate the professional management of the condominium property, and facilitate the application for collective loans to different financial institutions. Through these amendments, the plan aims at renovating 3.6 million square meters of residential buildings with on average at least 30% of primary energy savings.

[18] In order for an energy efficiency measure to get a 100% climate tag, the renovation has to lead to on average at least 30% primary energy savings.

Energy efficiency renovations in public buildings

France makes a significant contribution to the objective of reducing its CO2 emissions by dedicating a **big share of its plan to energy renovation measures for public buildings (EUR 3.8 billion).** These renovations are of at least a medium-depth level renovation. These actions generally follow up on actions already undertaken by France through previous policy instruments, thus accompanying an increase in scope and scale of the renovation effort, also with the aim of developing a wider professional know-how to underpin renovations at a larger scale. The plan also contains a significant reform on the thermic regulation of new buildings (RE2020), which is considered key to enshrine good practices in the domain.

Croatia will finance a large-scale renovation to improve the energy efficiency and performance of at least 288 000 m^2 of public buildings. It is expected that the energy renovations will achieve a minimum requirement of **reducing energy consumption for heating by at least 50 %** compared to the annual energy consumption for heating prior to the renovation for each building compared to the pre-renovation state. Croatia is also proposing financial support based on the ambition of the renovation: grants will cover up to 80 % of eligible renovation costs in case of deep renovations or blended seismic and energy renovations.

Since **Romania** is one of the European countries most exposed to seismic risk, energy renovation is to be carried out in parallel with **seismic renovation to ensure a cost-efficient approach and a long-lasting effect of the investment.** These renovations are of at least a medium-depth level renovation. It is expected that at least 2.3 million m^2 of public buildings will be renovated.

Energy efficient constructions

The **Portuguese** building stock has a structural shortage of permanent and temporary housing solutions for more vulnerable groups. The plan includes several investments and support programmes to address these challenges while improving energy efficiency. Portugal will finance the **construction of new buildings and the renovation of existing dwellings for vulnerable groups**, as well as the creation of **temporary accommodation for persons at imminent and actual risk of being left without accommodation following risks or social emergencies**. Additionally, the Portuguese RRP aims at providing affordable public housing for targeted groups in large urban environments, including student accommodations, as accommodation remains one of the biggest barriers in accessing tertiary education. All newly constructed buildings must have a primary energy demand at least 20% below the requirements of nearly zero energy buildings.

Several member states plan to invest in new, **energy efficient healthcare buildings** and laboratories to tackle structural problems evidenced during the Covid-19 pandemic outbreak. For example, the **Slovak RRP** includes a reform to optimise the **hospital network**. A substantial part of newly constructed hospitals as a result of the optimisation reform, must meet high energy efficiency requirements and obtain the certificate Building Research Establishment Environmental Assessment Method (BREEAM).

The Recovery and Resilience Funds will be also dedicated to the **construction of schools, universities and early childcare facilities** across various Member States. For instance, the **Slovenian** plan will invest EUR 81 million in the construction of 6 new highly energy-efficient educational institutions. On early child-care, the **Czech** plan provides for the construction of at least 98 new childcare facilities and the **Belgian** plan includes EUR 61m for the construction and renovation of 1700 early childcare infrastructure in the Walloon region. All new

infrastructure under the RRF must comply with the requirement of at least 20 % primary energy demand below the nearly zero-energy building.

Country overview

The figures provided on overall expenditure on energy efficiency are based on the pillar tagging methodology for the Recovery and Resilience Scoreboard and corresponds to the measures allocated to the policy area 'Energy Efficiency' as primary or secondary policy area. The country overview below however primarily focuses on measures related to energy efficiency in buildings, which is a subset of the overall policy area 'Energy efficiency'. To identify expenditure on measures related to energy efficiency in buildings, the data in the overview below is based on measures that are tracked with intervention fields 025/025bis/025ter/026/026bis, using Annex VI of the RRF Regulation. For all Member States, the listed relevant components are based on the Council Implementing Decision.

Austria

Allocation: EUR 64 million (out of EUR 249 million in energy efficiency). Relevant components: 1 (A.3), and 4 (C.3)

The Austrian plan compromises a series of investments and reforms with an emphasis on energy efficiency in homes and green investments in enterprises. The new Renewable Heating Law will regulate the phase-out of outdated heating systems in existing buildings, ban the installation of oil boilers in new buildings and create a common platform to coordinate flanking measures against energy poverty. The investments will focus on supporting private households to replace oil and gas heating with more sustainable heating devices (heat pumps, biomass and district heating). Additionally, to combat energy poverty, investments under the plan will promote energy efficiency and energy savings targeting low-income households, local municipalities and business through deep renovations, district heating, façade greening, and private investments.

Belgium

Allocation: EUR 1 127 million (out of EUR 1 152 million in energy efficiency). Relevant components: 1.1, 4.3 and 5.1

The Belgian plan includes several reforms and investments related to energy efficiency in buildings, mainly directed to the renovation of residential, social housing and public buildings across regions. The renovations aim at covering 200 000 dwelling (private and social) and 1 120 000 m^2 of public buildings, including schools, universities and sport centres, in the different regions. Another investment creates two complementary mechanisms aimed at demonstrating innovative, circular and sustainable energy-efficient renovations in Brussels. This investment aims at supporting 25 pilot projects, 50 project concepts and an estimated renovated surface of 20 000 m^2.

Bulgaria

Allocation: EUR 1 298 million (out of EUR 1 488 million in energy efficiency). Relevant components: 4 (R1, R2, R3, R4, I1, I3)

The Bulgarian plan aims at improving the energy efficiency of residential and non-residential buildings through the financing of large-scale energy-efficient renovation and targeted reforms to facilitate investments in energy efficiency. The reforms include the simplification and the update of the regulatory framework for transitioning to green buildings, including a decarbonisation fund, the acceleration of energy efficiency projects using Energy Service Companies models to cover the financing of energy efficiency renovations through the energy bills and the legal definition of "energy poverty". Regarding investments, the renovation of public and private buildings aims at covering over 5 million m^2 and at achieving a minimum of 30 % primary energy savings. The Bulgarian plan also aims at supporting energy-efficient street lighting systems.

Croatia

Allocation: EUR 778 million (out of EUR 869 million in energy efficiency). Relevant components: 1.1, 1.2, 2.5 and 6.1

The Croatian plan contains several reforms and investments for energy efficiency and post-earthquake reconstruction of buildings. Investments aim at renovating at least 225 000 square metres of residential buildings, 562 000 square metres of public buildings and 31 000 square metres of buildings with the status of a cultural good. The planned reforms include the adoption of renovation programmes to encourage in-depth renovation of buildings while paying particular attention seismic risks and energy poverty. Additional reforms aim at reducing the administrate burden for applicants, educate and upskill the workforce and develop the systemic energy management and a new energy-efficiency financing model.

Cyprus

Allocation: EUR 89 million (out of EUR 129 million in energy efficiency). Relevant components: 2.1

Cyprus plan includes various support schemes to implement energy efficiency measures in buildings and to combat energy poverty. One investment promotes energy efficiency renovations in buildings and/or facilities owned or operated by SMEs, municipalities, communities and the wider public sector. Another investment focuses on energy efficiency measures in at least 16 200 dwellings, including households of vulnerable electricity consumers, and addressing energy poverty in energy poor households as well as households with people with disabilities. Finally, the plan includes the mass installation of smart metering infrastructure.

Czechia

Allocation: EUR 1 310 million (out of EUR 1 310 million in energy efficiency). Relevant components: 2.1, 2.2, 2.3, 2.5, 2.8, 3.2, 3.3

The Czech plan includes a series of investments to increase the energy efficiency of residential and public buildings as well as reforms for the reskilling of workers on new practices in energy efficiency construction and renovation. These investments aim at the renovation and revitalisation of residential dwellings, state buildings and other public buildings. These renovations aim at decreasing the primary energy consumption by 30%. The renovation of public buildings will include the renovation of 293 pre-school childcare facilities and the construction of 98 new ones, the renovation of 52 social care facilities and the construction of 69 new ones, the implementation of energy efficiency measures in railway station buildings and the construction of energy efficient university facilities. The plan includes an investment on the modernisation of district heating distribution networks as well as an investment intended at improving the energy efficiency of public lighting systems.

Denmark

Allocation: EUR 168 million (out of EUR 208 million in energy efficiency). Relevant components: 3

The Danish plan includes a series of investments and reforms aimed at supporting energy savings for both private and public buildings. investments focus on replacing oil burners and gas furnaces through the expansion of district heating grids into new areas and providing support to households to convert to electric heat pump systems. These investments also support insulation and the optimisation of the operation of the building. For public buildings, energy saving actions will prioritise regional and municipal buildings with the lowest energy performance certificate and buildings heated by oil burners and gas furnaces.

Estonia

Allocation: EUR 47 million (out of EUR 47 million in energy efficiency). Relevant components: 4.1-4.3

The Estonian plan includes a reform and two investments dedicated to the promotion of energy efficiency through building renovations. The reform focuses on reducing the administrative barriers to energy efficient renovations by advising apartment associations, private households and local governments on legislation, technical aspects and financing of renovations. Investments include the deep renovation of apartment buildings and a renovation support scheme for small residential buildings. Both investments aim to achieve at least an average level of primary energy saving of 30 %.

Finland

Allocation: EUR 70 million (out of EUR 130 million in energy efficiency). Relevant components: Pillar 1 component 3

The Finnish plan contains several reforms and investments targeting energy efficiency in buildings. The reforms intend to reform the existing land use and building act to reduce emissions from the entire life span of buildings and establish an action plan to phase out fossil oil heating in 2030, with concrete targets for the reduction in the number of houses using this source for heating. In relation to investments, the Finnish plan supports research and innovation aimed at accelerating the development of low-carbon solutions in the built environment.

France

Allocation: EUR 8 282 million (out of EUR 8 702 million in energy efficiency). Relevant components: 1 and 9

Component 1 of the French Recovery and Resilience plan focuses on financing a large-scale renovation programme to increase the energy efficiency of buildings. The component includes a reform of the thermal regulation of new buildings to improve energy performance, decarbonisation of the energy consumed, reduce the carbon impact of new buildings and adapt buildings to climate change in line with the Renewable Energy regulation. Regarding investments, the plan finances a grant scheme for building owners to improve insulation, heating, ventilation or energy audit works for single-family houses or apartments in collective housing. The plan contains an investment for the energy renovation and major rehabilitation of social housing and an investment for the thermal renovation of public buildings, including hospitals and EHPAD (Residential Establishment for Dependent Elderly People).

Germany

Allocation: EUR 2 557 million (out of EUR 2 557 million in energy efficiency). Relevant components: 1.3

The German plan includes an investment to support a large-scale renovation programme aimed at increasing the energy efficiency of residential buildings. This investment is expected to achieve on average a minimum of 45 % of primary energy savings and potentially significantly more through bonuses for renewable energy and better classes of energy efficiency. These renovations are in line with the Commission Recommendation (EU) 2019/789 on Building Renovation and are expected to renovate 40 000 dwellings. The plan also includes at least four joint municipal living laboratories, projects that explore and demonstrate innovative solutions for the efficient and sustainable energy supply of urban neighbourhoods.

Greece

Allocation: EUR 2 540 million (out of EUR 4 642 million in energy efficiency). Relevant components: 1.2, 3.2, 3.3, 4.3, 4.6

The Greek plan contains several investments which support the energy efficient renovation of residential buildings (105 000 households), 80 hospitals and 210 public buildings, as well as the construction of new judicial buildings. The investments in energy efficiency of residential buildings also include the digitalisation of final energy consumption and the deployment of e-mobility infrastructure. Regarding public sector buildings, the investment will be carried out with the involvement of energy savings companies (ESCOs). Another investment aims to upgrade street lighting infrastructures. The plan contains a reform to put in place an action plan to combat energy poverty and includes actions targeting economically vulnerable households through improve energy efficiency, thereby reducing their energy bills.

Ireland

Allocation: EUR 90 million (out of EUR 90 million in energy efficiency). Relevant components: 1.1, 1.2, 1.3, 2.1

The Irish plan encompasses several investments that aim at assisting households and the public sector to implement energy efficiency investments and green technology solutions to reduce carbon emissions. The Public Sector's Energy Retrofit Program aims at fostering the modernisation of public building stock to reduce energy consumption and its carbon footprint. A second measure encourages private investment in energy efficiency by setting up a low interest rate residential retrofit loan scheme for private and non-corporate landlords. Another measure will finance the construction of a shared Government data centre that will lead to substantial energy savings (at least 50 %) and replace the existing inefficient data centre buildings.

Italy

Allocation: EUR 22 001 million (out of EUR 22 851 million in energy efficiency). Relevant components: F.1 (2.1I, 1.1R) F.2, F.3 (1.1, 1.2, 3.1)

In its Recovery and Resilience plan, Italy includes a series of investments and reforms that aim at improving the energy efficiency of private and public buildings. The plan comprises a major investment ("Superbonus", €12 billion) that will finance the energy renovation of residential buildings in the form of a tax deduction over five years, easing the high initial investment costs. Other investments comprise the renovation and requalification of justice buildings, and the progressive replacement of school buildings with more sustainable buildings. Italy has also committed to developing a more efficient district heating. Its energy savings will amount to 20 KToe. Further investments aim at improving the energy performances of buildings in the culture and creative sectors. The plan also envisages several reforms that aim at removing critical bottlenecks for the authorisation procedures for renewables and energy efficiency of buildings and simplifying and accelerating the procedures for energy efficiency interventions.

Latvia

Allocation: EUR 111 million (out of EUR 268 million in energy efficiency). Relevant components: 1.2.1.1, 1.2.1.2, 1.2.1.3, 1.2.1.4

Latvia's RRP envisages significant measures to reduce greenhouse gas emissions through energy efficiency measures both in the public and private sector buildings. The measures consist in investments to improve the energy efficiency of multi-family apartment buildings due to the high level of energy consumption of the building sector (40% of final energy consumption). Another measure will support Latvian businesses in improving energy efficiency and introducing renewable energy technologies and related research and development activities. Further energy efficiency-related stimuli will target municipal and infrastructure buildings as well as those owned by the central government, such as historical and judicial buildings.

Lithuania

Allocation: EUR 185 million (out of EUR 185 million in energy efficiency). Relevant components: A1.2, A1.3, B.1.3.1, B.1.3.2, B.1.3.3, B1.3.4

The Lithuanian plan addresses the challenges linked to energy efficiency in buildings through a substantial reform. This reform contributes to accelerating the building renovation process through (i) the updating and testing in practice of building renovation packages and standards, and the creation of a methodology for the development of sustainable cities; (ii) the creation of tools to simplify building renovation coordination, and technical assistance; (iii) the promotion of supply of construction products and services that speed up the renovation of buildings. Finally, the Lithuanian plan includes measures such as investments in infrastructure of healthcare facilities and installation of day care centres which contribute to the green transition. two measures related improving the health system, one related to the refurbishment of hospitals and the second to the installation of day care centres.

Malta

Allocation: EUR 54 million (out of EUR 73 million in energy efficiency). Relevant components: C1-R1, C1-I1, C1-I2

Malta's RRP comprises three investments and one reform that address energy efficiency in buildings. One of the main investments consists in the renovation, including deep retrofitting, and in the greening of at least 9 232 m2 of public buildings, and of at least 40 605 m2 of private sector buildings that should lead to at least a 30% reduction of primary energy demand (PED). Similar measures target public hospitals, and two public schools and will serve as a model for the renovation of other similar buildings. A complementary reform aims at developing a long-term renovation strategy to promote the renovation of Malta's building stock by 2050, and to train professionals in buildings renovation with a view to enhancing energy performance and increasing the use of renewable energy.

Netherlands

Allocation: EUR 849 million (out of EUR 849 million in energy efficiency). Relevant components: C3.I1 and C3.I2

The Dutch plan includes under component 3 several measures related to improving the housing markets and making the real estate more energy efficient. On the investment side, the Dutch plan will provide two different subsidy schemes, one to households supporting the installation of heat pumps, solar boilers, thermal connections and implementation of insulation measures. The second investment supports the owners of public real estate in order to improve the buildings energy efficiency and reduce CO2 emissions.

Poland

Allocation: EUR 4 633 million (out of EUR 4 933 million in energy efficiency). Relevant components: B1.1, B1.1.2, B1.1.3, B1.1.4, B1.2, B1.2.1, B3.4.1, B3.5, B3.5.1,

The Polish plan aims at supporting large-scale energy efficiency renovations of residential and public buildings. To achieve this, the plan includes a reform of the energy efficiency regulatory framework and a reform to amend the national building renovation scheme to promote faster energy savings. As for investments, one investment focuses on the energy renovation of the building envelope and on replacement of space and water heating equipment by renewable energy installations in private dwellings. Another investment covers the modernisation of district heating to install low-carbon and renewables for district heating.

Portugal

Allocation: EUR 4 555 million (out of EUR 5 376 million in energy efficiency). Relevant components: C01, C02, C03, C04, C06, C07, C010, C011, C013, C019

Representing 52 % of the green measures, energy efficiency in buildings is a big priority in the Portuguese plan. Investments include building renovations and constructions increasing energy efficiency of public infrastructure, for notably in health care facilities, schools, research facilities, cultural centres and government buildings. In addition, the plan will finance energy efficient building renovations and constructions for at least 26 000 households with the greatest needs and belonging to the most vulnerable groups. This investment is complemented by a reform to set up a national urgent and temporary housing plan, with a view to protecting and empowering the identified vulnerable groups.

Romania

Allocation: EUR 4 722 million (out of EUR 4 786 million in energy efficiency). Relevant components: 5, 6, 7, 10, 11, 12, 13, 14, 15

Energy efficient building renovations and constructions make up 30% of the climate-tagged measures in the Romanian plan, which shows the great importance put on it. In particular, the plan establishes a Renovation Wave fund backed by more than EUR 2 billion to finance energy efficiency actions to renovate 4.4 million m2 of multi-family apartment buildings and 3.6 million m2 of public buildings. Since Romania is one of the European countries most exposed to seismic risk, energy renovations will be carried out in parallel with seismic renovations to ensure a cost-efficient approach and a long-lasting effect of the investment. The investment aims to achieve at least an average level of primary energy savings of 30 %. This investment and others are reinforced by new reforms. For example, a simplified regulatory framework to support investments in green and resilient buildings aims to reduce by at least 50% the time required for the issuance of building permits. The Romanian plan integrates key principles of the European Green deal, such as promoting resource efficiency, nature-based solutions, biodiversity corridors, and circular economy.

Slovakia

Allocation: EUR 1 723 million (out of EUR 2 086 million in energy efficiency). Relevant components: 2, 4, 6, 7, 8, 11, 12, 13, 15, 16

Energy efficiency measures in buildings represent 50 % of the green measures in the Slovak plan, being the clear green priority of the plan. The plan contains

several energy efficient investments and reforms for both private and public buildings. The highlight would be the renovation of 30 000 family homes with on average at least 30% primary energy savings. Preference will be given to old homes achieving medium to deep renovations (60% primary energy savings and above). Another example includes a building construction measure which aims at building new energy efficient hospitals, which also obtain the Building Research Establishment Environmental Assessment Method certificate (BREEAM). For the renovated hospitals, 30% of primary energy savings is to be achieved. The investments are complemented with reforms, such as the harmonisation of support mechanisms and the publication of an implementation plan to mobilise green renovations of family houses.

Slovenia

Allocation: EUR 213 million (out of EUR 218 million in energy efficiency). Relevant components: 1, 2, 3, 11, 12

The Slovenian plan includes a series of reforms and investments in energy efficiency in buildings. There are reforms to establish a fund for energy renovations as well as a legal ban on the installation of heating oil, fuel oil or coal boilers. On the investment side, 20 000m2 of multi-family apartment buildings as well as 89 000m2 of public buildings of high administrative and social importance due to COVID-19 pandemic will be renovated in an energy efficient manner. In addition, the plan includes an investment to make tourist accommodation more sustainable and energy efficient. In terms of public buildings, six new highly energy efficient education institutions and a Centre for seeds, nurseries and forest protection will be built. These newly constructed buildings will have a primary energy demand that will be at least 20 % lower than the nearly zero-energy building (NZEB) requirement.

Spain

Allocation: EUR 7 756 million (out of EUR 8 868 million in energy efficiency). Relevant components: 2, 11, 12, 14, 17, 26

The Spanish plan includes a series of investments and reforms to support energy efficiency in buildings, which make up more than 20 % of the green measures in the plan. In terms of reforms, the plan includes a Spanish urban agenda, Spain's long term renovation strategy, a housing law, a Law to improve the architectural landscape and the creation of 'one-stop-shops' for building renovations. On the investment side, the largest investments are to renovate at least 355 000 unique dwellings as well as 1.23 million m2 of public buildings, both aiming to achieve on average a primary energy demand reduction of at least 30 %. There is also a programme to construct at least 20 000 new highly energy efficient buildings for social rental purposes or at affordable prices, which will be built in particular where currently social housing is insufficient.

Sweden

Allocation: EUR 256 million (out of EUR 424 million in energy efficiency). Relevant components: 1

The Swedish plan includes two investments in energy efficiency in buildings. The first investment is a public support scheme to incentivise property owners to renovate at least 600 000 m2 of multi-family apartment buildings, which would usually not be profitable for the owners. The investments aim to achieve at least an average level of primary energy savings of 30 %. The second investment plans to increase the supply of highly energy efficient rental and student housing by 4 800 new dwellings, which will ease access to housing for individuals in the lower half of the income distribution. These dwellings will have a primary energy demand that will be at least 20 % lower than the nearly zero-energy building (NZEB) requirement.