



Report on buildings and energy strategies linked to renovation wave policies and climate change mitigation initiatives

D5.4

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List of Abbreviations

GHG	Greenhouse Gas
MS	EU Member State
SECAP	Sustainable Energy and Climate Action Plan
KPI	Key Performance Indicator
RW	Renovation Wave
NRRP	National Recovery and Resilience Plan
WAM	With Additional Measures
WEM	With Existing Measures
NECPs	National Energy and Climate Plans
LTRS	Long-Term Renovation Strategies
RRF	Recovery and Resilience Facility
NGEU	Next Generation EU
NUTS	Nomenclature of Territorial Units for Statistics
toe	Tonne of oil equivalent
MtCO ₂ eq	Million tonnes of CO ₂ equivalent
GtCO ₂ eq	Gigatonnes of CO ₂ equivalent
ESD	Effort Sharing Directive
ETS	Emission Trading System
HDD	Heating Degree Days
CDD	Cooling Degree Days
SCSI	Summer Severity Index
WCSI	Winter Severity Index
ECI	European Cooling Index
SOI	SDG-oriented indicators

Executive Summary

The EU projections call for an annual energy renovation of all the building stock at a rate of 1% for 2021–2022, an increase to 1.2% for 2023–2025, and a stabilisation of at least 2% for 2026–2029. As a response to this urgent need, the Renovation Wave (RW) Initiative has been introduced as one of the largest parts of the Next Generation EU (NGEU) recovery package which runs for six years, from 2021 to 2026. It aims at improving energy efficiency in buildings by providing financial, technical, and structural support for the national and regional renovation programme.

Deliverable 5.4 conducts a comprehensive review of 112 national and regional renovation wave programmes in six selected countries (Italy, Spain, Poland, Germany, Austria, and Belgium) to uncover the main linkage between these policies and climate change mitigation initiatives as well as relevant SDGs and SECAP KPIs. The information generated in this deliverable will later be included in the LOCALISED Decarbonisation Profiler (WP8). Through a systematic review of the programmes covered by the RW initiative, the most relevant projects in terms of renovation, construction, or energy implementation of sustainable buildings were identified. A methodology was developed to compare these programmes in a harmonised, transparent, and replicable fashion. The deliverable presents the cluster of RW programmes for each of the six analysed countries at the national and regional levels as well as detailed descriptions that indicate for each programme: duration of the programme, funding scheme involved, target groups (to whom the programmes are addressed), coverage (national or regional), and as a conclusion, whether the adoption of these programmes leads to structural change or not. Furthermore, specific interventions in each programme are linked to the LOCALISED Mitigation/Adaptation database and to relevant SDGs and SECAP KPIs.

Furthermore, using an innovative methodology for clustering the EU regions based on climatic and socioeconomic conditions, a regional analysis was performed for selected regions in these six countries. The results of regional analysis match those of the national programmes. In both cases, the main SDGs linked to the RW programmes are SDG 7 (Ensuring access to affordable, reliable, sustainable and modern energy for all), SDG 11 (Making cities inclusive, safe, resilient and sustainable), and SDG 13 (Taking urgent action to combat climate change and its impacts). In terms of the intervention type, two categories stand out in both national and regional programmes: In warmer climate, A04 (Increase Efficiency of Cooling Systems), and in colder climate, A05 (Increase Efficiency of Heating Systems), seem to come to prominence. Finally, in a small but socio-culturally diverse country like Belgium, there seems to be a tendency to achieve RW programmes' objectives through implementing modern management systems (A12) and innovative regulations and standards (A18). Energy poverty pillar and buildings energy consumption are identified as the most relevant SECAP KPIs in both national and regional RW programmes.

1 Introduction

The Renovation Wave (RW) initiative has been designed by the European Union (EU) to tackle the dual problem of economic growth and energy saving in the building sector. In particular, it aims to double the annual energy renovation rate throughout the EU by 2030 and to foster deep energy renovations¹. As a result, such interventions would inevitably not only stimulate economic growth and job creation by creating new demands for renovation, but also foster the EU's contribution to the Sustainable Development Goals (SDGs), through the implementation of Sustainable Energy and Climate Action Plans (SECAPs) before 2030.

The main goal that EU countries attempt to achieve through the construction or the improvement of environmentally friendly buildings, by implementing RW strategies, is saving energy. In any event this would also promote the reduction of harmful GHG emissions, with great benefits in terms of environmental sustainability and climate change mitigation. In detail, the Renovation Wave strategy will prioritise three areas, namely: "tackling energy poverty and worst-performing buildings", "improving public buildings and social infrastructure", and "decarbonizing heating and cooling".

In general, improving the energy performance of buildings is important to meet energy efficiency requirements across the EU and worldwide. Since the building sector is responsible for about 39% of CO₂ emissions globally², the linkage between energy savings and the reduction of GHG emissions is particularly relevant here. In Europe, however, much of the building stock does not meet energy efficiency standards which currently results in about 1 GtCO₂ eq of GHG emissions per year from the combined consumption of fossil fuel, electricity, and heat in the building sector (Figure 1).

The two main components of GHG emissions in buildings fall under different EU regulations. While the Effort Sharing Directive (ESD) regulates the emissions from fossil fuels used in buildings, the EU Emission Trading System (ETS) sets standards for electricity generation that regulate emissions from electricity consumption. While generally important, none of these initiatives are specifically designed to target emissions from the building sector. This calls for a significant investment in renovation efforts to achieve the key energy savings and climate stabilisation goals³.

¹ <https://op.europa.eu/en/publication-detail/-/publication/91a70718-da3f-11ec-a95f-01aa75ed71a1/language-en>

² <https://www.iea.org/reports/global-status-report-for-buildings-and-construction-2019>

³ <https://homes4all.it/renovation-wave-che-cose-ristrutturazione-e-sostenibilita/>

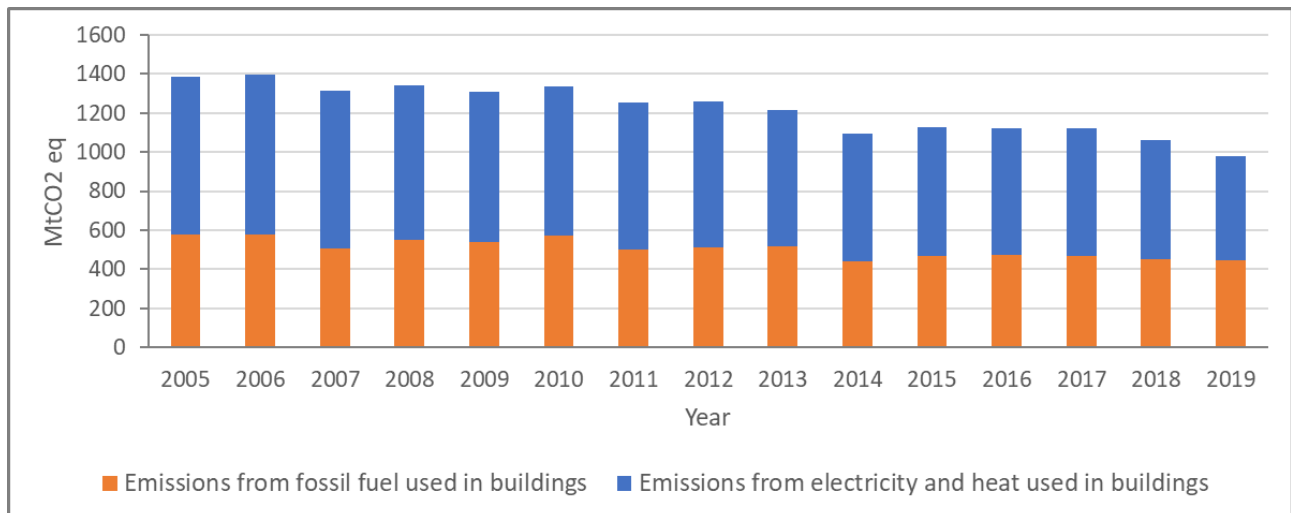


Figure 1: Total emissions from electricity, heat, and fossil fuel used in the EU buildings.⁴

These policies will accelerate the historical trend of emissions reduction in buildings in the EU. As Figure 2 indicates, between 2005 and 2019, GHG emissions in EU buildings have already fallen by about 23% on average.

To further accelerate decarbonisation in the building sector, the European Commission Vice President Frans Timmermans launched the RW initiative on 14th October 2020, emphasising that " We want everyone in Europe to have a home they can light, heat, or cool without breaking the bank or breaking the planet."⁵ As most of the EU housing stock is old and inefficient and in a dire need of upgrading, launching the RW initiative therefore is an essential measure for the decarbonisation of the EU region. Under RW policies, the decarbonisation trend in buildings is projected to continue, and the GHG emissions are expected to sink further by about 13% in 2023, compared to 2020 levels (Figure 2). Furthermore, given that nearly 34 million Europeans cannot afford to adequately heat their homes, promoting energy efficiency in buildings also means tackling energy poverty and providing equal access to common resources for all EU citizens⁶.

⁴ <https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emissions-from-energy/assessment>

⁵ https://single-market-economy.ec.europa.eu/news/renovation-wave-doubling-renovation-rate-cut-emissions-boost-recovery-and-reduce-energy-poverty-2020-10-14_en

⁶ <https://www.rinnovabili.it/energia/efficienza-energetica/renovation-wave-strategia-riqualificazione-edilizia/>

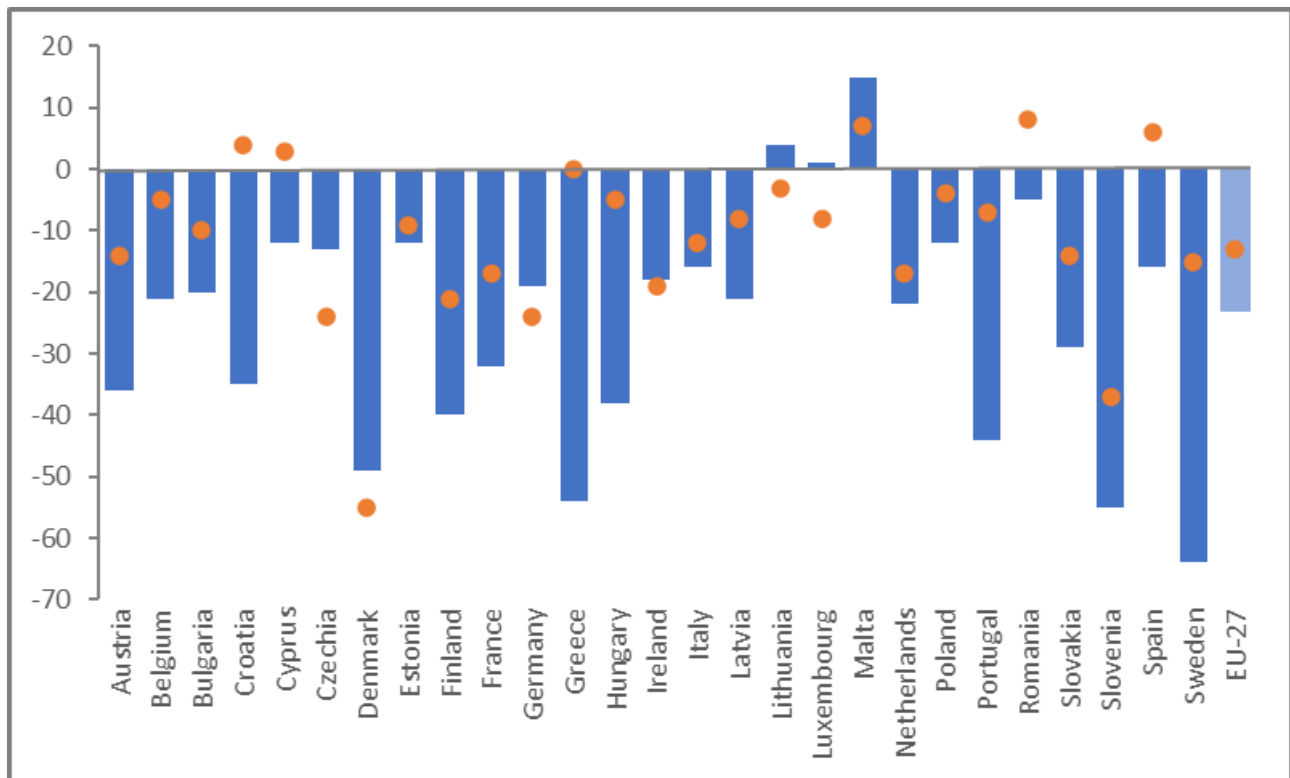


Figure 2: Percentage changes in GHG emissions from energy use in buildings across the EU. The historical trends from the 2005-2019 period (blue bars) and the 2020-2030 projections with existing measures (orange dots).⁷

1.1 Energy consumption in the building sector

About 27.0% of the EU's total final energy consumption in 2020 came from households. Of this amount, electricity (24.8%) and natural gas (31.7%) account for the majority of final energy consumption in EU households. Other sources include renewable energies (20.3%), oil and petroleum products (12.3%), followed by derived heat (8.2%). Coal-related (solid fuels) items still account for a tiny share (2.7%).

1.1.1 Household energy consumption in the EU

In 2019, the EU's average energy consumption per dwelling was 1.3 tonnes of oil equivalent (toe). Even after adjusting to for varying climate conditions, there are still significant differences between nations, ranging from 0.5 toe/dwelling in Malta to 2.3 toe/dwelling in Luxembourg. Since 2000, the majority of EU nations have seen a decline in their household energy consumption as shown in Figure 3 (-1.0% annually at the EU level).

⁷ <https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emissions-from-energy/assessment>

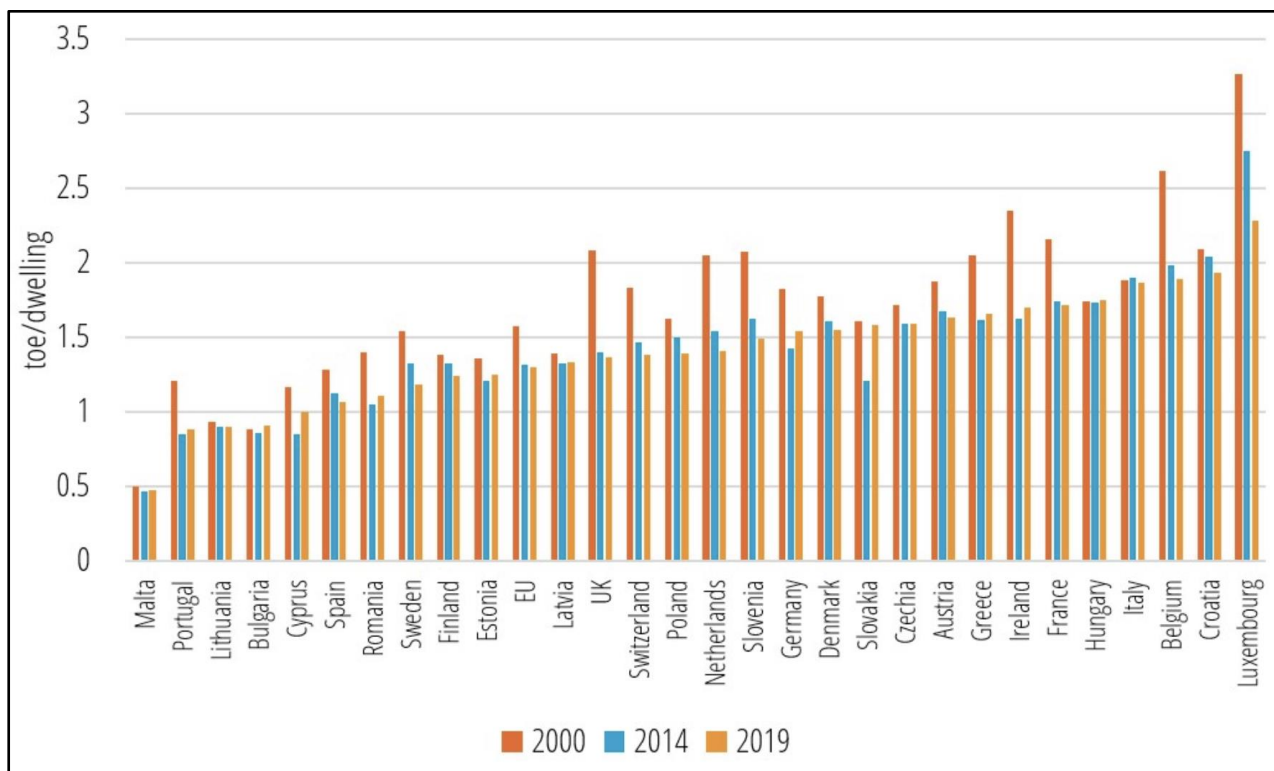


Figure 3: Energy consumption per dwelling, scaled to the EU average climate.⁸

1.1.2 Household heating energy consumption in the EU

The EU households mainly consume energy to heat their homes (62.8% of the total residential energy consumption). The share of electricity used for water heating is 15.1%, while the usage for lights and most electrical appliances accounts for 14.5% (primary heating, cooling, and cooking systems are not included)⁹.

As we can see in Figure 4, while some major EU countries like Germany, Spain, and Poland have experienced a considerable decline in the unit energy consumption per m² for space heating, the energy consumption in other countries like Italy has not changed significantly since 2014.

⁸ <https://www.enerdata.net/publications/executive-briefing/households-energy-efficiency.html>

⁹ <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220617-1>

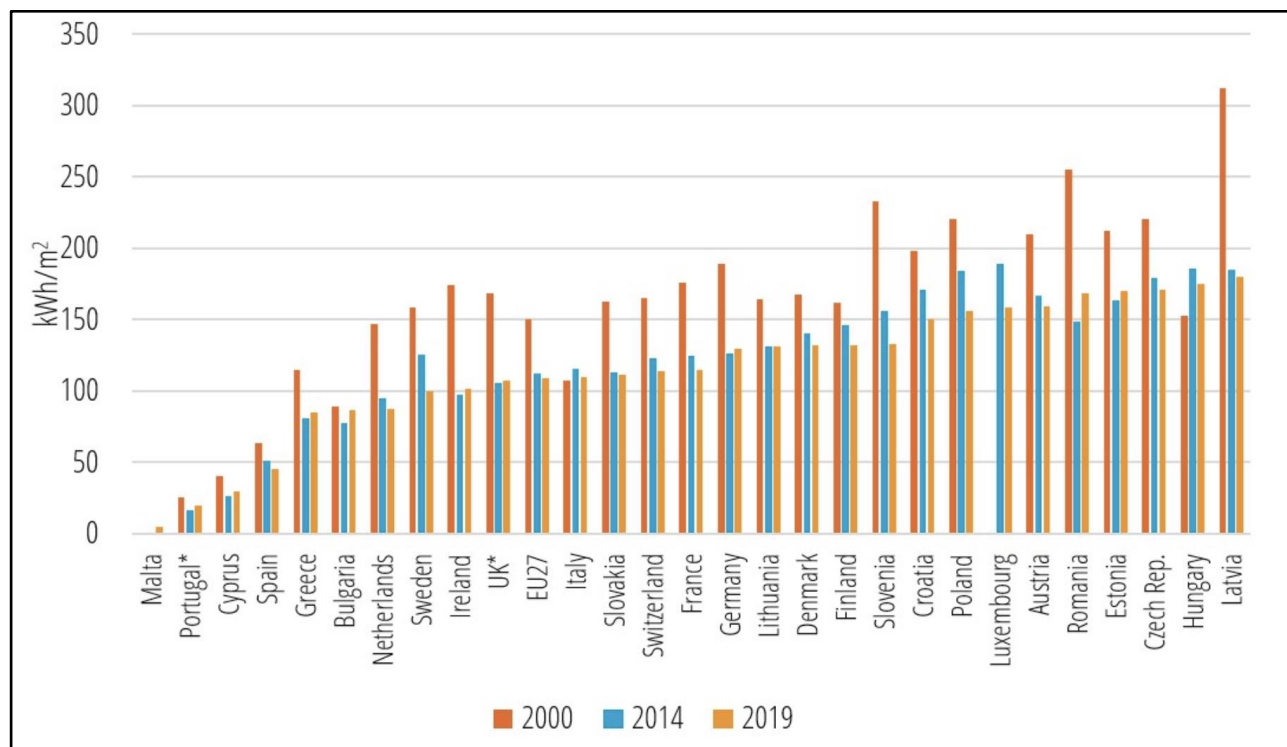


Figure 4: Households heating consumption per m².¹⁰

1.2 The need for a Renovation Wave in the building sector

Figure 5 demonstrates the expected renovated and constructed floor areas in the EU countries by 2030. Specifically, the information supplied for Germany, Italy, Poland, and Spain (whose project data are examined in more detail later in this report), show that unrenovated buildings will still remain in large numbers, respectively 72.3% (Germany), 76.2% (Italy), 73.0% (Poland), 72.4% (Spain).

The categories used in Figure 5 and Figure 6 to classify buildings are:

- **Least efficient new building** – new building energy consumption is aligned with the minimum national regulation
- **Medium efficient new building** – new building energy consumption is that of the EU benchmark set for a nearly zero-energy building (nZEB), depending on the climate region the benchmark ranges between 80 and 50 kWh/m²
- **Highly efficient new building** – new building energy consumption is zero as the building is self-sufficient in terms of energy
- **Shallow renovation** – Indicative energy consumption target in the building after renovation is 100 kWh/m²
- **Medium renovation** – Indicative energy consumption target in the building after renovation is 75 kWh/m²

¹⁰ <https://www.enerdata.net/publications/executive-briefing/households-energy-efficiency.html>

- **Deep renovation** - Indicative energy consumption target in the building after renovation is 50 kWh/m²
- **Unrenovated buildings**

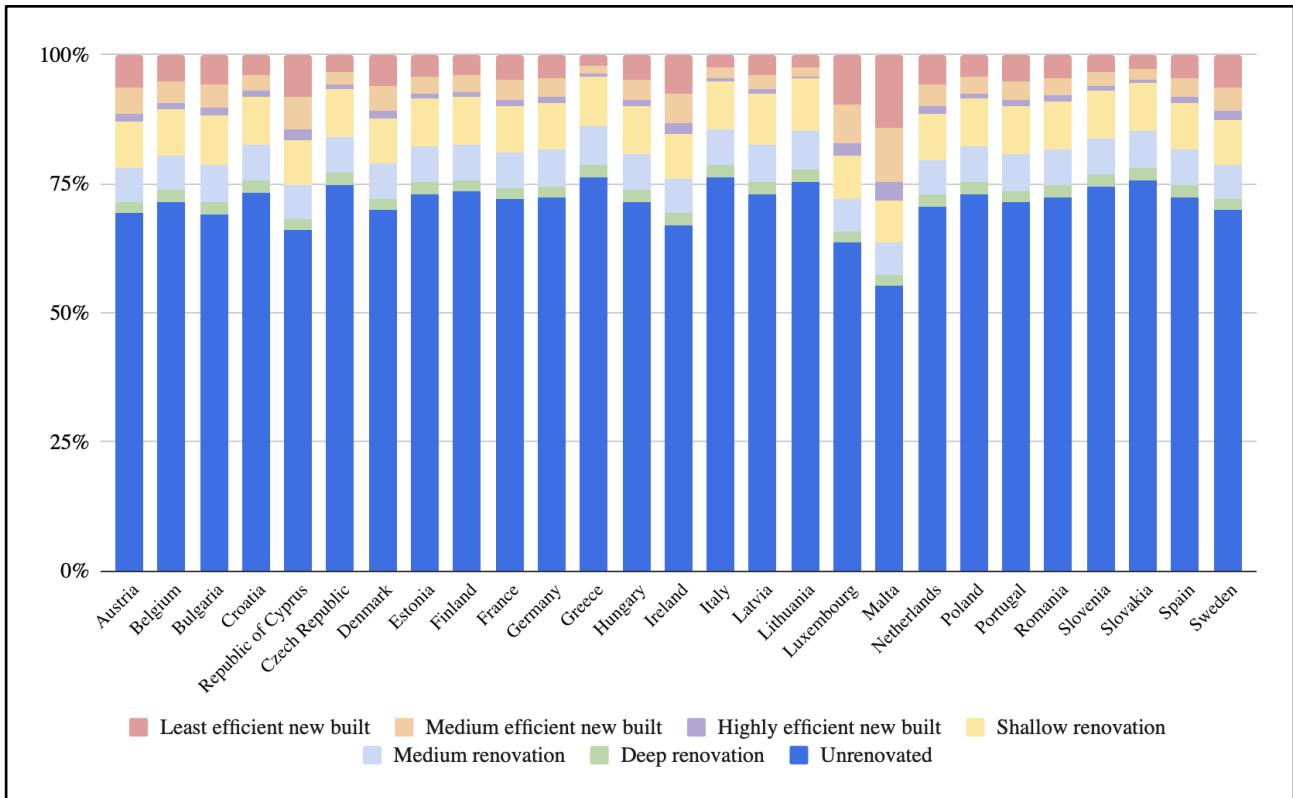


Figure 5: Renovated and constructed floor area by achieved energy performance category by 2030.¹¹

Figure 5 shows that Italy will be the country with the highest number of unrenovated buildings (76.2%) in 2030. As shown in Figure 6, only 0.6% of buildings are expected to be deeply renovated in Italy by 2050 while 45.3% of buildings will remain unrenovated. Nevertheless, most of the buildings will undergo some sort of renovations. A similar outcome is also expected for Spain. In this case, it is expected that only 0.2% of the buildings in the country will undergo deep renovation and 38.5% of the buildings will remain unrenovated. On the other hand, in the year 2050, Poland and Germany are projected to be more careful and develop deep renovations respectively for 5.5% and 4.1% of the buildings on their territories.

¹¹ <http://tool.european-calculator.eu/app/buildings/renovation-construction>

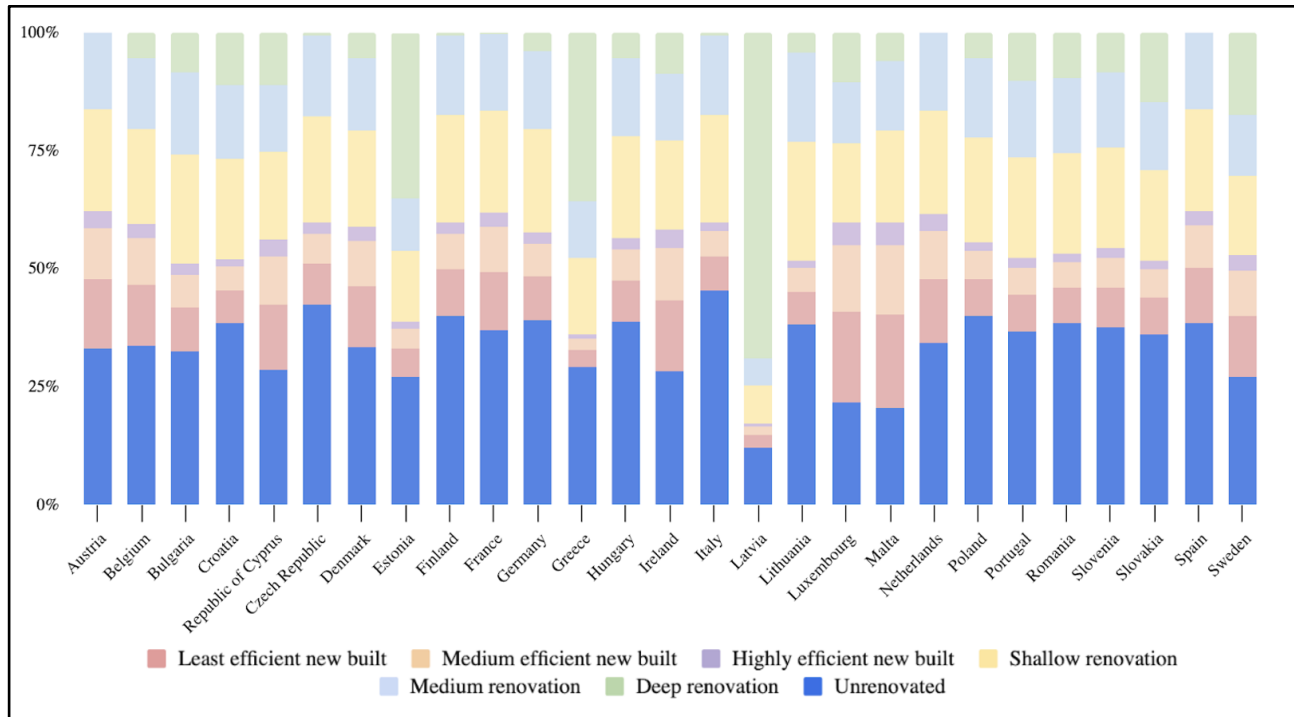


Figure 6: Renovated and constructed floor area by achieved energy performance category by 2050.¹²

1.3 Financing Renovation Wave Initiatives

The main sources of financing for investment in the RW policies are the Recovery and Resilience Facility (RRF) and the EU flagship initiatives "Renovate" and "Power Up". The RRF is the largest part of the EUR 750 billion Next Generation EU (NGEU) recovery package which runs for six years (2021-2026). RRF has a total budget of EUR 672.5 billion including 37% dedicated to climate initiatives. Additional financial resources include policy funds (with a proposed budget of EUR 330 billion) that aim to achieve high energy performance in line with the goals of national energy and climate plans (NECPs) and long-term renovation strategies (LTRS). Also part of the renovation wave funds are InvestEU's dedicated financial products for building energy renovation and the European Investment Bank support for the Building Renovation Initiative for aggregating building renovation projects into portfolios¹³. Additionally, the National Recovery and Resilience Plans (NRRP) that are financed by RRF grants include specific decarbonisation targets for the building sector. These plans are allocated to each country in response to the COVID-19 pandemic¹⁴.

¹² <http://tool.european-calculator.eu/app/buildings/renovation-construction>

¹³ <https://www.fi-compass.eu/sites/default/files/publications/Financing the EU Renovation wave through FIs.pdf>

¹⁴ https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

When the EU Commission launched the RW initiative, Energy Commissioner Kadri Simson illustratively suggested that if the EU member states (MS) allocated one third of the 37% climate-related investment earmarked in the RRF to support renovation of the EU's buildings, investment would amount to over EUR 80 billion, approximately 12% of the total RRF funding.

However, public funding alone cannot cover the scope of renovation required to satisfy the EU climate objectives. According to the Commission, the EU spends between EUR 85 and EUR 90 billion annually on improving the energy efficiency of buildings. Furthermore, according to the RW initiative, renovations will require additional EUR 275 billion/year through 2035 to fulfil the new 55% objective, which includes decarbonising heat in buildings. This is the highest climate investment gap of any industry.

To close this gap and increase investor trust, more private investment sources must be matched with the NRRP financing. A deciding factor will also be the implementation of greater technical assistance to promote adoption of new technologies and better training of the workforce in construction and renovation projects.

A study of 18 selected EU member states has shown that out of a total of EUR 472 billion that are anticipated to be allocated to these countries, EUR 39.9 billion are currently designated for building energy renovation. Figure 7 shows the country-level allocation of NRRP funds for energy renovation for these 18 EU member states. As this figure indicates, a large variation in energy renovation investment exists across the EU countries, ranging from EUR 0.1 billion for Slovenia and Austria to EUR 6.6 billion and EUR 8.6 billion for Spain and Italy, respectively.

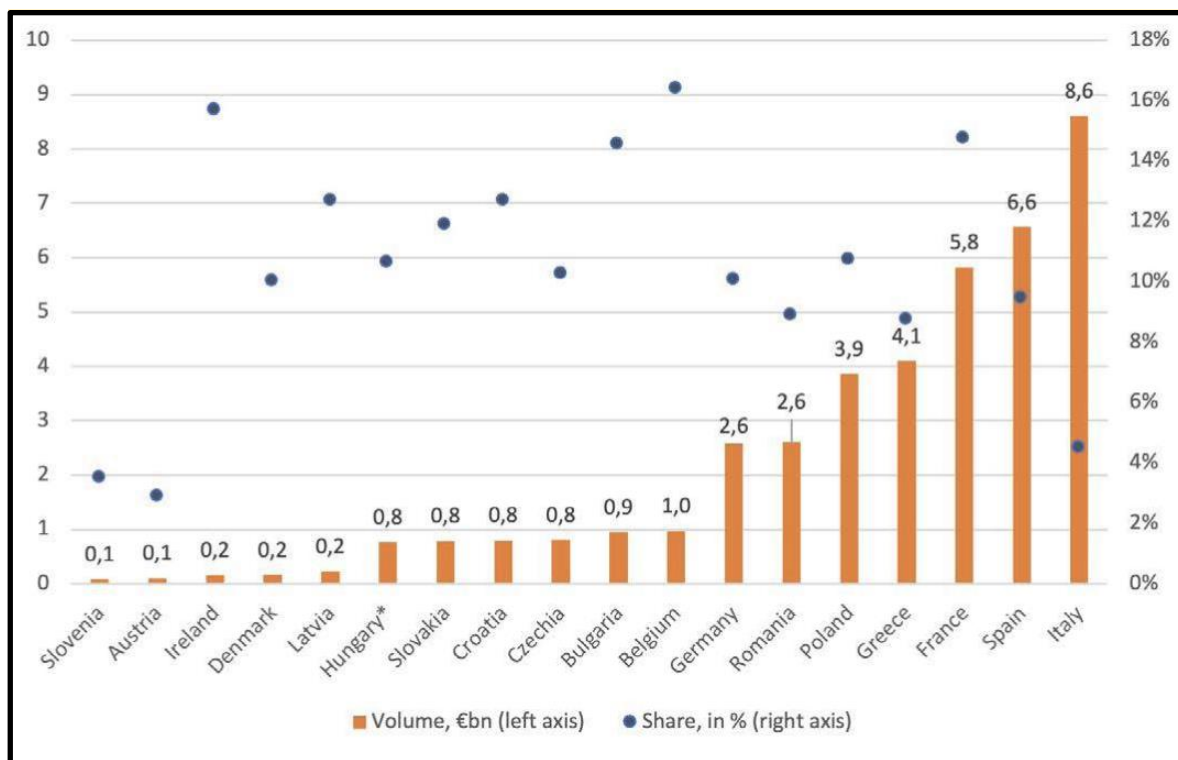


Figure 7: Allocation of NRRP funds to energy renovation initiatives in 18 selected EU countries.¹⁵

The allocated funds for this flagship initiative are intended to increase energy efficiency in both public and private buildings. The details of each MS's implementation will determine the precise scope and amount of financing. Public-private partnerships may be included in these plans, depending on the particularities of the national implementation. The NRRPs present a unique opportunity to accelerate the delivery of deep renovation across the EU. The analysis of the NRRPs in this deliverable demonstrates that significant renovation activity is planned and will be made possible through the successive disbursement of RW programmes. But these renovations must be done properly, and the money must be spent well. This unprecedented additional injection of public funds must set the EU building stock firmly on the path to achieving its Renovation Wave goals of 2030 and meeting the 2050 climate targets. Today, it is important to assess whether NRRPs have the potential to be "transformative" in the path toward achieving the national goals set out in the Long-Term Remediation Strategies and the EU goals set out in the Renovation Wave initiative¹⁶.

¹⁵ <https://www.renovate-europe.eu/renovate2recover-how-transformational-are-the-national-recovery-plans-for-buildings-renovation/>

¹⁶ <https://www.renovate-europe.eu/renovate2recover-how-transformational-are-the-national-recovery-plans-for-buildings-renovation/>

2 Renovation Wave Policies in LOCALISED

2.1 Ambition and consistency

2.1.1 Renovation Wave in Decarbonisation pathways

RW programmes aim to have effects on the entire EU community, and even though the weighted annual average rate of energy remodelling is presently only 1%, the trend is expanding. By 2030, the EU Commission hopes to improve average gains in energy efficiency while at least doubling this rate. As a result, in the upcoming ten years, 35 million structures may need to be renovated. This could start a positive feedback loop between rising demand for more extensive renovation developing more sustainable products, and faster renovation methods. According to estimates, there are 220 million building units in the EU. The EU predictions call for an annual energy renovation rate of 1% for 2021–2022, an increase to 1.2% for 2023–2025, and a stabilisation at minimal 2% for 2026–2029, considering the reality that renovation projects require a certain amount of lead time. In both the residential and service sectors, the rate of renovations that only involve replacing heating equipment must hit about 4% in 2026–2030. The gradual rise enables the supply chain to adapt as well as the mobilisation and absorption of the proposed funding. To achieve climate neutrality across the EU by 2050, the increased rate of renovation will need to be sustained with increased depth also after 2030.¹⁷

As presented in deliverable D2.1, if we consider decarbonisation scenarios in the EU, we can see how buildings and the construction industry are responsible for almost 40% of all energy-related worldwide CO₂ emissions. Therefore, a net-zero carbon future is impossible without decarbonising buildings. In addition, reducing emissions in buildings has spill over impacts on other parts of the society, from lowering energy costs to improving public health and creating green jobs. However, decarbonisation of the building sector requires significant investments from the government and long-term commitments from public and private actors. Table 1 shows the planned allocation of resources needed for renovation efforts in the building sector in the 8 EU countries studied in this report.

¹⁷ https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1836

Table 1: Contribution of the building sector to national decarbonisation pathways for selected EU countries

Country	Residential buildings	Non-residential buildings	Source
Italy	<p>Tax deductions for energy-efficient retrofitting and restoration of existing buildings</p> <p>EUR 45.5 billion between 2021-2030</p>	<p>Programme for upgrading the energy efficiency of central government buildings (PREPAC)</p> <p>EUR 290 million between 2021-2030</p> <p>EUR 40 million between 2020-2022</p>	<p>Integrated national energy and climate plan</p>
Spain	<p>Energy efficiency in existing buildings in the residential sector</p> <p>EUR 5,059 million over the 2021-2030 period</p>	<p>Energy efficiency in buildings of the service sector</p> <p>EUR 2,166 million over the 2021-2030 period</p>	<p>National integrated energy and climate plan (PNIEC)</p>
Poland	<p>Between 2014-2019, aggregate value of co-funded single and multi-family renovation amounted to about EUR 2.1 billion</p> <p>Financial needs for renovation of residential buildings evaluated at ~EUR 70 billion between 2021-2030</p>	<p>Between 2014-2019, aggregate value of co-funded public- and enterprise-building renovation amounted to about EUR 2.7 billion</p> <p>Financial needs for non-residential buildings evaluated at ~EUR 28 billion between 2021-2030</p>	<p>Polish Long-Term Building Renovation Strategy</p>
Germany	<p>Use renewable energies to generate heating and cooling, as well as for certain heat storage facilities and local heat networks, both in residential and non-residential buildings</p> <p>EUR 320 million/year</p>		<p>Long-Term Renovation Strategy of the Federal Government</p>
Belgium	<p>The wave of renovation (EUR 1,012 million) will concern 1,300,000 m² of public buildings and 240,000 additional private residences (including social housing) whose energy performance is not optimal and has the potential to reduce energy consumption, while improving environmental and health performance. This component thus contributes significantly to the national objective of reducing -0.085 MtCO₂e per year until 2030, which is part of the national energy and climate plan adopted in</p>		<p>Recovery and Resilience Plan Belgium</p>

	2019.	
Austria	<p>The objective of the subcomponent (Renovation Wave) is to (i) promote the green transition by supporting the replacement of climate-damaging oil and gas heating systems with renewable technology, and (ii) strengthen social resilience by supporting complex thermal renovation of dwellings to reduce the energy costs of low-income households.</p> <ul style="list-style-type: none"> • Renewable Heating Law • Exchange of oil and gas heating systems (EUR 158.92 million) • Combating energy poverty (EUR 50 million) 	Recovery and Resilience Plan Austria
Portugal*	<p>Rehabilitation of buildings intended for housing or other activities, including the most suitable integrated energy efficiency solutions within this rehabilitation scope.</p> <ul style="list-style-type: none"> • Energy efficiency in residential buildings: Large-scale renovation programme to increase the energy efficiency of residential buildings (EUR 300 million) • Supporting programme for access to housing: Providing decent and adequate housing for at least 26,000 households in need (EUR 2,7 billion) 	IFRRU 2020 Portugal's Recovery and Resilience Plan

* This report only contains the list of national programmes for Portugal in the Appendix (A7).

2.1.2 Renovation Wave in LOCALISED

This report under Task 5.3 of LOCALISED is the final version of a deliverable aimed at monitoring national, regional, and local RW initiatives. The purpose of this report is to establish the link between renovation programmes and the decarbonisation of the building stock, which, more specifically, means linking RW programmes with SDGs and SECAP KPIs. The programmes identified in this report include projects dealing with the issues of sustainability, renovation of old buildings, or the construction of new ones. These programmes aim to incentivise interventions to increase energy efficiency and to improve heating and cooling systems using renewable sources. This may include, among many others, certifying the energy saving efforts that combine energy efficiency measures and enhancement projects (e.g., White Certificates in Italy).

Therefore, in connection with deliverable D5.1, this report contributes to the overarching objective of the LOCALISED project to present a set of SDG-oriented indicators (SOIs) to establish in detail, where municipalities are, where they need to go, and how they get there in a feasible and reliable manner, adapted to the conditions

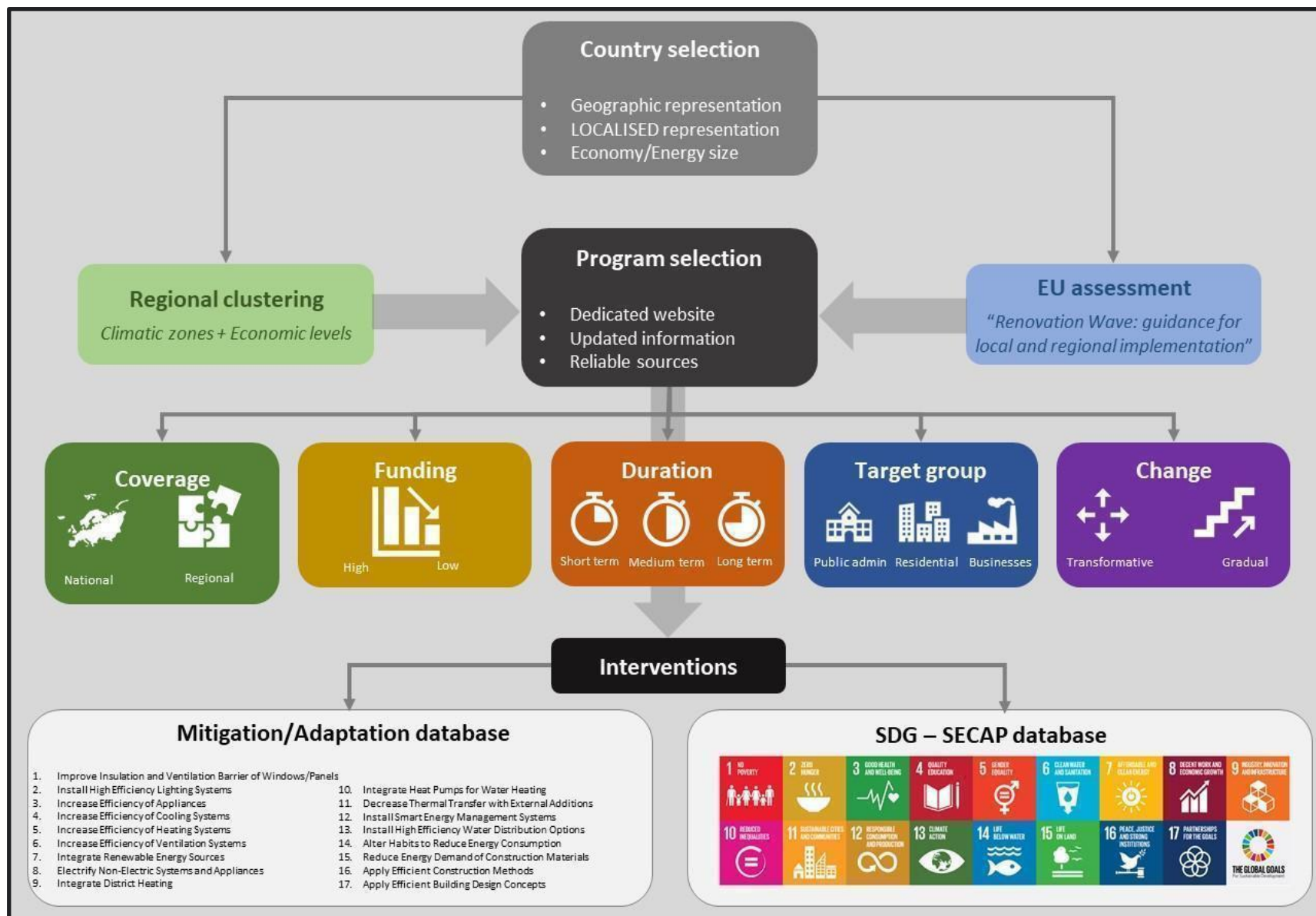
of their territory. D5.4 is aimed at enhancing the connection between the two aspects of decarbonisation pathways in the building sector and the achievement of SDGs and SECAPs.

Furthermore, the selected national and regional programmes identified in Task 5.3 include specific mitigation and adaptation actions that can be applied to a greater number of NUTS-3 areas in the EU. These actions are then linked to a database of all potential mitigation and adaptation actions created from existing academic and practical sources in *Task 4.1 Database of potential adaptation and mitigation measures across European regions*.

Linking the measures identified in the RW programmes with the actions presented in the mitigation and adaptation database (Task 4.1) involves two key steps: (1) the harmonisation of these measures across all programmes, and (2) the identification of a comprehensive set of criteria to cross-reference them with the building sector measures in the database. As a result of this procedure, specified measure-programme pairings were produced, enabling identified measure strategies to assign retrofit procedures to RW initiatives and give end users economic and legal context. By giving regional context on local renovation efforts, the exercise also helped the measure database's bidirectional development.

2.2 Evaluation methodology

Figure 8: The workflow of activities in this deliverable under Task 5.3



The workflow of activities in Task 5.3 and the current deliverable is shown Figure 8.

We start by focusing on programmes covered by the RW initiative aimed at improving energy efficiency, sustainability, and decarbonisation processes in eight selected countries. These countries are chosen as they represent a balanced mix of socioeconomic and energy composition within the EU. They are also well-represented by the LOCALISED consortium members, which makes it easier for translating documents and maintaining consistency with other deliverables throughout the project.

For each country a list of national programmes under the RW initiative was obtained from the EU's handbook of RW programmes¹⁸. In addition, selected regions within six countries were identified to provide an overview of regional renovation programmes. To ensure the availability and the relevance of these programmes, the official website or information page of each programme was visited, and key information was extracted, compiled, and presented in a set of harmonised "information cards". The full set of information cards for each country are provided in the Annex. The information provided includes duration of the programme, funding scheme involved, target groups (to whom the programmes are addressed), coverage (national or regional), and as a conclusion, whether the adoption of these programmes leads to structural change or not. At the end, specific interventions in each programme are linked to the LOCALISED Mitigation/Adaptation database, and also to relevant SDGs and SECAPs initiatives through specific KPIs (the so-called SOIs from D5.1). The detailed overview of all RW identified programmes and their connections to SDGs and SECAPs are provided in the Annex.

¹⁸ https://cor.europa.eu/en/engage/studies/Documents/Renovation_wave_full_study/Renovation_wave_full_study.pdf

2.3.1 Regional clustering

Since this report's main goal is to evaluate regional decarbonisation initiatives, we further narrow the scope of our analysis and focus on regional RW programmes in one of the case countries (Spain). To achieve this goal, we implement a regional clustering exercise to identify three representative regions. Regional clustering (i.e., geo-clustered classification) aims to highlight the differences and the similarities among the EU regions, facilitating the extraction of more accurate data from the implementation of RW programmes under different local climatic, socioeconomic, and financing characteristics. Additionally, other aspects related to RW implementation in each EU region include:

- LTRS of each country, as presented by the local administrations during 2019 and,
- financial mechanisms adopted by each EU member state country to promote the renovation of the existing building stock.

Thus, to summarise the establishment of the geo-clusters, they are based on the intersection of the climatic conditions and the socioeconomic characteristics. These two have been selected as the most relevant factors, as they have a direct relation with energy consumption and economic conditions correspondingly.

2.3.1.1 Climate zones

The climate characteristics of the site where the building is located will affect the conditions to which it is exposed, and therefore, will determine its thermal behaviour and subsequent energy consumption. The reference climate zones typologies typically identify regions and sub-regions in the different countries, as it has been the methodology followed by 6 different research projects; thus, the different approaches considered to incorporate this aspect were studied. Since there are several weather variables that affect building behaviour it is not straightforward to establish a definition of the climatic clusters. Different approaches have been considered:

1. The Köppen-Geiger classification, developed by the climatologist Wladimir Köppen in 1884 (Rubel & Kottek, 2011), which classifies regions according to temperature and precipitations,
2. the degree day's methodology, developed during the 19th century in the USA (Day, 2006), which provides an indication of severity of the climate in different locations by documenting when during a given year the external air temperature falls below (Heating Degree Days, HDD) or rises above (Cooling Degree Days, CDD) a specified temperature,

3. the European Heating Index (EHI) (Werner, 2006) and the European Cooling Index (ECI)¹⁹, developed by the Ecoheatcool project during 2005 using 80 reference cities, that considers the HDD and CDD but also the interrelation with insulation, solar gains and internal gains, and finally
4. the climate severity index (Markus, 1982) (Salmerón, Álvarez, Molina, Ruiz, & Sánchez de la Flor, 2013) (Summer Severity Index, SCSi and Winter Severity Index, WCSi), introduced in Section HE-1 of the Spanish Technical Building Code which combines the cooling/heating degree-days and the insolation hours in a specific latitude in a way that it can be demonstrated that when two localities exhibit the same climatic "severity", the energy demands of same buildings situated in both localities are equal.

As a conclusion, most of the references consulted constructed the clusters based on the heating indicators. For LOCALISED purposes, and since cooling needs are a relevant factor in warmer climates, the HAPPEN project²⁰ has been considered as a starting point. This project includes both heating and cooling variables and has sufficient data to construct the maps for Europe.

The severity index was developed by Markus, Thomas A. Strathclyde in 1982 (Markus, 1982 and 1984) intended to establish a correlation between the energy demand, three climatic variables and three physical parameters describing the building itself. It is hence not only a description of the climate but a description of the behaviour of a certain building within a range of climates. It has been subsequently used to propose correlations between the average consumption of a mix of building prototypes and two or three climatic variables.

CSI is calculated following the methodology described in Section HE-1 of the Spanish Technical Building Code (Annex 2 "determination of climatic zones based on climatic records") and by Salmeron in 2012 (Salmerón et al., 2013). The Index is a single number on a dimensionless scale which is specific for each building and location. The equation for winter is formulated as follows:

$$WCSI = a \times HDD + b \times n/N + c \times [HDD]^2 + d \times (n/N)^2 + e \quad (1)$$

And the respective for summer:

¹⁹ ECOHEATCOOL Intelligent Energy Europe Project, "The European Cold Market," ECOHEATCOOL project WP2, Belgium, 2005-2006.

²⁰ MEDZEB HAPPEN European Union's Horizon 2020 Project, "MEDZEB-HAPPEN," National Research Council of Italy - Institute for Construction Technologies (ITC-CNR), 1 April 2018. [Online]. Available: http://medzeb-happen.eu/?page_id=1407.

$$SCWI = a \times CDD + b \times n/N + c \times [CDD]^2 + d \times (n/N)^2 + e \quad (2)$$

HDD and CDD are the degree days for heating/cooling using the same base temperature of 20°C for both the winter months (October to May) and summer months (June to September), while n/N is the ratio of the actual insolation hours (n) and the maximum insolation hours (N) for that latitude and for the respective months. This set of inputs was obtained from a typical meteorological year for each location.

Table 2: Coefficients for the winter and summer climate severity index equations.

Winter		Summer	
a	3.546 10 ⁻³	a	3.052 10 ⁻³
b	-4.043 10 ⁻¹	b	1.784 10 ⁻¹
c	8.394 10 ⁻⁸	c	-1.343 10 ⁻⁷
d	-7.325 10 ⁻²	d	-2.339 10 ⁻¹
e	-1.137 10 ⁻¹	e	-2.041 10 ⁻¹

As indicated in the Representative Climates and Zoning of HAPPEN project (Efthymiou, Assimakopoulou, & Karlessi, 2016), the data from 71 locations were obtained and then classified according to the thresholds described in Table 3. These thresholds were obtained starting from the limits used by Briggs in 2003 (Briggs, Lucas, & Taylos, 2003) for the climatic classification of the United States of America. First, the bin boundaries that occur at 500 degree-days Celsius were converted to climate severity units using the equations $WCCSI = a \times HDD + b \times n/N + c \times HDD^2 + d \times (n/N)^2 + e$ (1 and 2 respectively). Finally, the limits have been corrected considering smooth granularity, to include, within the same climatic zone, locations that in their respective building’s regulations are considered of equal intensity.

Table 3: Intervals for winter and summer zoning.

Winter				
Winter 0	Winter 1	Winter 2	Winter 3	Winter 4
CSI < 0	0 ≤ CSI < 0.522	0.522 ≤ CSI < 1.52	1.52 ≤ CSI < 2.77	2.77 ≤ CSI
Summer				
Summer 0	Summer 1	Summer 2	Summer 3	Summer 4
CSI < 0	0 ≤ CSI < 0.508	0.508 ≤ CSI < 1.34	1.34 ≤ CSI < 2.00	2.00 ≤ CSI

Finally, in order to create the climatic zones for the selected region, the numbers are combined, thus resulting in 5 subcategories in each case, and 25 possible combinations of winter and summer conditions, as shown in the table below.

Table 4: Climate zones according to CSI values.

	S0	S1	S2	S3	S4
W0	W0S0	W0S1	W0S2	W0S3	W0S4
W1	W1S0	W1S1	W1S2	W1S3	W1S4
W2	W2S0	W2S1	W2S2	W2S3	W2S4
W3	W3S0	W3S1	W3S2	W3S3	W3S4
W4	W4S0	W4S1	W4S2	W4S3	W4S4

From these 25 open options, analyses for all the European regions have been implemented, resulting in 13 real climatic zones as indicated in Table 5, whilst the remaining 12 being options not representative in Europe.

Table 5: Summary of regions in Europe.

Zone	WCS I	Threshold Winter	SCS I	Threshold Summer	N° Of Regions	Represented Countries
01	W4	$2.77 \leq \text{CSI}$	S0	$\text{CSI} < 0$	84	Mainly in 5 countries Sweden, Estonia, Iceland, Finland, and Norway
02	W4	$2.77 \leq \text{CSI}$	S1	$0 \leq \text{CSI} < 0.508$	30	Mainly in one country Latvia (also present in some regions of Lithuania)
03	W3	$1.52 \leq \text{CSI} < 2.77$	S0	$\text{CSI} < 0$	217	Mainly in Denmark, Lithuania, Netherlands, and England (also present in some regions of Latvia, Sweden, Belgium, Ireland, Poland and Norway)
04	W3	$1.52 \leq \text{CSI} < 2.77$	S1	$0 \leq \text{CSI} < 0.508$	376	Mainly in Germany, Czech Republic, Switzerland, Belgium, France, Croatia, Luxemburg, Hungary, Austria, Romania, Slovenia, Poland
05	W3	$1.52 \leq \text{CSI} < 2.77$	S2	$0.508 \leq \text{CSI} < 1.34$	138	Mainly in Bulgaria, North Macedonia, and Serbia (also present in Portugal, Italy and Austria)
06	W2	$0.522 \leq \text{CSI} < 1.52$	S0	$\text{CSI} < 0$	24	Mainly in one country Ireland (also present in some regions of England)

07	W2	$0.522 \leq \text{CSI} < 1.52$	S1	$0 \leq \text{CSI} < 0.508$	16	Not the most frequent in any country, only in some regions of Spain, Portugal, and France.
08	W2	$0.522 \leq \text{CSI} < 1.52$	S2	$0.508 \leq \text{CSI} < 1.34$	113	Mainly in Spain, Italy, Albany, and Montenegro (also present in some regions of Slovenia, North Macedonia, Portugal, France, and Greece)
09	W2	$0.522 \leq \text{CSI} < 1.52$	S3	$1.34 \leq \text{CSI} < 2.00$	10	Mainly in Greece (also present in some regions of Spain and Italy)
10	W2	$0.522 \leq \text{CSI} < 1.52$	S4	$2.00 \leq \text{CSI}$	1	Not the most frequent in any country, only in Sicily (Italy)
11	W1	$0 \leq \text{CSI} < 0.522$	S2	$0.508 \leq \text{CSI} < 1.34$	8	Not the most frequent in any country, only in some regions of Portugal, Italy, France, and Spain.
12	W1	$0 \leq \text{CSI} < 0.522$	S3	$1.34 \leq \text{CSI} < 2.00$	8	Mainly in Malta (also present in some regions of Greece, Spain, and Portugal)
13	W1	$0 \leq \text{CSI} < 0.522$	S4	$2.00 \leq \text{CSI}$	8	All of them in Cyprus

Finally, to conclude the climatic analysis, as shown in Figure 9, a map has been reconstructed using the available information.

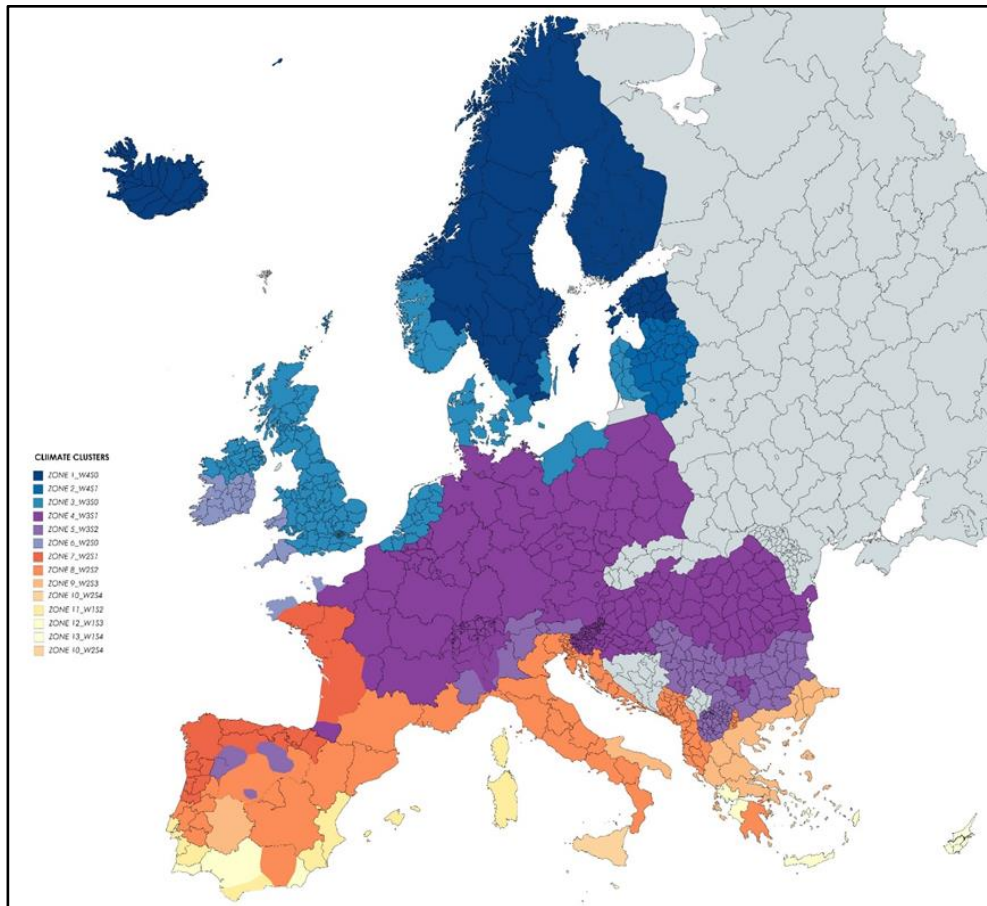


Figure 8: Climatic zones in EU members. (Source: own elaboration)

2.3.1.2 Socio-economic indicator

Socio-economic conditions in the represented region have been incorporated in the analysis as another relevant factor; the Income and Living Conditions in the different households can determine the boundaries among which the implementation solutions would be feasible for the users. The aim was to carry out comparative analyses of income distribution and quality of life in the different countries and verify if there are similar or different conditions in each situation.

The 2019 income by households in NUT-2 regions (NAMA_10R_2HHINC) was extracted from the Statistical Office of the European Union (Eurostat).

Table 6: Income levels and represented countries.

Levels	Threshold established	Represented Countries
Level 1	[0 € to 7.676,74 €]	Spain, France, Italy, Greece, Bulgaria, Hungary, Poland, Belgium
Level 2	[7.676,43 € to 14.418,64 €]	Portugal, Spain, Italy, Croatia, Austria, Romania, Hungary, Slovakia, Czech Republic, Austria, Poland, Lithuania, Belgium, Netherlands, Sweden
Level 3	[14.418,64 € to 22.810,9 €]	Spain, France, Italy, Greece, Bulgaria, Cyprus, Romania, Slovakia, Czech Republic, Austria, Slovenia, Poland, Lithuania, Germany, Netherlands, Ireland, Sweden, Denmark, Latvia, Estonia
Level 4	[22.810,9 € to 36.763 €]	Spain, Portugal, France, Belgium, Netherlands, Denmark, Germany, Italy, Austria, Romania, Poland, Finland
Level 5	[36.763 € to 59.955,93 €]	Spain, Portugal, France, Italy, Germany, Belgium, Netherlands, Denmark, Sweden, Austria, Poland, Greece, Finland, Ireland
Level 6	[59.955,93 € to 402.742,3 €]	Spain, France, Italy, Netherlands, Germany, Denmark, Sweden, Ireland

Figure 10 elaborated by EUROSTAT shows the distributions of the different thresholds around the regions. The regions where no data was collected are represented in grey colour.

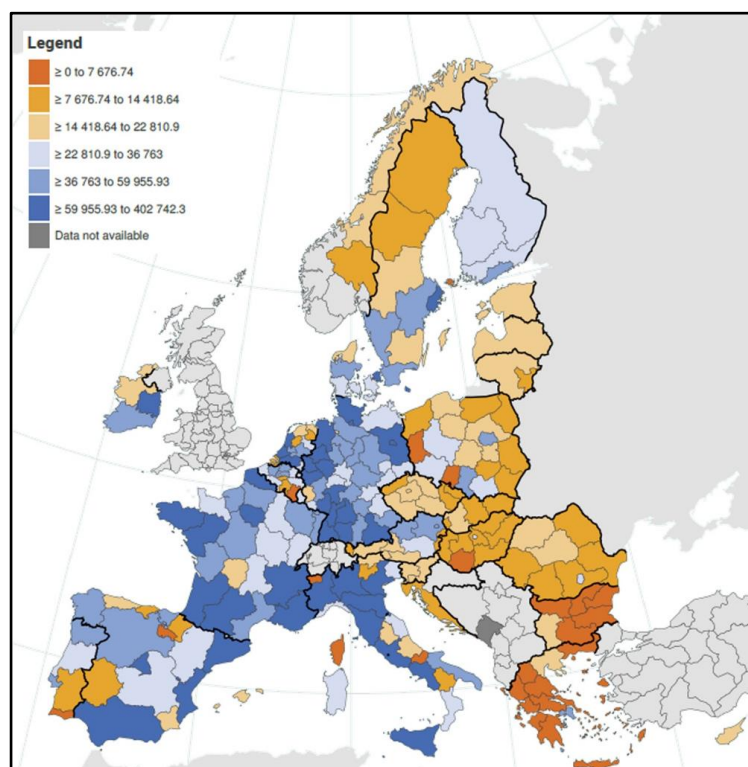


Figure 10: Income levels by NUTS-2 regions. (source: EUROSTAT)

2.3.1.3 Combined clusters

Lastly, for six representative countries the socio-economic classification was crossed with the climatic zones and a final map for each country was constructed with the different clusters. The **C** represents the climatic zone, and the **E** the economic level within the region.

As it can be seen in Figure 11, 25 different combinations were identified over the territories.

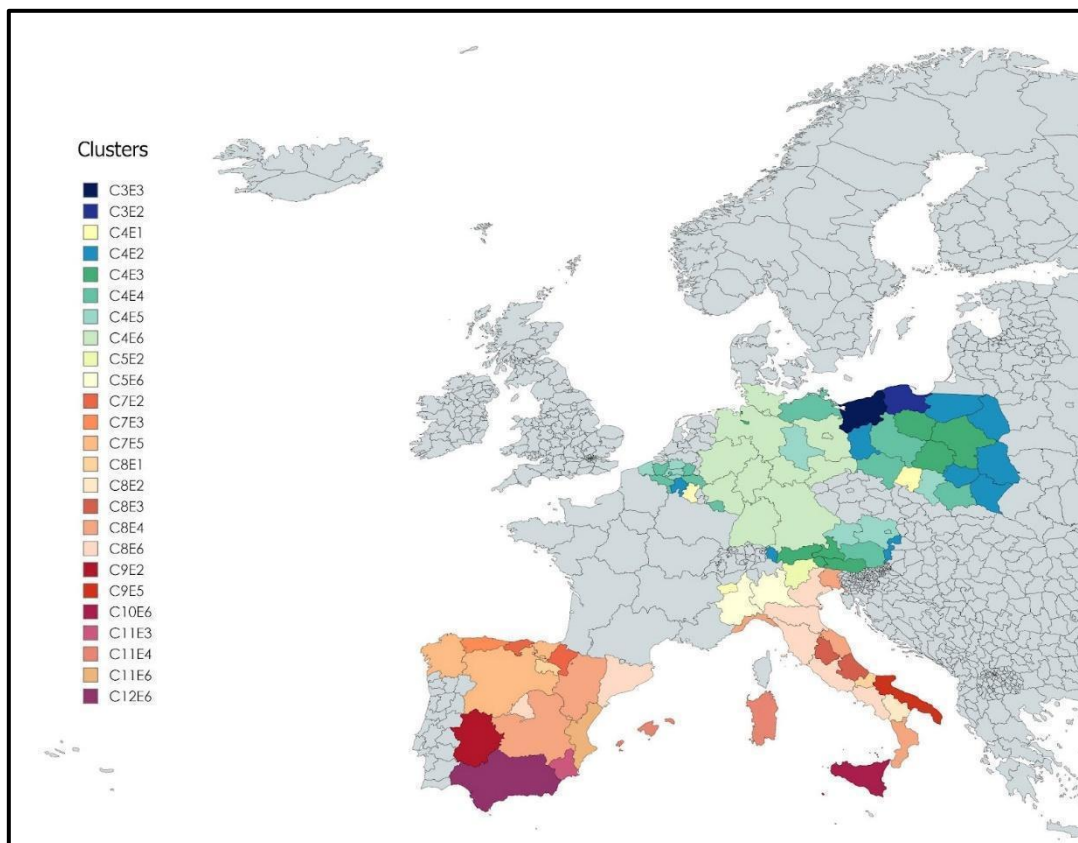


Figure 11: Climatic & income combined clusters.

Specifically, for the purposes of this deliverable the most representative Spanish clusters were selected to review and identify the plans and instruments set in place. As shown in Figure 12, 11 clusters were identified in the country.

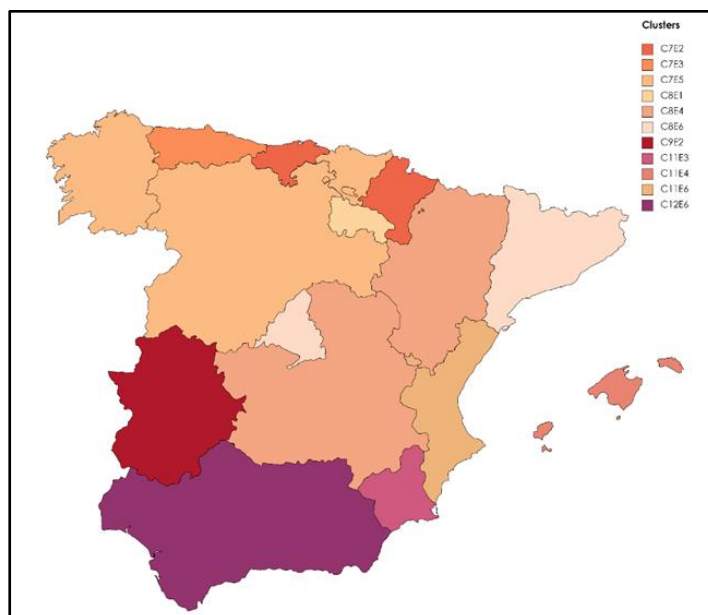


Figure 12: Spanish climatic & income combined clusters.

As it can be seen in Table 7, climatic zones 7 and 8 are the most frequent ones, along with income level 5 and 6. From there three regions were selected, Catalonia and Galicia which belong to the most frequent conditions, and additionally Extremadura, since it can provide valuable insight of how provinces with significantly lower incomes are approaching the implementation of resources.

Table 7: Clustering of Spanish regions

Region	Climatic zone	Economic level NUTS-2	Cluster
Catalonia	Zone 8	Level 6	C8E6
Aragon	Zone 8	Level 4	C8E4
Valencian C	Zone 11	Level 6	C11E6
Murcia	Zone 11	Level 3	C11E3
Castilla LM	Zone 8	Level 4	C8E4
Andalucia	Zone 12	Level 6	C12E6
Castilla Leon	Zone 7	Level 5	C7E5
Extremadura	Zone 9	Level 2	C9E2
Asturias	Zone 7	Level 3	C7E3
Cantabria	Zone 7	Level 2	C7E2
Pais Vasco	Zone 7	Level 5	C7E5
La rioja	Zone 8	Level 1	C8E1

Navarra	Zone 7	Level 2	C7E2
Madrid	Zone 8	Level 6	C8E6
Balearic Islands	Zone 11	Level 4	C11E4
Galicia	Zone 7	Level 5	C7E5
Canary Islands	Zone 13	Level 4	C13E4

2.3.2 SDGs and regional programmes: Spanish case study

According to the National Recovery Transformation and Resilience Plan, funds from the NGEU are allocated to Spanish autonomous communities in proportion to their population. For other regions, the national strategy plan has been downscaled and therefore, regional programmes are similar across different regions. For example, PREE 5000, DUS 5000, the series of subsidies programmes in the field of rehabilitation and social housing per autonomous community, and the series of subsidies programmes linked to self-consumption and storage, with renewable energy sources, are all linked to the national programmes.

The PREE 5000 & DUS 5000 programmes aim to reduce the final energy consumption and the CO₂ emissions by promoting renovation actions in all existing buildings and funding clean energy projects in public buildings and infrastructure in municipalities with less than 5000 inhabitants. Furthermore, the series of subsidy programmes in the field of rehabilitation and social housing per autonomous community is about renovation actions at dwelling, building, and district level, support the retrofitting one-stop-shops, subsidy to draft rehabilitation projects and create social rental housing in energy-efficient buildings. As a conclusion, there is the series of subsidy programmes linked to self-consumption and storage, with renewable energy sources that encourage the implementation of renewable energy generation for self-consumption in the tertiary sector and other productive sectors of the economy, in residential buildings and public administrations.

The targets introduced in the regional plans funded by the Next Generation Funds are almost the same for all regions. However, in some cases there are small differences, as it can be noted in the Extremadura and Galicia region plans, where a specific programme dedicated to the energy improvement of social housing is missing – meaning that it does not target the corresponding SDG 1.3 (implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable).

On the other hand, some differences between regional plans cannot be identified by comparing the SDGs, as they are too generalist. For instance, the self-consumption aids of the Galicia region are more focused on thermal energy while those of the Catalonia

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region are more focused on solar and wind energy. The rest of the regional renovation plans are unique for each region and focused on SDG targets that are already mentioned in the downscaled plans from the national strategy.



Figure 13: Regional plans in Spain and SDGs linkage

Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)

Regional plans	NEXTGEN funds	Linked SDGs	*SDGs NOT linked compared to national plan
EXTREMADURA (C9E2)			
'Rehabita' program for the rehabilitation of rental housing		1.2,1.4, 7.1, 7.3, 8.4, 11.1, 11.3, 13.2	Not downscaled from national plan
"HousEInvest" Financing model defined for the total energy renovation of multi-family residential buildings in Extremadura		7.3, 11.1, 13.2	Not downscaled from national plan
Program for energy efficiency actions in smes and large companies in the industrial sector		7.3, 8.4, 9.4, 13.2	Not downscaled from national plan
PREE 5000 Extremadura		7.1, 7.2, 7.3, 8.4, 11.1, 11.3, 11.A, 12.1, 12.6, 12.7, 13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.7, 12.2, 12.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
DUS 5000 Extremadura		7.1, 7.2, 7.3, 8.4, 9.1, 9.4, 11.1, 11.2,11.3, 11.A, 12.2, 12.6, 12.7, 13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.3, 11.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Incentive programs linked to renewable energy self-consumption		7.1, 7.2, 7.3, 9.4, 11.1, 11.3, 12.2, 12.7, 13.2	1.2,1.3,1.4, 6.1, 8.4, 8.5, 8.6, 9.1, 9.3, 11.2, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies programs in the field of rehabilitation and social housing in the Autonomous Community of Extremadura (RR345 PROGRAM)		1.4, 7.1, 7.3, 11.1, 11.3, 12.2, 12.7, 13.2	1.2,1.3, 6.1, 7.2, 8.4, 8.5, 8.6, 9.1, 9.3, 11.2, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
CATALONIA (C8E6)			
PRE E 5000 - Aid program for the energy rehabilitation of buildings		7.1,7.2, 7.3, 8.4,11.1,11.3, 11.A,12.6, 12.7, 13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.7, 12.2, 12.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
DUS 5000 Catalonia		7.1, 7.2, 7.3, 8.4, 9.1, 9.4, 11.1, 11.2,11.3, 11.A,12.2,12.6, 12.7, 13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.3, 11.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Aid programs linked to self-consumption and storage, with renewable energy sources and implementation of renewable thermal systems		7.1, 7.2, 7.3, 9.4, 11.1,11.3, 12.2, 12.7, 13.2	1.2,1.3,1.4, 6.1, 8.4, 8.5, 8.6, 9.1, 9.3, 11.2, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies programs in the field of rehabilitation and social housing in the Autonomous Community of Catalonia		1.2, 1.3, 1.4, 7.1, 7.2, 7.3, 11.1, 11.3, 12.2, 12.7, 13.2	6.1, 7.2, 8.4, 8.5, 8.6, 9.1, 9.3, 11.2, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
GALICIA (C7E5)			
PREE 5000 - Aid program for the energy rehabilitation of buildings		7.1,7.2, 7.3, 8.4,11.1,11.3, 11.A,12.6, 12.7,13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.7, 12.2, 12.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
DUS 5000 Galicia		7.1, 7.2, 7.3, 8.4, 9.1, 9.4, 11.1, 11.2,11.3, 11.A,12.2,12.6, 12.7, 13.1, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.3, 11.7, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Appliances renovation plan in Galicia		1.4, 7.3, 11.1, 12.2	Not downscaled from national plan
Subsidies for energy improvement projects aimed at freelancers and SMEs with activity in the service sector (SME energy bond program)		7.2, 7.3, 8.4, 9.1, 9.4, 11.1, 11.2, 11.3, 11.a, 12.2, 12.6,12.7, 13.1, 13.2	Not downscaled from national plan
Subsidies year 2021 state aid program for energy efficiency actions in agricultural holdings		7.1, 7.2, 7.3, 8.4, 9.4, 13.2	Not downscaled from national plan
State subsidies program for energy efficiency actions in SMEs and large companies in the industrial sector (program of energy efficiency actions in industry in Galicia)		7.1, 7.2, 7.3, 8.4, 9.4	Not downscaled from national plan
Subsidies corresponding to incentive program 1 of R.D. 1124/2021, linked to the realization of thermal renewable energy installations in the industrial, agricultural, services and other sectors of the economy, including the residential sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422N)		1.4, 7.1,7.2, 7.3, 8.4, 11.1, 12.2,12.6, 12.7, 13.2	1.2,1.3, 6.1, 8.5, 8.6, 9.1, 9.3, 9.4,11.2, 11.7, 11.A, 12.1,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies corresponding to incentive programs 1, 2 and 3 of R.D. 477/2021, linked to self-consumption and storage in the services sector and in other productive sectors, within the framework of the European recovery, transformation and resilience plan (procedure code IN421W)		7.1, 7.2, 7.3,8.4, 9.1, 9.4, 11.3, 11.A, 12.2, 12.6,12.7,13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.3, 11.2, 11.7, 12.1,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies corresponding to incentive programs 4 and 5 of R.D. 477/2021, linked to self-consumption and storage in the residential sector, public administrations and the third sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422K)		7.1, 7.2, 7.3, 8.4, 11.1,11.3,11.A, 12.2, 12.6, 12.7, 13.2	1.2,1.3,1.4, 6.1, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.7, 12.1, 13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies corresponding to incentive programs 6 of R.D. 477/2021, linked to the realization of thermal renewable energy installations in the residential sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422M).		7.1, 7.2, 7.3, 11.1, 12.2, 12.7, 13.2	1.2,1.3,1.4, 6.1, 8.4, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.3, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18
Subsidies programs in the field of rehabilitation and social housing in the Autonomous Community of Galicia		7.1, 7.2, 7.3, 11.1, 12.2, 12.7, 13.2	1.2,1.3,1.4, 6.1, 8.4, 8.5, 8.6, 9.1, 9.3, 9.4, 11.2, 11.3, 11.7, 11.A, 12.1,12.6,13.1, 13.3, 16.6, 16.7, 17.14, 17.16, 17.18

*Not linked: Compared to the national recovery and resilience plan (C2 Housing rehabilitation and Urban regeneration program) linked SDGs

As we can see in Figure 13, the SDGs more linked at the regional level are:

- **SDG 7.1:** ensure universal access to affordable, reliable, and modern energy services (80% of the listed regional plans)
- **SDG 7.2:** increase substantially the share of renewable energy in the global energy mix (75%)
- **SDG 7.3:** double the global rate of improvement in energy efficiency (100%)
- **SDG 11.1:** ensure access for all to adequate, safe, and affordable housing and basic services and upgrade slums (80%)
- **SDG 11.3:** enhance inclusive and sustainable urbanisation and capacity for participatory, integrated, and sustainable human settlement planning and management in all countries (65%)
- **SDG 9.1:** Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all (25%)
- **SDG 9.4:** By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries acting in accordance with their respective capabilities (45%)
- **SDG 1.2:** By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions (30%)
- **SDG 1.3:** Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable (10%)
- **SDG 1.4:** ensure that all men and women, in particular, the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance (25%)

We observe that some national targets are absent in the regional plans, including:

- **SDG 8.5, 8.6:** The regional renovation plans don't focus on the employment rate and youth employment rate impact of boosting building renovation.
- **SDG 9.1, 9.3:** The regional renovation plans do not address the strengthening of accessibility in rural areas.
- **SDG 13.3:** Climate change awareness is not a strong asset on the different regional renovation plans.
- **SDG 16 or 17:** The regional plans do not address targets regarding institution transparency, structural changes and policy coherence.

2.3.3 European Regional Development Fund: Italian case study

The European Regional Development Fund (ERDF, Italian: FESR) stands as one of the primary financial instruments within the European Union's cohesion policy framework²¹. Its inception in 1975 was motivated by the overarching goal of mitigating extant disparities among various developmental strata across European regions and enhancing the standard of living in economically less advantaged areas. A specific focus is directed towards regions grappling with pronounced and enduring natural or demographic disadvantages, exemplified by those in the northern hemisphere with notably low population densities, as well as island, cross-border, and mountainous regions.

The ERDF is strategically positioned to contribute substantially to the rectification of prominent regional imbalances within the European Union. This mandate is pursued through targeted support mechanisms, including facilitation for the development and structural adaptation of regions experiencing developmental lags, and initiatives geared towards the revitalization of declining industrial regions.

The FESR pursues two primary objectives:

- Investments in favour of growth and employment – aimed at fortifying the labour market and regional economies.
- European Territorial Cooperation – designed to enhance cross-border, transnational, and interregional cooperation within the EU.

Resources allocated to the first objective are distributed among three distinct categories of regions:

- Most developed regions, with a per capita GDP exceeding 100% of the EU average.
- Transition regions, with a per capita GDP ranging from 75% to 100% of the EU average.
- Less developed regions, with a per capita GDP below 75% of the EU average.

The specifics of the allocation and future utilisation of ERDF funds are defined in partnership agreements established between the Commission and each member state. These agreements outline the modalities of fund utilisation and are crafted with the involvement of regional and social stakeholders.

²¹ <https://www.europarl.europa.eu/factsheets/en/sheet/95/european-regional-development-fund-erdf->

The overarching framework for the realisation and implementation of ERDF is delineated in the regulation containing common provisions, which encompasses various other EU funds. This regulation identifies specific objectives and the scope of potential support.

In the 2021-2027 period, the cohesion policy encompasses five strategic objectives (SOs) for ERDF, ESF+, and the Cohesion Fund:

1. A Smarter Europe – Innovative and intelligent economic transformation (SO1).
2. A Greener and Low-Carbon Europe (SO2).
3. A More Connected Europe – Regional mobility and connectivity to ICT (SO3).
4. A More Social Europe through the implementation of the European Pillar of Social Rights (SO4).
5. A Europe Closer to Citizens – Sustainable and integrated development of urban, rural, and coastal areas through local initiatives (SO5).

Each region and member state must allocate at least 30% of their ERDF allocation to SO2, focusing on a greener and low-carbon transition towards a zero-net-carbon economy and a resilient Europe. Additionally, based on their prosperity, each region and member state should concentrate spending on SO1, emphasising a more competitive and intelligent Europe. Aid distribution should follow these guidelines:

- Least developed regions or member states must allocate at least 25% to SO1.
- Transition regions or member states must allocate at least 40% to SO1.
- Most developed regions or member states must allocate at least 85% of their allocation to SO1 and SO2.

FESR also supports sustainable urban development. In the 2021-2027 period, a minimum of 8% of ERDF resources (at the national level) will be dedicated to sustainable urban development and the creation of the European Urban Initiative, enabling urban areas to experiment with innovative solutions to address urban challenges.

Cohesion policy outlines a list of activities ineligible for FESR financing, including the decommissioning or construction of nuclear power plants, airport infrastructure (except in ultra-peripheral regions), certain waste management operations (e.g., landfills), and support for the tobacco industry.

2.3.3.1 Regression analysis

In order to investigate the correlation between FESR funding and various factors related to residential buildings, a linear regression analysis was conducted. The study focused on exploring the relationship between FESR funding and variables (figure below) including Heating energy per residential building (KWh), Domestic hot water energy requirement per residential building (KWh), Cooling per residential building (KWh), Electricity consumption per residential building (KWh), Annual average household income (EUR), number of households per residential building, and Percentage of households with air conditioning.

Table 8 shows the regional values for each variable along with the available FESR funding divided by the number of residential buildings in each region. We perform statistical analysis to investigate the relationship between FESR funding and other regional household energy consumption characteristics. After several iterations, and considering the correlations between variables, it was determined that Heating energy, Electricity consumption, and Domestic hot water energy consumption per residential building exhibited the strongest associations with FESR funding.

Subsequently, a multiple linear regression model was constructed, incorporating these three variables to provide a comprehensive understanding of their impact on FESR funding allocation. This streamlined approach allowed for a clearer and more focused interpretation of the regression results, facilitating a more effective analysis of the relationship between FESR funding and residential building's energy characteristics. The analysis was conducted while considering data from all 20 regions of Italy.

Table 8: Regional household energy characteristics and FESR

Region	Heating energy* (KWh)	Domestic hot water* (KWh)	Cooling* (KWh)	Electricity* (KWh)	Annual average household income (EUR)	number of households*	% of households with AC	FESR* (EUR)
Piemonte	29,839	3,994	64	4,894	34125	2.1	28.80%	511
Valle d'Aosta	20,989	2,207	0	3,725	35237	1.4	4.70%	2,140
Liguria	25,474	4,966	119	6,450	31586	2.9	30%	745
Lombardia	33,317	5,375	266	7,696	40277	3.0	50.40%	1,344
Trentino Alto Adige	33,368	5,337	11	5,494	41448	2.2	15.20%	1,387
Veneto	25,200	3,722	332	5,339	37113	2.0	70%	975
Friuli-Venezia Giulia	24,690	3,075	167	4,496	34637	1.8	50.90%	1,193
Emilia-Romagna	29,915	4,463	414	6,328	39941	2.5	60.30%	1,252
Toscana	21,635	3,831	121	5,666	35815	2.3	40.20%	1,675
Umbria	23,994	3,478	52	4,693	38011	1.9	26.70%	2,619
Marche	20,355	3,792	97	5,029	34730	2.1	33.90%	1,879
Lazio	22,088	5,498	225	8,135	33205	3.3	51.90%	2,268
Abruzzo	20,884	3,224	73	3,781	29021	1.6	31.20%	1,954
Molise	15,357	2,178	43	2,618	27247	1.2	20.10%	3,751
Campania	11,703	4,349	227	6,200	26676	2.5	46.10%	6,203
Puglia	10,288	2,926	195	4,408	28097	1.7	57.30%	5,888
Basilicata	17,071	3,176	73	3,131	29043	1.5	24.60%	6,143
Calabria	11,770	2,058	130	3,339	26854	1.3	43.90%	5,203
Sicilia	4,633	2,138	236	3,958	26322	1.4	62.40%	4,093
Sardegna	9,723	2,100	197	4,344	26653	1.4	59.90%	3,086

*per household

The linear regression model can be formulated as

$$FESR = \beta_0 + \beta_1 \text{Domestic hot water} + \beta_2 \text{Electricity} + \beta_3 \text{Heating} + \varepsilon$$

where the **independent variable (Y)** is "FESR funding per household (EUR)" and the **dependent variables (X)** are "Domestic hot water per residential building (KWh)", "Electricity consumption per residential building (KWh)", and "Heating energy per residential building (KWh)"

As we can see from the regression analysis, all variables are significant in explaining FESR funding and positively correlated to it. The coefficient of determination (R² in table 9) is quite high, explaining approximately 72.5% of the function. Figure 16 shows the scatter plot of the residuals (ϵ) which do not exhibit any pattern and seem to be scattered randomly around 0, as expected from a good regression fit.

Table 9: Summary output of the statistical analysis

<i>Regression Statistics</i>	
Multiple R	0.851415313
R Square	0.724908036
Adjusted R Square	0.673328293
Standard Error	1065.657397
Observations	20

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	6774.428777	903.4194122	7.4986531	1.2708E-06
Heating	-0.253051331	0.045767777	-5.529028284	4.5783E-05
Domestic hot water	1.528923535	0.583854182	2.618673605	0.01862039
Electricity	-0.86998124	0.37456052	-2.322672021	0.03370682

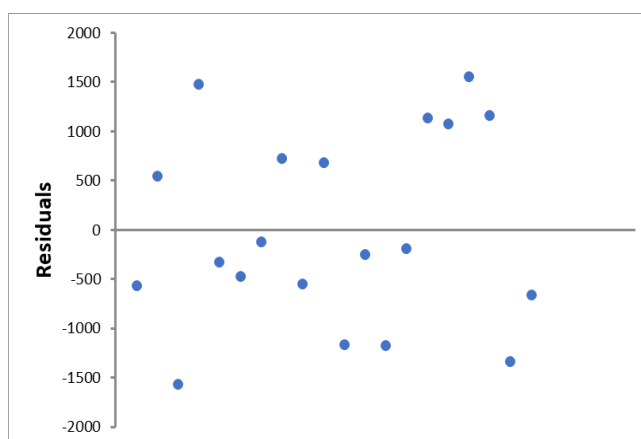


Figure 14: Residual scatter plot

The regression results reveal some interesting findings:

- Although FESR funding is correlated with household energy consumption, its relationship to heating, electricity, and hot water consumption is heterogenous.
- FESR is positively related to domestic hot water consumption indicating some level of policy responsiveness to energy demand.
- FESR is, however, negatively related to heating and electricity consumption. In other words, regions with higher demand for heating per capita (northern regions) receive less funding per household.
- This is mainly because national and European funds for sustainability and climate action very often have a strong preference for reducing socio-economic and regional disparities between the wealthier north and less-developed southern part of the country.²²

²² <https://european-social-fund-plus.ec.europa.eu/en/news/italy-partnership-2021-2027-adopted>

3 Renovation wave policies in selected countries

Six countries were chosen for the analysis of renovation wave programmes. These are **Italy, Spain, Poland, Germany, Austria,** and **Belgium**, representing some of the LOCALISED project partners. Decarbonisation programmes in some of these countries such as Germany have been the subject of in-depth analysis in previous LOCALISED deliverables (D2.1).

In addition to this, the analysis of RW national and regional programmes in these countries, cover a vast and diverse part of the EU with distinct geographical and climatic characteristics that can be somewhat representative of the rest of the EU as shown in Figure 15. This figure indicates that the area covered by the selected countries is vast, and it includes the Iberian and Italian peninsula areas with continental maritime climate to the intermediate and continental climate areas of Germany and Poland.

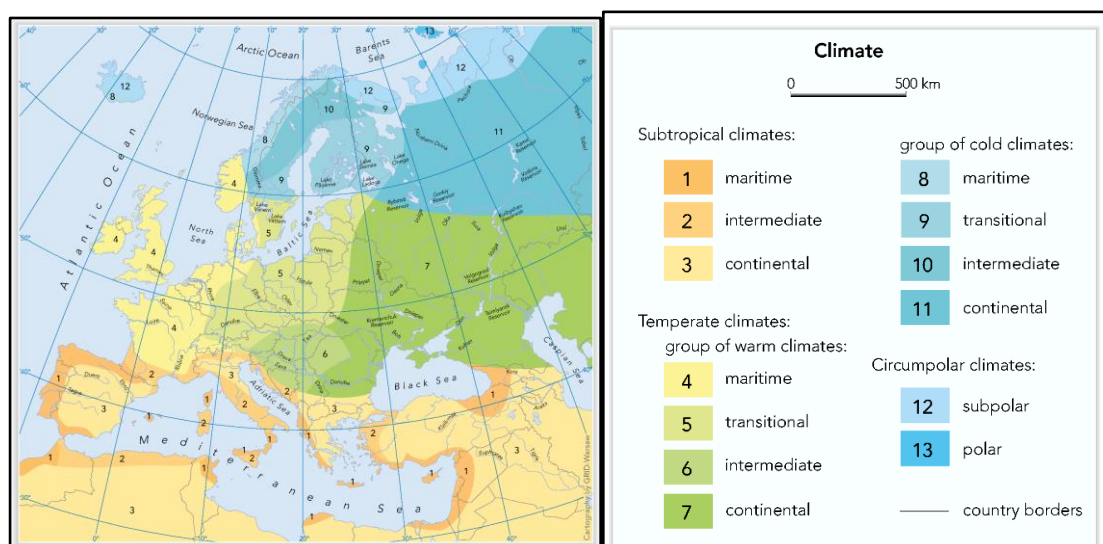


Figure 15: Geographical and Climatic coverage in EU Countries.²³

Furthermore, energy consumption in buildings ranges from very high to moderately low in these countries. According to the data from the building sector, presented in Figure 16, residential energy consumption is the highest in Poland and Belgium, at an annual rate of almost 250 kWh/m². It is then followed by Germany, Austria, Italy, and Spain. This indicates that the choice of the selected countries can well represent the overall energy consumption in the building sector within the EU. The overview of the RW programmes for each country (national and selected regional programmes) is presented in the following sections, and the detailed description of each programme is presented in the Annex.

²³ <https://www.eea.europa.eu/data-and-maps/figures/climate>

Furthermore, the detailed measures covered by each programme has been linked to the mitigation and adaptation database developed in Deliverable 4.1 of this project. Table A8 in the Annex provides the clustering of actions used in analysing RW programmes in this report and their relations to the measure database in D4.1.

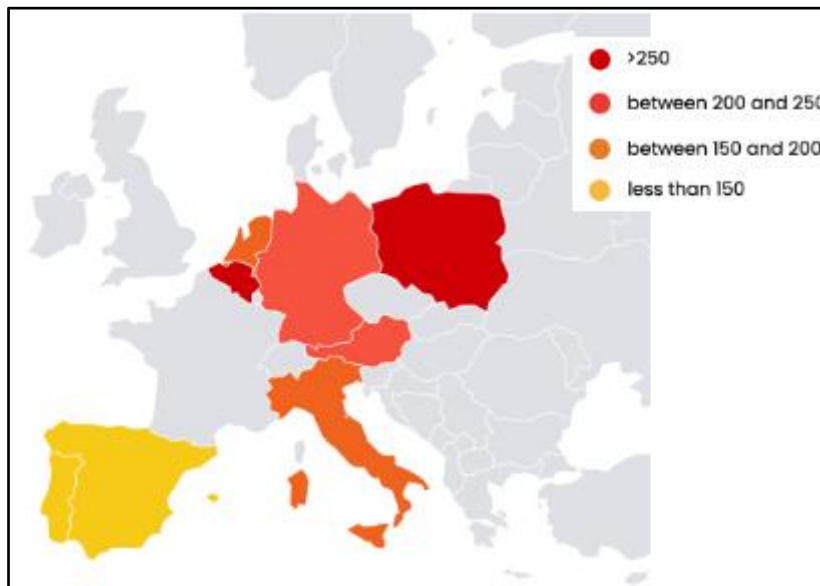


Figure 16: Energy consumption (in kWh/m² yearly) in the building sector of selected EU Countries.²⁴

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https://www.researchgate.net/publication/319613243_The_Impact_of_the_Energy_Performance_Regulations_updated_on_the_construction_technology_economics_and_energy_aspects_of_new_residential_buildings_The_case_of_Greece

3.1 Italy

3.1.1 Key challenges and opportunities

An assessment report conducted by the EU²⁵ has identified ten RW projects in Italy. Out of these ten, only eight projects were used in the current report, either because not enough information was found or because the referenced websites were expired.

The eight Italian projects identified in Table A1 in the Annex, involve core topics that incentivise: interventions to increase energy efficiency and thermal energy generation from renewable sources (Conto Termico, PREPAC), the payment through certificates that can be converted into currency and used as an incentive to achieve energy targets (White certificates), grants for renovation and construction of schools for the removal of architectural barriers and improvement of space in a sustainable manner (only addressed to municipalities with less than 1,000 inhabitants), and usage of consultancy funds at a private and industrial level (National Energy Efficiency Fund).

In addition to national projects, some projects at the regional level have been included in Table A1 in the Annex, and national projects with specific funds allocated to specific regions were examined. For example, there are some specific programmes and funds allocated to public authorities in the Southern regions of Italy for building new schools.

The programmes analysed in this paper vary across different dimensions such as scope, duration, and budget. Regarding funding schemes, the funds are ranging from EUR 14.4 million for regional programmes (such as Lombardy region's RE-GENERATE) to EUR 5.6 billion for national programmes (see White certificates). Dwelling on the durations of the programmes, the time frame considered, ranges from the years 2017 to 2030, keeping in mind the goals of the 2030 agenda which are highlighted at the end of the table with a link to SECAP goals identified in section 5.1.

As already stated, most of the Italian projects analysed are directed at improving, renovating, or constructing buildings on a national level. However, we can find some exceptions. Considering the 'Building new school' project, for example, it provides specific funds for the regions of southern Italy and Valle D'Aosta²⁶ and the RE-GENERATE project entirely directed to the Lombardy region (EUR 14.4 million). Such funds are, however, allocated according to the size of the territories to which they are directed and therefore have a lower coverage than the nationwide interventions.

²⁵ <https://op.europa.eu/en/publication-detail/-/publication/91a70718-da3f-11ec-a95f-01aa75ed71a1/language-en>

²⁶ 40% of resources are allocated to public authorities in the Southern regions. Overall, 30% of the resources on the regional basis is allocated to provinces, metropolitan cities, regional decentralisation bodies and the autonomous region of Valle d'Aosta for second-cycle schools, and 70% is allocated to municipalities and/or Unions of municipalities.

In our list of sustainability programmes identified in Table A1 in the Annex, we can also see that the suitable candidates for sustainable incentives are manifold: public administration, private companies, and individuals. Only for more specific programmes that aim, for example, at the reduction of energy consumption in industrial processes (See National Energy Efficiency Fund), programmes are addressed only to private companies, public administration, and Energy services companies.

3.1.2 Evaluation of national renovation programmes

The RW programmes in Italy are designed to achieve the energy efficiency goals and decarbonisation objectives by improving energy efficiency in the building sector, facilitating energy generation from clean and renewable sources, diversifying energy supply, and creating economic and employment opportunities in the energy, construction, and manufacturing sectors. Given the climate change impacts on socioeconomic systems, another improvement the RW initiatives aim at, is overall energy savings. For example, improving the thermal insulation of the building envelope through the replacement of window frames (see Conto Termico) lowers the heat loss. Similarly, the replacement of lighting systems with more efficient ones can help achieve further energy savings.

As many decarbonization efforts such as renovation require a standard procedure for carbon accounting and reporting, some of the fundings under national RW programmes have been reserved for training and consultation services to improve the renovation technical knowledge and expertise. Furthermore, considering an achievement-focused perspective, surely enhance the advancement of White certificates as a way of incentivising good actions to fulfil 2030 energy goals.

Keeping the focus on the White Certificates programme, which contributes EUR 900 million to energy targets, this is one of the crucial new instruments envisaged to promote increased energy efficiency. The main objective of a tradable White Certificate programme is to help achieve current or newly set energy efficiency targets in an efficient and cost-effective manner, not by replacing existing policies and initiatives, but rather by complimenting them. However, critics argue that it could only be aimed at increasing efficiency and not at an actual and overall reduction of energy consumption, also entailing large transaction costs and above all requiring a substantial harmonisation of energy policies by the European system that is difficult to achieve in a short time.²⁷

Despite significant regional heterogeneity in Italy, the programmes listed in Table A1 in the Annex, are predominantly at the national level. Additionally, the advent of alternative methods to reduce energy waste are subject to constant change which

²⁷http://3csep.ceu.hu/sites/default/files/field_attachment/project/node-2045/whitecertificatesconceptandmarketexperiences.pdf

necessitates the periodic revision of renovation programmes and energy efficiency standards. Therefore, there is a need for developing regional programmes considering specific local characteristics as well as the most relevant renovation methods.

3.1.3 Evaluation of regional renovation programmes

The Italian peninsula, characterised by its remarkable geographical and climatic heterogeneity, presents a multifaceted challenge for implementing uniform renovation programs aimed at improving energy efficiency in the building sector. Spanning latitudes from 35°N to 47°N, Italy encompasses mountainous areas bordering Austria and Switzerland, the fertile Po Valley, the volcanic landscapes of central Italy, and the Mediterranean islands like Sicily and Sardinia. This diversity translates into distinct climatic zones, ranging from the cold, snowy winters and temperate summers of the north to the hot, dry summers and mild winters of the south. Such variations inevitably influence building stock characteristics and energy demands, with buildings in the north requiring advanced insulation solutions and higher heating demand compared to the large cooling demand in the south.

Socioeconomic disparities further complicate the Italian landscape. The well-documented "North-South divide" manifests in varying levels of economic development, infrastructure quality, and access to financial resources across regions.²⁸ These factors significantly impact investment capacity and public funding availability for building renovation projects.

Therefore, it is imperative to consider a regionally differentiated approach to building renovation and energy efficiency programs. Recognizing the unique geographical, climatic, and socioeconomic contexts of each Italian region, table 10 provides a regional clustering based on both climatic and economic conditions. We choose 4 regions to offer a comprehensive representation of both climatic and economic factors across the northern area (Trento), central part (Tuscany), southern regions (Puglia), and islands (Sicily).

3.1.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)²⁹
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)³⁰
- Annual Cooling and heating degree days³¹
- Households annual heating and cooling energy consumption (Ktoe) by regions (2018)³²

²⁸ Asso, Pier Francesco. "New perspectives on old inequalities: Italy's north-south divide." *Territory, Politics, Governance* 9.3 (2021): 346-364.

²⁹ https://doi.org/10.2908/DEMO_R_D2JAN

³⁰ <https://doi.org/10.2908/TGS00005>

³¹ https://doi.org/10.2908/NRG_CHDDR2_A

³² Gestore dei Servizi Energetici (GSE), "Valutazione del potenziale nazionale e regionale del riscaldamento efficiente", 2021

Table 10: Italy NUTS-2 Regions by climatic zone and economic level

Region	Climatic zone	Economic level NUTS-2	Cluster
Valle d'Aosta	Zone 4	Level 1	C4E1
Piemonte	Zone 5	Level 6	C5E6
Liguria	Zone 8	Level 4	C8E4
Lombardia	Zone 5	Level 6	C6E6
Provincia autonoma di Trento	Zone 5	Level 2	C6E2
Provincia autonoma di Bolzano	Zone 5	Level 3	C6E3
Friuli-Venezia Giulia	Zone 5	Level 4	C6E4
Veneto	Zone 8	Level 6	C8E6
Emilia-Romagna	Zone 8	Level 6	C8E6
Toscana	Zone 8	Level 2	C8E6
Marche	Zone 8	Level 4	C8E4
Umbria	Zone 8	Level 3	C8E3
Lazio	Zone 8	Level 6	C8E6
Abruzzo	Zone 8	Level 3	C8E3
Molise	Zone 8	Level 1	C8E1
Campania	Zone 8	Level 6	C8E6
Puglia	Zone 9	Level 5	C9E5
Basilicata	Zone 8	Level 2	C8E2
Calabria	Zone 8	Level 1	C8E4
Sicilia	Zone 10	Level 5	C10E6
Sardegna	Zone 11	Level 4	C11E4

- Most repeated climatic zone and economic level: C8E6. **C8E6-Toscana**
- Two opposite regions with different economic conditions and climate zones: **C6E2-Trento, C9E5-Puglia**.

3.1.3.2 Provincia autonoma di Trento

Trento, situated in a mountainous region with an alpine climate, is economically prosperous, boasting a diverse economy, low unemployment, and a high standard of living. The PEAP program in Trento aims to achieve energy upgrades, promote sustainability, and foster collaboration. One of the aims of PEAP is introducing green hydrogen by 2030, prioritising urban planning for climate resilience, and fostering collaboration with the research and development sector. As we can see from the table below, Trento’s relatively cold climate represented by high annual heating degree days.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
542,996	157.9	3,114	46	361.4	40,800

3.1.3.3 Toscana

Tuscany, in central Italy, has a Mediterranean climate and is economically robust, driven by tourism, wine production, and agriculture. The Tuscany Regional Strategy for Sustainable Development focuses on five key areas: climate change and energy, smart cities, mobility, urban greenery and forestry, and circular economy. Measures to be taken include achieving 100% renewable electricity by 2050, improving energy efficiency in buildings, promoting the circular economy and waste management, supporting renewable energy research, sustainable mobility, public awareness, sustainable spatial planning, agriculture, and forest conservation. From the table below, it can be seen that Tuscany, a region in central Italy, has a generally mild climate.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
3,661,981	22,985	1,568	372	1,613.7	31,900

3.1.3.4 Puglia

Puglia, in southeastern Italy, primarily experiences a Mediterranean climate, has seen economic growth, and relies on agriculture and tourism. Agriculture, particularly olive oil production, and tourism are significant contributors to the region's economy. Puglia has made efforts to promote tourism and economic development, especially along its picturesque coastline. The program in Puglia we analysed seeks financial support for developing the Action Plan for Sustainable Energy and Climate (PAESC), which translates the commitment to reduce greenhouse gas emissions by 55% by 2030 and enhance climate resilience. Covenant of Mayors signatories join for various reasons, including stronger cooperation with authorities, international recognition, policy influence, credibility, funding opportunities, networking, practical support, access to expertise, self-assessment, and a flexible framework for local action. Puglia, as we can

see from the table below, a region located in southern Italy, has a relatively warm climate condition.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
3,907,683	19,541	1,284	482	1,092.2	20,300

3.1.3.5 Sicilia

For each selected country we decided to analyse 3 regions, but in the case of Italy, in order to have a more complete picture of the economic, social and climatic situation, we decided to include Sicily for a greater representation of the islands. Sicily is the largest island in the Mediterranean part of Italy. Its mediterranean climate provides the ideal conditions for agriculture, particularly the cultivation of fruits and grapes for wine production. Its varied landscapes and the influence of Mount Etna contribute to a rich tapestry of microclimates across the island. Sicily has historically faced economic challenges and is one of Italy's less affluent regions. Agriculture, including citrus fruit production and wine, plays a role in the economy, but there are persistent issues with unemployment. Sicily's new energy-environmental plan, outlined in the Preliminary Regional Environmental Energy Plan, focuses on three main principles: development through renewable energy expansion, participation by addressing social and environmental consequences, and protection of historical and artistic heritage by integrating renewable technologies into architectural and landscape contexts. From the table below, Sicily, Italy's largest island, has a particularly warm climate with a large number of cooling degree days.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
4,814,016	25,711	1,079	556	862.4	18,800

These four Italian regions showcase diverse climates, economic statuses, and sustainability initiatives, highlighting their unique characteristics and priorities.

3.1.4 Synergies between national and regional programmes in Italy

Conto Termico, White certificates, and the National Energy Efficiency Fund (FNEE) are three distinct Italian national programs aimed at promoting energy efficiency and renewable energy production, each with its unique focus and incentives.

Targeting small-scale installations and focusing on direct financial support for energy efficiency enhancements in buildings, Conto Termico aims to boost energy efficiency

and renewable thermal energy. It offers financial aid, covering a substantial portion of expenses, to enhance energy efficiency in buildings and systems. Eligible improvements range from better insulation to upgraded lighting, efficient air conditioning, renewable thermal energy generation, and advanced ventilation controls. Furthermore, White Certificates focus on certifying energy savings from efficiency efforts. They provide tradable certificates that represent these savings and can be exchanged for money when significant improvements are achieved. Eligible projects span various initiatives, including thermal energy systems, electric motors, power quality enhancements, district heating and cooling upgrades, transportation fleet improvements, and more. If Conto Termico and White certificates focus on small scale installations, on the other hand, the National Energy Efficiency Fund (FNEE) is a broader program supporting a range of initiatives to achieve national energy efficiency goals under the Kyoto Protocol. FNEE offers financial backing for projects addressing industrial energy consumption reduction, district heating and cooling, public service and infrastructure enhancements, and building energy efficiency. Eligible expenses encompass consultancy services, equipment costs, building envelope enhancements, and necessary infrastructure for energy efficiency projects.

Figure 17 shows the distribution of specific mitigation actions covered by 7 national programmes in Italy. As indicated by red colour in this figure, actions A02 (Install high efficiency lighting system), A04 (Increase Efficiency of Cooling Systems), and A07 (Integrate Renewable Energy Sources) are the most cited actions within the national programmes in Italy.

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Italy National Programmes	Conto Termico	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	White Certificates	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Grants to municipalities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	National Energy Efficiency Fund	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PREPAC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Building up new schools	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Re-Generate	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Figure 17: National programmes and their linkage to mitigation actions in Italy

In terms of the connection between these 7 national programs and SDGs, the most related SDGs are SDG7, SDG9, and SDG11 as highlighted by red colour in Figure 18.

Programmes		Link to SDGs																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Italy National Programmes	Conto Termico																	
	White Certificates																	
	Grants to municipalities																	
	National Energy Efficiency Fund																	
	PREPAC																	
	Building up new schools																	
	Re-Generate																	

Figure 18: National programmes and their linkage to SDGs in Italy

On the other hand, regional programs may vary in scope, duration, and coverage from the national ones, as demonstrated for Provincia Autonoma di Trento, Tuscany, Puglia, and Sicily. Italy is forging a distinct path toward achieving its 2030 goals, with a primary focus on reducing emissions of greenhouse gases by 55 percent. As an example, Trento province and the Trentino Alto Adige region have made significant strides in this direction. In the period from 2014 to 2016, they managed to reach the halfway mark towards this ambitious target. Notably, by 2016, Trentino had already achieved a commendable reduction of emissions by 20.6% compared to the levels in 1990.

In line with many European countries, there is a noticeable allocation of funds towards substantial energy improvements in existing residential structures and the promotion of both individual and collective self-consumption. These objectives are in alignment with the common goals of the PEAP Programme in the Autonomous Province of Trento and the 'Strategia per lo sviluppo sostenibile' in Tuscany. Over the years, there has been a consistent effort to expand energy generation from renewable sources and employ newer, highly efficient energy technologies, which represent a significant departure from those used in the past. The 'Piano energetico regione Sicilia' underscores how these measures will not only contribute to a greener environment but also lead to tangible economic advantages for the area, including the creation of new jobs and reduced energy expenses for residents. In this regard, looking at the "Obiettivo riqualificazione" of Tuscany region is important to highlight the theme of digital transformation of professions, considering the new production and business models crucial in market strategies, as well as the diverse technological skills demanded in any profession and at any level of professionalism. This will be achieved through training initiatives aimed at strengthening and particularly capitalising on digital skills in various business functions and sectors of productive activities in Tuscany. Simultaneously, alongside the digital paradigm, there is a focus on sustainability, tied to the development of specific strategies for environmental preservation. This involves the use of renewable energies, reducing consumption, and recycling waste in both production and the distribution and management of raw materials. The goal is to transition from a linear economy model to a circular economy model, taking into account a product's life cycle and its various phases in an integrated manner while minimising waste as much

as possible. In the realm of sustainable economics, the objective of this notice is to promote energy savings, reduce environmental impact, waste materials, and waste. This will be achieved through the development of knowledge and tools related to the cross-cutting integration of production, environmental, climate, and energy issues, through the training of "green jobs."

Moreover, the participation of many regions and provinces of Europe in the Covenant of Mayors initiative holds substantial promise. This pact stands to benefit its members in several ways. Firstly, it strengthens cooperation and garners support from both national and local authorities. Additionally, it facilitates the dissemination of enhanced funding opportunities for local climate and energy projects. Moreover, it promotes innovative avenues for networking, experience sharing, and expertise development through a variety of means such as regular events, twinning arrangements, webinars, and online discussions. This collaborative approach is poised to accelerate progress and reinforce the commitment of these regions to achieving their ambitious climate and energy objectives.

Figure 19 shows the distribution of specific mitigation actions covered by 5 selected regional programmes in Italy. As indicated by red colour in this figure, actions A02 (Install High Efficiency Lighting Systems), A04 (Increase Efficiency of Cooling Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Italy. Comparing Figure 17 and Figure 19 shows that A02 and A04 are the most dominant mitigation actions in Italy both on a national and a regional level.

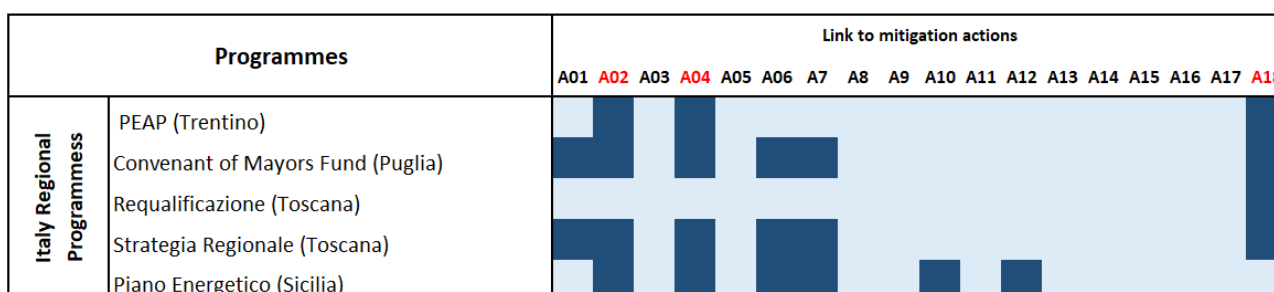


Figure 19: Regional programmes and their linkage to mitigation actions in Italy

In terms of the connection between these 5 regional programs and SDGs, like the national programmes, the most related SDGs are SDG7, SDG9, and SDG11 as highlighted by red colour in Figure 20.

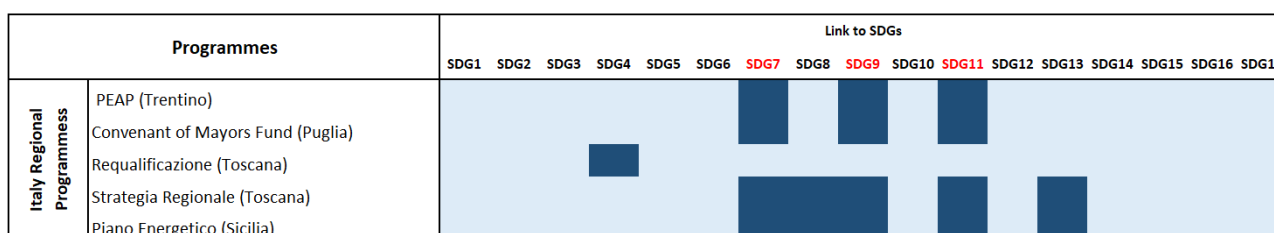


Figure 20: Regional programmes and their linkage to SDGs in Italy

3.2 Spain

3.2.1 Key challenges and opportunities

The European building sector's high impact on consumption and emissions marks no exception in the case of Spain. This is due to the fact that Spain inherits an obsolete building stock, in which most of the buildings were built between the 1960s and 1970s, prior to any energy regulations in the sector. It is also estimated that in 2050, 80% of the real estate park will be buildings already built. Contextualising the above from the energy aspect, in 2020 only 0.3% of the 4,524,694 official energy certificates for existing buildings corresponded to a letter A rating, while more than 94% corresponded to ratings between D and G³³. It is also necessary to point out that:

- 1) the certified stock is still less than 50% of the built area³⁴
- 2) the energy consumption associated with the certification of buildings is far from the real consumption of the buildings.

One of the main challenges is to establish the retrofitting of the building stock as a priority, not only at a political and administrative level, but also at a social level. The available funds from EUNG programmes

are an excellent initiative, but they can only affect a small portion of the aging building stock. Therefore, it is crucial for these programmes to generate new dynamics and trends that last long. Some of such notable long-term trends and guidelines which have already started to be designed and implemented include:

- 1) the modification of some regulations related to the management of communities of owners, which will facilitate the official decision-making procedure for implementing retrofitting measures.
- 2) the appearance of a new actor called "the rehabilitation agent", which can be both a public or a private entity or organisation, that facilitates the interactions between the key stakeholders in the renovation process chain.
- 3) the appearance of one-stop public offices, which bring together all the administrative and legal procedures and steps necessary to carry out the rehabilitation and renovation in one place.

Nowadays, all these mechanisms and opportunities are being defined in detail and implemented at a local and regional level, and it will be necessary to follow their impact in the medium-long term.

³³ Estado de la certificación energética de los edificios. 9º Informe diciembre 2020. Ministerio para la Transición Ecológica y el Reto Demográfico. Ministerio de Transportes, Movilidad y Agenda Urbana

³⁴ Observatorio de vivienda y suelo. Boletín especial sobre Rehabilitación 2021. Ministerio de Transportes, Movilidad y Agenda Urbana, DG de Vivienda y Suelo, 2021.

3.2.2 Evaluation of national renovation programmes

At Spanish level, most of the renovation wave is being structured through the so-called Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program). This plan includes several retrofitting programmes to introduce more efficiency-oriented actions for subtopics such as private vs public buildings, low demographic areas, or neighbourhoods and buildings specifically affected by energy poverty, to specifically comply with the premise of leaving no one behind. All these different subprogrammes are drafted at the national level, but then downscaled to the regional level (mainly by considering population criteria) and implemented by regional public authorities. Although this could lead to a variety of implementation scenarios (for each of the 17 autonomous communities that make up Spain), the reality is that currently, and probably due to the speed of the process and the short implementation times, most cases are being implemented in an equivalent way, without major differences. This is one of the elements to consider and assess in the analysis presented which, for the Spanish case, not only includes the national assessment but also the regional one (for representative cases). Table A2 in the Annex provides the list of all identified programmes under the RW initiative in Spain.

3.2.3 Evaluation of regional renovation programmes

Spain is located in the Iberian Peninsula in southwestern Europe and is surrounded by the Atlantic Ocean to the west and northwest, the Mediterranean Sea to the east and southeast, and the Bay of Biscay to the north. The country has a diverse geography, presenting mountain ranges such as the Pyrenees and Sierra Nevada, elevated plateaus like the Meseta Central, and coastal regions like the Costa del Sol and Costa Brava. The diverse topography of Spain provokes a variety of climates. The coastal areas generally have a Mediterranean climate with hot, dry summers and mild, wet winters. Inland regions, especially in the central plateau, may have more extreme temperatures, with hot summers and cold winters. The northern regions, including areas along the Bay of Biscay, have an oceanic climate with milder temperatures and more rainfall throughout the year. The southern regions, like Andalusia, can have a semi-arid or arid climate with hot temperatures.

The socio-economic conditions can also be very different depending on the region, Northern regions are considered more economically developed and industrialized and the southern regions may face higher levels of unemployment and have poorer economies.

The diverse climate zones, socio-economic conditions and cultural influences give rise to a range of building types in Spain. In major urban areas, there is often a blend of contemporary apartments, historical buildings, commercial premises and a substantial number of older apartments. Rural areas may have more traditional housing styles, often reflecting the local architectural heritage. These can include houses with tiled roofs and country houses, especially in villages and smaller towns. And finally, coastal regions

may have a higher prevalence of tourist-oriented contemporary apartments and beachfront properties.

Spain is divided into 19 NUTS-2 level regions, comprising 17 autonomous communities and 2 autonomous cities, Ceuta and Melilla. However, for the purpose of this analysis, only the autonomous communities were taken into account. In this study, three regions were chosen, each representing different climate zones and socio-economic conditions: Extremadura, Catalonia, and Galicia.

3.2.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)³⁵
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)³⁶
- Annual Cooling and heating degree days³⁷
- Household energy consumption^{38, 39, 40}

³⁵ https://doi.org/10.2908/DEMO_R_D2JAN

³⁶ <https://doi.org/10.2908/TGS00005>

³⁷ https://doi.org/10.2908/NRG_CHDDR2_A

³⁸ <https://www.idescat.cat/indicadors/?id=aec&n=15483&lang=es>

³⁹ https://www.inega.gal/sites/default/descargas/enerxia_galicia/consumo_final_enerxia_sectores.pdf

⁴⁰ <https://extremadura2030.com/wp-content/uploads/2021/09/peiec-vf-30.06.21.pdf>

Table 11: Spain NUTS-2 Regions by climatic zone and economic level

Region	Climatic zone	Economic level NUTS-2	Cluster
Catalonia	Zone 8	Level 6	C8E6
Aragon	Zone 8	Level 4	C8E4
Valencian C	Zone 11	Level 6	C11E6
Murcia	Zone 11	Level 3	C11E3
Castilla LM	Zone 8	Level 4	C8E4
Andalucia	Zone 12	Level 6	C12E6
Castilla Leon	Zone 7	Level 5	C7E5
Extremadura	Zone 9	Level 2	C9E2
Asturias	Zone 7	Level 3	C7E3
Cantabria	Zone 7	Level 2	C7E2
Pais Vasco	Zone 7	Level 5	C7E5
La rioja	Zone 8	Level 1	C8E1
Navarra	Zone 7	Level 2	C7E2
Madrid	Zone 8	Level 6	C8E6
Balearic Islands	Zone 11	Level 4	C11E4
Galicia	Zone 7	Level 5	C7E5
Canary Islands	Zone 13	Level 4	C13E4

3.2.3.2 Extremadura

Extremadura is a region located in the southwestern Spain, bordering with Portugal to the west. The capital is Mérida, and other mid-sized significant cities in the region include Badajoz or Caceres. The area experiences a Mediterranean climate with continental influences. Summers tend to be hot and dry, while winters are relatively mild. Precipitations are generally low, contributing to arid conditions.

There is a high unemployment rate compared to other regions in Spain. The economy depends basically on agriculture, with a focus on livestock farming and extensive cultivation, and lately, on the tourism sector, which is becoming a more significant contributor.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
1,054,306	41,634	1,048	645	361	20,200

3.2.3.3 Catalonia

Catalonia is a region situated in northeastern Spain, bordered by France to the north and the Mediterranean Sea to the east. The capital of Catalonia is Barcelona. Other significant cities in the region are Girona, Tarragona, and Lleida.

Catalonia has a Mediterranean climate. Summers are typically warm and dry, while winters are relatively mild. The coastal areas may have milder temperatures due to the influence of the Mediterranean Sea. Precipitation levels vary, with some areas receiving more rainfall, contributing to a more temperate climate compared to other Spanish arid conditions.

The region of Catalonia has a diverse economy with a focus on industry, services, and tourism. Unemployment rates are lower compared to other regions of Spain. Barcelona, as a major economic hub, plays a crucial role in the country's overall economic activity. Agriculture, once significant, has diminished in importance, and the economy has diversified to include sectors such as technology, finance, and tourism. The tourism industry, in particular, has become a significant contributor to Catalonia's economic development during the last 60 years.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
7,901,963	32,114	1,576	373	2,123	31,700

3.2.3.4 Galicia

Galicia is a region situated in the northwest corner of Spain, bordered by the Atlantic Ocean to the west and the Cantabrian Sea to the north. The capital of Galicia is Santiago de Compostela. Other notable cities in the region include A Coruña, Vigo, and Lugo. Galicia experiences a maritime climate influenced by its proximity to the Atlantic Ocean. This results in mild temperatures and relatively high humidity throughout the year. The region is characterized by moderate temperatures in summer and winter, with a big amount of rainfall.

In terms of socio-economic conditions, Galicia faces a medium unemployment rate compared to the other Spanish regions. Historically, the economy has been linked to traditional sectors, including agriculture and fisheries. Though, In recent years, efforts

have been made to diversify the economy, and there has been a growing focus on tourism, especially along the coastal areas.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating and cooling Energy consumption (Ktoe)	GDP per capita (EUR)
2,699,424	29,574	1,532	76	980	24,900

3.2.4 Synergies between national and regional programmes in Spain

According to the National Recovery Transformation and Resilience Plan, funds from the NGEU are allocated to Spanish autonomous communities in proportion to their population. For other regions, the national strategy plan has been downscaled and adopted uniformly by every region. Therefore, regional programmes are similar across different regions resembling the national programmes. For example, PREE 5000, DUS 5000, the series of subsidies programmes in the field of rehabilitation and social housing per autonomous community, and the series of subsidies programmes linked to self-consumption and storage, with renewable energy sources, are all linked to the national programmes.

The PREE 5000 & DUS 5000 programmes aim to reduce the final energy consumption and the CO₂ emissions by promoting renovation actions in all existing buildings and by funding clean energy projects in public buildings and infrastructure in municipalities with less than 5000 inhabitants. Furthermore, subsidy programmes in the field of rehabilitation and social housing in autonomous communities are about renovation actions at dwelling, building, and district level, support the retrofitting one-stop-shops, subsidy to draft rehabilitation projects and create social rental housing in energy-efficient buildings. As a conclusion, there is the series of subsidy programmes linked to self-consumption and storage, with renewable energy sources that encourage the implementation of renewable energy generation for self-consumption in the tertiary sector and other productive sectors of the economy, in residential buildings and public administrations.

Figure 21 shows the distribution of specific mitigation actions covered by 17 national programmes in Spain. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A02 (Install High Efficiency Lighting Systems), and A04 (Increase Efficiency of Cooling Systems) are the most cited actions within the national programmes in Spain.

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Spain National Programmes	PRTR	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	NCEP	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	AUE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	ERESEE 2020	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Long Decarbonization	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Housing Act	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	National Architecture Act	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Retrofitting offices	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Financing for rehabilitation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Housing Access	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Rehabilitation program	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Social rented housing	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PREE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PREE 5000	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PIREP 2022	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Support for elaboration	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Nat. Stg. Against Energy Poverty	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Figure 21: National programmes and their linkage to mitigation actions in Spain

In terms of the connection between these 17 national programs and SDGs, the most related SDGs are SDG7, SDG9, and SDG11 as highlighted by red colour in Figure 22.

Programmes		Link to SDGs																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Spain National Programmes	PRTR	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	NCEP	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	AUE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	ERESEE 2020	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Long Decarbonization	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Housing Act	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	National Architecture Act	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Retrofitting offices	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Financing for rehabilitation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Housing Access	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Rehabilitation program	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Social rented housing	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PREE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PREE 5000	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	PIREP 2022	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Support for elaboration	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Nat. Stg. Against Energy Poverty	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Figure 22: National programmes and their linkage to SDGs in Spain

The targets introduced in the regional plans funded by the Next Generation Funds are almost the same for all regions. However, in some cases there are small differences, as it can be noted in the Extremadura and Galicia region plans, where a specific

programme dedicated to the energy improvement of social housing is missing – meaning that it does not target the corresponding SDG 1.3 (implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable).

On the other hand, some differences between regional plans cannot be identified by comparing the SDGs, as they are too generalist. For instance, the self-consumption aids of the Galicia region are more focused on thermal energy while those of the Catalonia region are more focused on solar and wind energy. The rest of the regional renovation plans are unique for each region and focused on SDG targets that are already mentioned in the downscaled plans from the national strategy.

Another aspect worth mentioning is that despite being a country with a variety of climate zones with zones with considerable summer seasons, the general strategy for rehabilitating the existing park, that is, the ERESEE “Long-term strategy for energy rehabilitation of the building sector in Spain”⁴¹, is focused on reducing heating demands. Consequently, most of the strategies proposed and covered by the recovery plan go in line with the plan; therefore, some climate zones are not properly represented. Moreover, even though some of the plans do not list specific measures, the reduction of the total energy demand requested can be a challenge where cooling is the predominant energy demand.

Figure 23 shows the distribution of specific mitigation actions covered by 22 selected regional programmes in Spain. As indicated by red colour in this figure, actions A04 (Increase Efficiency of Cooling Systems), A05 (Increase Efficiency of Heating Systems), A07 (Integrate Renewable Energy Sources), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Italy. Comparing Figure 21 and Figure 23 shows that A04 is the most dominant mitigation action in Spain both on a national and a regional level.

⁴¹ Ministry of Transport Mobility and Urban Agenda. (2019, November 28). ERESEE 2020. Ministerio de Transportes y Movilidad Sostenible. Retrieved February 27, 2024, from https://www.mitma.gob.es/recursos_mfom/paginabasica/recursos/es_ltrs_2020.pdf

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Spain Regional Programmes	REHABITA (Extremadura)																		
	HOUSEENVEST (Extremadura)																		
	Energy Eff. In SEME (Extremadura)																		
	PREE 500 (Extremadura)																		
	DUS 5000 (Extremadura)																		
	Incentive Renewable (Extremadura)																		
	Subsidies Rehab. (Extremadura)																		
	PREE 5000 (Catalonia)																		
	DUS 5000 (Catalonia)																		
	Incentive Renewable (Catalonia)																		
	Subsidies Rehab. (Catalonia)																		
	PREE 5000 (Galicia)																		
	DUS 5000 (Galicia)																		
	Appliances renovation (Galicia)																		
	Subsidies for energy improvement (Galicia)																		
	Subsidies year 2021 (Galicia)																		
	State subsidies for energy eff. (Galicia)																		
	Subsidies RD 1124 (Galicia)																		
	Subsidies 1,2,3 RD 477 (Galicia)																		
	Subsidies 4,5 RD 477 (Galicia)																		
	Subsidies 6 RD 477 (Galicia)																		
	Subsidies Rehab. (Galicia)																		

Figure 23: Regional programmes and their linkage to mitigation actions in Spain

In terms of the connection between these 22 regional programs and SDGs, the most related SDGs are SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 24. Comparing with the national programs, we find that SDG7 and SDG11 are the most related SDGs both on a national and regional level.

Programmes		Link to SDGs																	
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17	
Spain Regional Programmes	REHABITA (Extremadura)	■						■											
	HOUSEENVEST (Extremadura)							■											
	Energy Eff. In SEME (Extremadura)							■											
	PREE 500 (Extremadura)							■											
	DUS 5000 (Extremadura)							■											
	Incentive Renewable (Extremadura)							■											
	Subsidies Rehab. (Extremadura)	■						■											
	PREE 5000 (Catalonia)							■											
	DUS 5000 (Catalonia)							■											
	Incentive Renewable (Catalonia)							■											
	Subsidies Rehab. (Catalonia)	■						■											
	PREE 5000 (Galicia)							■											
	DUS 5000 (Galicia)							■											
	Appliances renovation (Galicia)	■						■											
	Subsidies for energy improvement (Galicia)							■											
	Subsidies year 2021 (Galicia)							■											
	State subsidies for energy eff. (Galicia)							■											
	Subsidies RD 1124 (Galicia)	■						■											
	Subsidies 1,2,3 RD 477 (Galicia)							■											
	Subsidies 4,5 RD 477 (Galicia)							■											
Subsidies 6 RD 477 (Galicia)							■												
Subsidies Rehab. (Galicia)	■						■												

Figure 24: Regional programmes and their linkage to SDGs in Spain

3.3 Poland

3.3.1 Key challenges and opportunities

In Poland, the pollution stemming from heating installations forms quite a big problem. The main pollutant is benzo(a)pyrene⁴², which is emitted from burning solid fuels such as coal. This is, however, a much bigger issue in the Polish countryside, as many cities have extensive district heating networks. These heating networks are mostly fuelled by coal and/or gas, but they are not as polluting per household as there were big investments in filtration installations. Counterintuitively, this means that the air pollution in winter is much worse in the countryside than in the city centres. For renovation, however, this means that residents connected to district heating have little to gain from changing their heat source – if this is technically possible at all. The big problem for Polish cities is the huge amount of apartment buildings from the communist era (construction boom between the Sixties and Eighties) that were cheaply constructed, are in quite a bad state, and have high needs for heating. They require substantial renovation, which in not all cases is possible to be done adequately, e.g., in some cases the changes are too costly. Thermo-modernisation of such a usually building means adding isolation on the outside and changing windows.

The real monitoring of the buildings has been done since around 2000 – the real changes and regulation regarding the amount of used primary energy/m² started in 2009. Since then, the standards for isolation were increased in 2014, 2017 and 2021. The long-term strategy for thermal modernisation of buildings was published in 2022⁴³. The general ambition is that by 2050 65% of buildings reach a primary energy factor of less than 50 kWh/m² per year. From 2024, every new building will have to have an energy label, and the existing buildings would be required to have it in case of changing owners. From 2023, the energy audits will be performed in buildings that have solid-fuel boilers. The goal of the government is that those who decide to perform an energy audit will have easier access to subsidies for renovations and other financial support.

In 2022, Poland started the inventorisation of heat sources in buildings – particularly for residential buildings this was a revolution. This inventorisation is done by means of a survey, and in its first iteration there are still numerous issues to be resolved, for example if a declaration contains multiple heat sources and it is unclear how they are used.

The last couple of years, a huge increase in small photovoltaic installations was observed to the point that Poland now has more capacity of photovoltaic electricity generation than it was prognosed in 2010 for the year 2030. This illustrates that people are open to new technologies, but there is the reservation that it must pay off

⁴² <http://archive.sciendo.com/AEP/aep.2017.43.issue-1/aep-2017-0005/aep-2017-0005.pdf>

⁴³ <https://www.gov.pl/attachment/5720cb23-15d2-473d-829f-ff1010c89ecc>

financially. The rising prices for gas, coal and other fuels has put those new technologies, such as heat pumps, more in the spotlight. The biggest problem for people at this point is the cost of the initial investment, but also the difficulties in finding trustworthy installers and solutions.

Choosing a good representation of the regions is not an easy task as Poland has relatively uniform continental climate, which for the whole country area requires buildings to be prepared for temperatures ranging -30 degr. C to 30 degr. C. Historically there were areas where the industry was dominating (e.g. Silesia was dominated by mining industry) and those that were much more focussed on agriculture. Now the differences are much more complex, and they are strongly affected by governing strategy and economy. Some areas that were in 2016 considered very polluted are now the pioneers of change (e.g. great example is the city of Rybnik - in 2016 was the 4th most polluted city in Europe, in 2022 there is almost no coal usage for heating in the area and the air quality has vastly improved), another areas which were historically very green are now struggling to keep the pollution in norms (e.g. in 2021 the public opinion was shocked by publication showing that Rabka-Zdrój, which is a health resort, has exceeded norms for benzopyrene by 800%).

There is a significant difference between cities and rural areas. In Polish cities there usually is a very developed district heating, while in rural areas the individual heat sources are the norm and there is no gas network that can be used. The effect of this is a completely different renovation strategy between those areas: in the cities for a long-time gas heating was supported, while, at the same time, in rural areas there was a possibility to exchange between different classes of coal furnaces. For the last few years, the approach has changed, and now more sustainable solutions are preferred (esp. heat pumps and renewable generation).

3.3.2 Evaluation of national renovation programmes

In 2001, the government introduced the possibility to voivodships to implement Anti-Smog Acts. These allowed them to limit or ban specific fuels or types and categories of furnaces in buildings. The first was Małopolska, which introduced its act in January 2016; its capital Kraków introduced stricter rules in 2019, which resulted in a full ban of burning coal and wood. By 2022, fourteen voidvodships (out of sixteen in Poland) prepared their Anti-Smog Acts that, to different extents, limit coal and wood burning, but also define the minimum class of furnace that can be used. All acts introduce timelines that progressively increase the restrictions, most will for example ban furnaces below class 3 by 2026.

Many cities have special municipal police units ("Ekopatrol") that aim to educate and convince residents of the most problematic houses to replace their heat-source. "Ekopatrol" units have measuring equipment to check what is burned and drones to verify the emission from the chimneys.

There are renovation strategies on different levels; the biggest is the National Priority Programme "Czyste powietrze" (Clean Air), others are "Stop smog" and "Ciepłe mieszkanie" (Warm flat). In addition to these, there are very prominent municipal funds. Also, there are special programmes for public buildings (hospitals, schools and churches, buildings classified as monuments) that shall be expanded in the next years.

Under the "Clean Air" programme, natural persons who own a single-family building or dwelling and do not earn more than 100,000 PLN annually can apply for a subsidy for increasing isolation or changing the heat source. The "Warm flat" programme was started last year and is similar in goal as the "Clean Air" programme, but it is aimed at multi-family buildings. The national government passes a budget to the municipality, which then distributes it based on applications.

"Stop smog" is aimed at people who cannot afford thermo-modernisation or modernisation of the heat source. In these cases, the municipality pays 30% of the costs, and the rest is covered by national fundings. Not all the municipalities have joined the programme so far. Additionally, in Poland, the costs of thermos-modernisation of a single-family house can be partly deducted from taxes – it is meant as an incentive for middle-class families. Table A3 in the Annex provides the list of all identified programmes under the RW initiative in Poland.

On the contrary, there are very few programmes aimed at supporting the companies to decrease their energy usage (in the renovation fund), they are also a relatively new thing. Since 2013 there is the system of white certificates, but due to personal problems in URE (agency that is issuing the white certificate) this mechanism in Poland is not working as it should. Legal issues with the validity of some types of certificates caused the fall of white certificate market in 2018. Since then, the popularity of the certificates has fallen as Polish companies have to wait around 2 years to get the certificates and a large percentage of the requests is denied due to the documentation deficiencies.

3.3.3 Evaluation of regional renovation programmes

Even though Poland is divided into two climatic zones, the differences in climate are minor and the extremes regarding temperatures are the same for all areas in the country. There is also no important difference in building style. The economic differences are much bigger as Poland is very non uniform regarding economic activity, its type and character. Generally, a large part of population lives in cities, with rural areas in between.

There are 17 regions on NUTS-2 level, but Poland is administratively divided into 16 voivodenships. The difference is in the division of the Mazowieckie voivodenship into 2 regions: Warsaw capital (Warszawski stołeczny) and Mazowiecki regional (Mazowiecki regionalny) - this division is based on the population distribution on municipality levels and has no legal entity. The effect is that it is not possible to talk about Mazowiecki regionalny programmes, as there is no legal body to decide on that. Warszawski stołeczny region is also not a legal entity, from 2017 there are attempts to create the

Warsaw metropolitan zone, which would gather Warsaw city and surrounding municipalities into one organ that has its own budget and deciding power. The proposed area of the Warsaw metropolitan zone does not follow NUTS-2 definition. Officially, Warsaw is part of the Mazowieckie voivodenship, however there is a problem of huge economic disproportions between Warsaw and the rest of the area, which is the reason why Warsaw is often excluded from getting funds. The effect of Warsaw city on the region is huge and very complicated.

3.3.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)⁴⁴
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)⁴⁵
- Annual Cooling and heating degree days⁴⁶
- Household heating energy consumption⁴⁷

⁴⁴ https://doi.org/10.2908/DEMO_R_D2JAN

⁴⁵ <https://doi.org/10.2908/TGS00005>

⁴⁶ https://doi.org/10.2908/NRG_CHDDR2_A

⁴⁷ <https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/zuzycie-paliw-i-nosnikow-energii-w-2022-roku,6,17.html>

Table 12: Poland NUTS-2 Regions by climatic zone and economic level

Region	Climatic zone	Economic level NUTS-2	Cluster
Zachodniopomorskie	Zone 3	Level 2	C3E2
Pomorskie	Zone 3	Level 3	C3E3
Lubuskie	Zone 4	Level 2	C4E1
Wielkopolskie	Zone 4	Level 4	C4E4
Kujawsko-Pomorskie	Zone 4	Level 3	C4E3
Warmińsko-Mazurskie	Zone 4	Level 2	C4E2
Podlaskie	Zone 4	Level 2	C4E2
Mazowiecki regionalny	Zone 4	Level 3	C4E3
Warszawski stołeczny	Zone 4	Level 5	C4E5
Lódzkie	Zone 4	Level 3	C4E3
Lubelskie	Zone 4	Level 3	C4E3
Dolnośląskie	Zone 4	Level 4	C4E4
Opolskie	Zone 4	Level 1	C4E1
Śląskie	Zone 4	Level 5	C4E5
Małopolskie	Zone 4	Level 4	C4E4
Podkarpackie	Zone 4	Level 3	C4E2
Świętokrzyskie	Zone 4	Level 2	C4E2

- Most repeated climatic zone and economic level: C4E3 or C4E2. **C4E3 – Mazowiecki regionalny.**
- Two opposite regions with different economic conditions and climate zones: **C3E2 - Zachodniopomorskie, C4E5 - Śląskie.**

3.3.3.2 Pomorskie

Pomorskie region is the most north area of Poland climatically with large influence of Baltic Sea, which mildens the temperatures, but increases the wind speeds. It is a region with the Tricity Metropolitan area (defined by 3 joined cities: Gdańsk, Gdynia and Sopot), which is one of the main economic forces in the region. Gdańsk and Gdynia have important ports, industry and are also very attractive for living due to very good job opportunities. The other municipalities within the region are more rural, with large areas covered by forests that are considered nature reserves. The whole region is very touristic - Gdańsk is a city of historical importance, while municipalities around are known for their lakes and water sport possibilities.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating energy consumption (Ktoe)	GDP per capita (EUR)
2,295,745	18,323	3,312	36	257	24,400

3.3.3.3 Mazowiecki regionalny

It is a statistical region that has no representative body. It is the area of the Mazowieckie voivodenship with the exclusion of the Warsaw area and some surrounding municipalities. The area has a number of small cities surrounded by rural areas. In Radom there is the biggest military company Polska Grupa Zbrojeniowa SA; in Płock there are headquarters of the biggest Polish fuel and energy company - Orlen SA as well as one of their main oil refineries.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating energy consumption (Ktoe)	GDP per capita (EUR)
2,210,253	-	3,309	33	673	21,700

3.3.3.4 Warszawski stołeczny

This region covers Warsaw city and some surrounding municipalities. It is the most populated region, the only one with an increasing population (mainly due to migration to the city). Economically it is the strongest region in Poland due to the large number of companies and infrastructure.

The municipalities around Warsaw are heavily affected by the urban sprawl, e.g. the city Legionowo (north of Warsaw) is the most densely populated city in Poland due to excellent train connection to Warsaw and relatively low prices of houses.

Warsaw has a very extensive city heating network - it covers 80% of the needs of the city; unfortunately, the cogeneration power plants powering the system are still coal and gas based.

Warsaw is a capital city with a very ambitious plan of being completely zero-emission till 2050 and finishing a number of different activities till 2030. The greatest problems noticed by the city is a problem of its expansion - the living districts are being constructed on the suburbs and neighbouring municipalities. It is an infrastructural challenge, as the heating, transport and gas networks should be expanded.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating energy consumption (Ktoe)	GDP per capita (EUR)
3,269,510	35,559	3,178	54	-	53,700

3.3.3.5 Opolskie

Opolskie is the smallest voivodenship in Poland. It is located south of Poland between Silesia and Lower Silesia - two very important industry centres and this causes Opolskie to perform economically worse compared to its neighbours. Its capital - Opole - is a very dynamically developing city. Its main problem is high depopulation due to emigration and ageing of the society.

Opolskie is known for its summer festival and many touristic sites (e.g. Moszna castle).

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating energy consumption (Ktoe)	GDP per capita (EUR)
896,370	9,412	2,952	42	80	20,000

3.3.3.6 Śląskie

Śląskie is a region of the Silesia voivodeship, it is located in the south of Poland bordering the Czech Republic and Slovakia. It is mainly a mountain area with a number of natural resources. Even now, the most important economic factor is the presence of coal mines, steelwork industry and electric power plants.

Because of the industry, this region was and still is one of the most polluted, however the local administrations are doing everything to improve the situation.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential heating energy consumption (Ktoe)	GDP per capita (EUR)
4,245,283	12,333	3,152	26	501	25,500

3.3.4 Synergies between national and regional programmes in Poland

The national programmes and EU programmes are the main source of funds for decarbonization activities. The regional authorities on the level of voivodenships and cities are not having sufficient funds to open large scale renovation programmes, however the local authorities very often organize information and educational activities to support renovations, but it is done in context of bad air quality.

National programmes since 2007 were aimed at reducing the smog by removing the coal-based heating and changing it to gas, heat pumps or district heating. The secondary goal was to decrease the overall energy usage by funding renovations such as adding isolation and exchange of windows. Now, past 2013, the activities are more varied, and more focus is put on effects than on the methods. Generally, there were many programmes to boost locally produced energy from renewable sources, which

was a huge success to the point that the amount of small PV installations has exceeded any prognosis and expectations.

Figure 25 shows the distribution of specific mitigation actions covered by 6 national programmes in Poland. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A05 (Increase Efficiency of Heating Systems), A08 (Electrify Non-Electric Systems and Appliances), A10 (Integrate Heat Pumps for Water Heating), and A11 (Decrease Thermal Transfer with External Additions) are the most cited actions within the national programmes in Poland.

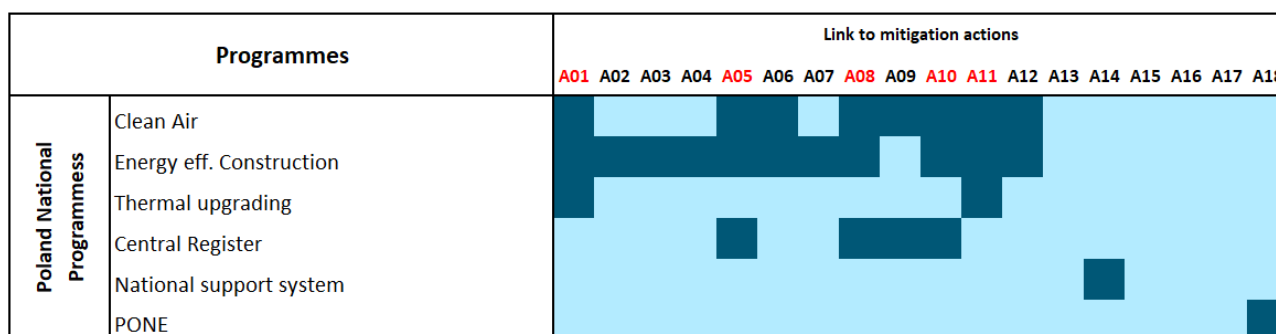


Figure 25: National programmes and their linkage to mitigation actions in Poland

In terms of the connection between these 6 national programs and SDGs, the most related SDGs are SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 26.

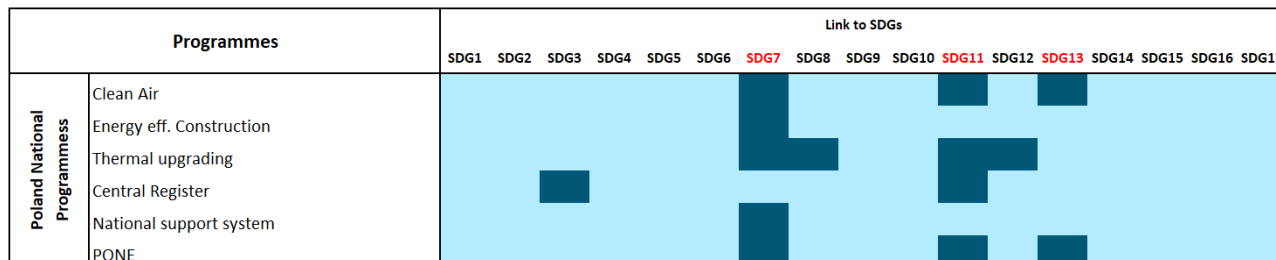


Figure 26: National programmes and their linkage to SDGs in Poland

The local and regional projects and programmes are much more detailed and focussed on special needs of the regions and municipalities, one of the main barriers is lack of well-trained staff on the municipality or city level to create the proposal and fight for funds.

Figure 27 shows the distribution of specific mitigation actions covered by 16 selected regional programmes in Poland. As indicated by red colour in this figure, actions A05 (Increase Efficiency of Heating Systems), A07 (Integrate Renewable Energy Sources), A14 (Alter Habits to Reduce Energy Consumption), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Italy. Comparing Figure 25 and Figure 27 shows that A05 is the most dominant mitigation action in Poland both on a national and a regional level.

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Poland Regional Programmess	Projekty Zintegrowanych (Warsawski)																		
	Warsaw Green City (Warsawski)																		
	Dotations (Warsawski)																		
	ERDF (Pomorskie)																		
	Zintegrowane Inwestycje (Pomorskie)																		
	European Participatory (Opolskie)																		
	Marszalkowski Budzet (Opolskie)																		
	Marszalkowska Inicjatywa (Opolskie)																		
	Project LIFE (Opolskie)																		
	Rewitalizacja (Opolskie)																		
	Mazovia (Slaskie)																		
	Blue Sky (Slaskie)																		
	Full Breath (Slaskie)																		
	Antismog (Slaskie)																		
	Clean air (Mazowiecki)																		
	Adaptation (Mazowiecki)																		

Figure 27: Regional programmes and their linkage to mitigation actions in Poland

In terms of the connection between these 16 regional programs and SDGs, like the national programmes, the most related SDGs are SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 28.

Programmes		Link to SDGs																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Poland Regional Programmess	Projekty Zintegrowanych (Warsawski)																	
	Warsaw Green City (Warsawski)																	
	Dotations (Warsawski)																	
	ERDF (Pomorskie)																	
	Zintegrowane Inwestycje (Pomorskie)																	
	European Participatory (Opolskie)																	
	Marszalkowski Budzet (Opolskie)																	
	Marszalkowska Inicjatywa (Opolskie)																	
	Project LIFE (Opolskie)																	
	Rewitalizacja (Opolskie)																	
	Mazovia (Slaskie)																	
	Blue Sky (Slaskie)																	
	Full Breath (Slaskie)																	
	Antismog (Slaskie)																	
	Clean air (Mazowiecki)																	
	Adaptation (Mazowiecki)																	

Figure 28: Regional programmes and their linkage to SDGs in Poland

3.4 Germany

3.4.1 Key challenges and opportunities

While the ambition in Germany is high when it comes to renovation, it is very likely that the funding for several programmes and incentives in place will remain a limiting factor. For example, the preservation of historic buildings (between 13-26% of the building stock⁴⁸) is a priority in Germany, which can make renovations more complex due to the need to maintain their historic character and meet preservation requirements. Furthermore, the high efficiency standards set by the German government mean that older buildings (stock built up to 1978, which has higher energy consumption than residential buildings with a younger construction age) often require significant upgrades to meet modern energy efficiency standards.

The scale of planned renovations to happen “on the ground” is substantial and difficult to reconcile with observable trends. For example, to attain the objectives of the national efficiency label for old heating installations, the replacement rate for old heating installations needs to be in the order of 3.7% a year (Germany NECP). In addition, overall refurbishment rates for both single and multi-family houses, apartments, and non-residential buildings, need to be above the 2% mark by 2030⁴⁹. A study from the Housing and the Environment (IWU) from 2018 highlights that in old buildings the overall renovation rate is only about 1.4% and in newer buildings is about 1%⁵⁰. Unfortunately, the time span between the establishing of the programmes and their implementation is not sufficient to observe discernible trends in the rate of renovations.

One long standing challenge in promoting renovations of buildings is the lack of awareness and expertise. Some building owners in Germany lack the knowledge or expertise to undertake a renovation project, which can make the process more challenging. In this regard the current programmes make some progress by having dedicated subsidies for the financing of energy consulting and the establishing of building renovation plans (see Table A4 in the Annex). This might alleviate to some extent the lack of expertise of homeowners in energy renovations.

End of 2023 the EU Commission made an EU wide assessment⁵¹ of the draft updated National Energy and Climate Plans to cross-check if they are able to reach the more ambitious 2030 energy and climate objectives under the European Green Deal and RePowerE. The German draft updated NECP reports 24 measures specifically targeting the building sector including notably updates of the building energy law (see below)

⁴⁸ https://energy.ec.europa.eu/system/files/2020-09/de_2020_ltrs_official_en_translation_0.pdf

⁴⁹ https://energy.ec.europa.eu/system/files/2020-09/de_2020_ltrs_official_en_translation_0.pdf

⁵⁰ https://wohngebaeuedaten2016.iwu.de/dl/Endbericht_Datenerhebung_Wohngeb%C3%A4udebestand_2016.pdf

⁵¹ https://eur-lex.europa.eu/resource.html?uri=cellar:bb8fb395-9d9c-11ee-b164-01aa75ed71a1.0001.02/DOC_1&format=PDF

related to heating and the support scheme for building renovations. However, the energy savings of each measure is not quantified. Therefore, the assessment team was not able to judge if efforts will be sufficient and they need to wait for the finalised updated NECP.

3.4.2 Evaluation of national renovation programmes

With the aim of facilitating loans and grants for renovations easier, existing programmes of the German Reconstruction Loan Corporation (KfW) and the Federal Office of Economics and Export Control (BAFA) were streamlined and replaced by federal funding for efficient Building (BEG) in 2021. Subsidies primarily aim at decreasing the primary energy requirements of buildings and are sectioned separately for residential buildings (BEG-WG), non-residential buildings (BEG-NWG), or individual measures (BEG-EM).

A new funding programme for climate-friendly construction was to be launched in 2023, which, according to the current coalition-government in Germany, shall include "ambitious, holistically oriented funding for new buildings in terms of climate policy"⁵². In particular, the focus should be on greenhouse gas emissions per square metre for residential buildings.

The ministry for housing, urban development, and construction (BMWSB) has started different programs⁵³ and is still debating additional ones with the overarching aim to support 'affordable and climate-friendly construction'. Some of these programs are implemented together with the federal states reflecting Germany's federal structure and organisation. There are also programs supporting special groups like families with middle income (up to 90.000 EUR annually) or elderly in age-appropriate renovation of their houses for example. Other programs are planned and confirmed already, but details are still open like the conversion of commercial spaces into living space.

Under the impression of the war in the Ukraine, the German government changed its energy security strategy to speeding up the replacement of fossil fuels, including a program for buildings to replace old heating systems. In 2024 the 'Building Energy Act' (GEG) came into force, which will apply for new buildings as well as for the replacement of heating systems in existing buildings. Different target groups are addressed, there are programs for private owners, businesses, NGOs, and municipalities. To provide information and facilitate the application process the Ministry for Economic Affairs and Climate Action (BMWK) provides a special website that lists funding possibilities on a national level for different owners and categories such as energy efficiency measures, energy consulting, new construction, or renovation of existing buildings. This funding can be either a cost subsidy or a loan (BAFA or KfW).

⁵² <https://www.welt.de/wirtschaft/article236964169/KfW-Zuschuesse-fuer-energetische-Gebaeudesanierung-koennen-wieder-beantragt-werden.html>

⁵³ <https://www.bmwsb.bund.de/SharedDocs/topthemen/Webs/BMWSB/DE/foerderprogramme-bmwsb/foerderprogramme-bmwsb-artikel.html>

3.4.3 Evaluation of regional renovation programmes

Germany's federal structure, encompassing 16 states of diverse sizes, that shapes the country's character. While some federal states, like Hamburg, are characterised by high urban density, others, such as Mecklenburg-Vorpommern, have large rural areas with lower population density. This density variation is not solely confined to the urban-rural divide but also manifests geographically, with differences observed between north and south, and especially east and west of the country. These intra-state and inter-state variations cause diverse challenges and needs due to the aforementioned heterogeneity in size and population density. Germany's 16 states further display economic and climatic diversity, with the north's flat lowlands contrasting the south's mountainous terrain. Consequently, the selection of representative regions considers factors such as economic and geographic diversity, encompassing variation in size (e.g., Berlin vs. Trier) and the urban-rural divide (e.g., Mittelfranken).

3.4.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)⁵⁴
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)⁵⁵
- Annual Cooling and heating degree days⁵⁶

Table 13: Germany NUTS-2 Regions by climatic zone and economic level

Region	Climatic zone	Economic level NUTS-2	Cluster
Stuttgart	Zone 4	Level 6	C4E6
Karlsruhe	Zone 4	Level 6	C4E6
Freiburg	Zone 4	Level 6	C4E6
Tübingen	Zone 4	Level 6	C4E6
Oberbayern	Zone 4	Level 6	C4E6
Niederbayern	Zone 4	Level 5	C4E5
Oberpfalz	Zone 4	Level 4	C4E4
Oberfranken	Zone 4	Level 4	C4E4
Mittelfranken	Zone 4	Level 5	C4E5
Unterfranken	Zone 4	Level 5	C4E5
Schwaben	Zone 4	Level 5	C4E5
Berlin	Zone 4	Level 6	C4E6

⁵⁴ https://doi.org/10.2908/DEMO_R_D2JAN

⁵⁵ <https://doi.org/10.2908/TGS00005>

⁵⁶ https://doi.org/10.2908/NRG_CHDDR2_A

Brandenburg	Zone 4	Level 6	C4E6
Bremen	Zone 4	Level 3	C4E3
Hamburg	Zone 4	Level 6	C4E6
Darmstadt	Zone 4	Level 6	C4E6
Gießen	Zone 4	Level 4	C4E4
Kassel	Zone 4	Level 4	C4E4
Mecklenburg-Vorpommern	Zone 4	Level 4	C4E4
Braunschweig	Zone 4	Level 5	C4E5
Hannover	Zone 4	Level 5	C4E5
Lüneburg	Zone 4	Level 5	C4E5
Weser-Ems	Zone 4	Level 6	C4E6
Düsseldorf	Zone 4	Level 6	C4E6
Köln	Zone 4	Level 6	C4E6
Münster	Zone 4	Level 6	C4E6
Detmold	Zone 4	Level 5	C4E5
Arnsberg	Zone 4	Level 6	C4E6
Koblenz	Zone 4	Level 5	C4E5
Trier	Zone 4	Level 3	C4E3
Rheinhessen-Pfalz	Zone 4	Level 6	C4E6
Saarland	Zone 4	Level 4	C4E4
Dresden	Zone 4	Level 4	C4E4
Chemnitz	Zone 4	Level 4	C4E4
Leipzig	Zone 4	Level 4	C4E4
Sachsen-Anhalt	Zone 4	Level 5	C4E5
Schleswig-Holstein	Zone 4	Level 6	C4E6
Thüringen	Zone 4	Level 5	C4E5

- Most repeated climatic zone and economic level: **C4E6-Brandenburg /Berlin**
- Two additional regions with different economic conditions: **C4E3-Trier, C4E5-Mittelfranken.**

3.4.3.2 Mittelfranken

Mittelfranken is part of the Federal State Bavaria and located in the south of Germany. It is a European metropolitan region including, next to rural areas, also five mid-sized cities (Nürnberg, Fürth, Erlangen, Schwabach, and Ansbach) which have a strong industrial power and therefore, a high demand of qualified industrial workforce and specialised education causing constantly high demand for housing.

Bavaria uses the national programs to focus on the renovation of older buildings and improve their demand for energy, water etc. in order to become more efficient. Special focus is on usage of renewable energy and social inclusion (affordable rents, special renovation to meet needs of elderly people). Target groups of the funding are private owners, leaseholders and usufructuaries of rented residential buildings and authorised residential care facilities. The funding rate can be up to 60% (or 75% in special cases) of comparable new construction costs and must amount to an average of at least EUR 5,000 per flat or care place.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential electricity consumption (Ktoe)	GDP per capita (EUR)
1,805,791	7,243	2,858	27	N.A.	43,600

3.4.3.3 Berlin

Berlin is the capital and largest city in Germany and functions as a federal state; it is located in the north-east of Germany. Due to the high degree of urbanisation and low degree of manufacturing industry the regional funding focuses on: insulation of the building envelope, including external wall insulation or upgrading or replacement of windows; preparation of a building-specific refurbishment roadmap; replacing or optimise heating and ventilation systems; systems for digital energy consumption optimisation; and comprehensive refurbishment of buildings to achieve the efficiency house level. Reflecting the diversity of ownership structures, different target groups, such as natural and legal persons under private and public law, as well as partnerships with legal capacity, who own or have the right to dispose of owner-occupied or rented buildings and 'Homeowners' associations (WEG) can apply for the funding, which can go up to an amount of 500,000 € per year and project.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential electricity consumption (Ktoe)	GDP per capita (EUR)
3,755,251	891	2,614	83	N.A.	40,200

3.4.3.4 Trier

Trier is one of the oldest cities in Germany and is located close to the border with Luxembourg in the south-west of Germany. It belongs to the federal state Rheinland-Pfalz and the NUTS 2 region encompasses not only the city, but also its surrounding area. The federal state focus funds on infrastructure such as hospitals; noise abatement, in particularly on roads; urban development (excluding wastewater) including age-appropriate conversion; barrier removal (including in local public transport); brownfield revitalisation; information technology, limited to financially weak municipalities in rural areas, to achieve the 50 Mbit expansion target; energy-efficient refurbishment of other infrastructure investments. Applications can be made by financially disadvantaged municipalities, determined by financial vulnerability criteria.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential electricity consumption (Ktoe)	GDP per capita (EUR)
546,565	4,926	2,747	31	N.A.	29,800

3.4.4 Synergies between national and regional programmes in Germany

As mentioned above Germany is organised federally and programs are defined in the national ministries, but often they just give the larger direction and dedicate funds in order to achieve specific objectives or reaching special target groups. The federal states can decide how to implement them into their federal strategy and can also define their own priorities. Often the national level only provides funds if the federal level contributes as well. There are different ways of implementation and linkages, which are often not clearly mentioned.

During our research, it became clear that there are significant differences between the national and federal level, as well as between the different federal states. On the official website of the federal ministries responsible for the topics of climate protection, environment, housing & constructing etc., most federal states present no clear or easy link to the Green Deal, the Renovation Wave, and EFRE funds or funding schemes.. However, the search reveals the existence of EFRE program documents for all the federal states, all of which mention the "Renovation Wave or Strategy", which are sometimes governed by different ministries, indicating a lack of inter-ministry linkages

due to the different structures within the federal states. More often, however, the term "energy-efficient building or refurbishment" or "urban development funding" is used, which does not make it easier to find the right funding stream for the target group. Figure 29 shows the distribution of specific mitigation actions covered by 8 national programmes in Germany. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A02 (Install High Efficiency Lighting Systems), A05 (Increase Efficiency of Heating Systems), A07 (Integrate Renewable Energy Sources), A10 (Integrate Heat Pumps for Water Heating), A11 (Decrease Thermal Transfer with External Additions), and A12 (Install Smart Energy Management Systems) are the most cited actions within the national programmes in Germany. However, there is no clear dominant action in this distribution.

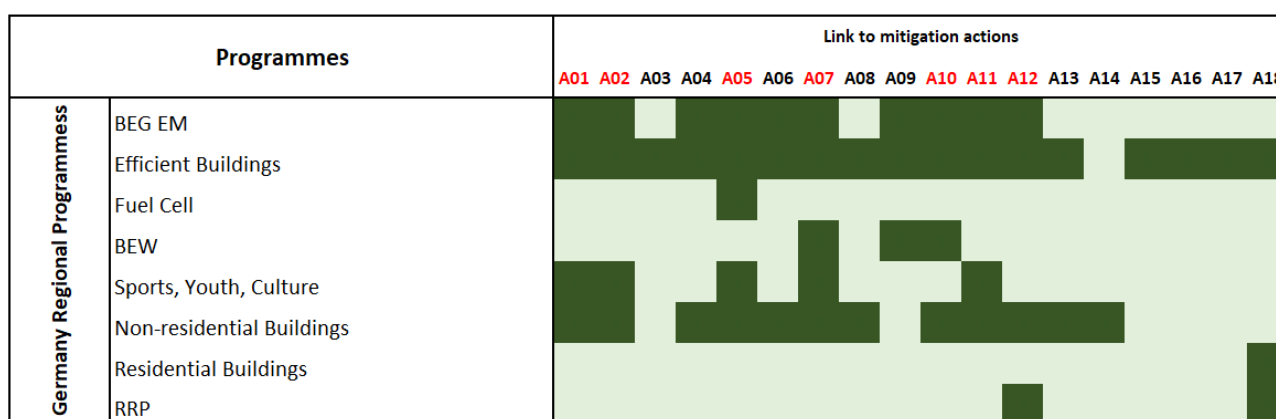


Figure 29: National programmes and their linkage to mitigation actions in Germany

In terms of the connection between these 8 national programmes and SDGs, the most related SDGs are SDG7 and SDG9 as highlighted by red colour in Figure 30 with SDG7 being linked to all programmes.

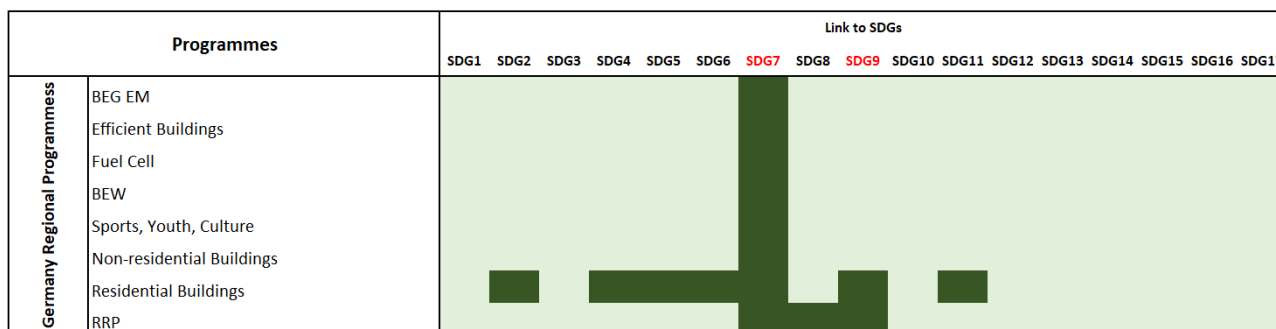


Figure 30: National programmes and their linkage to SDGs in Germany

According to our search results only four (Bavaria, Berlin, Hamburg, and Saarland) out of 16 federal states demonstrate a clear and easily accessible connection between the Green Deal, Renovation Wave, and EFRE program, seamlessly linked across multiple ministries. Additionally, Berlin provides also a separate (self-defined) funding program for energy-efficient building refurbishment and Saarland provides a lot of additional literature, such as an environmental status report.

In many federal states several documents are available, some of them refer to each other and some are independent. It may therefore be necessary to synthesise the results depending on the intended use. In addition, the search process itself shows how difficult it can be for certain target groups to access the right information. This underlines the urgent need for action in the area of 'information accessibility'. The fact that the Renovation Wave of the Green Deal is not always explicitly referred to at federal state level or that specific funding programs are not always clearly and fully identified, may be due to a number of reasons:

1. Communication gaps: Information about specific funding programs and initiatives may not be communicated effectively between the federal government and the individual federal states. In such cases, the federal states may not have enough information to publish on their websites.
2. Time delays: It often takes time for national or international initiatives to be implemented at the regional level. It is possible that the Renovation Wave of the Green Deal has not yet been fully implemented at the state level and therefore specific programs are not in place or have not yet been publicly announced.
3. Budget constraints: Implementing grant programs requires financial resources. If states have limited funds available, they may focus their resources on other pressing needs or programs, which could lead to delays in the rollout of specific Renovation Wave programs.
4. Local adaptation: Implementation of international programs often requires adaptation to local conditions and needs. This process can take time to ensure that programs are effective and targeted.
5. Sources of information: It is possible that information about the Green Deal's Renovation Wave and related funding programs may be available on other platforms or in other formats that are not necessarily published on official state websites. This could include information events, local community meetings or specific information leaflets.
6. Administrative hurdles: Local programs need to be tailored to the target audience, but there are administrative requirements that make it difficult for applicants to access funding, such as long reimbursement periods and the need to pre-finance actions, or some tight deadlines for implementation that are not realistic.

It is rather unlikely to find programme documents at NUTS level among the federal states. There is some documentation of demonstration projects at the district level, dealing with energy-efficient building refurbishment etc., but these are individual projects and not linked to an overarching funding scheme.

Nonetheless, there are municipalities and cities which are leading the way (see above). They try to find pragmatic solutions or using public buildings to demonstrate what is already possible. They try to give local support by providing information or help with the application process, but all this is only possible with commitment, knowledge, and some budget that they can direct to the specific sector. Therefore, a national effort to

simplify and harmonise these processes over all levels without losing local targets could make a huge difference in regard to speeding it up.

Figure 31 shows the distribution of specific mitigation actions covered by 6 selected regional programmes in Germany. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A02 (Install High Efficiency Lighting Systems), A05 (Increase Efficiency of Heating Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Italy. Comparing Figure 29 and Figure 31 shows that A01, A02 and A05 are the most dominant mitigation actions in Germany both on a national and a regional level. A01 in particular, is linked to all regional programmes.

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Germany Regional Programmes	Bay. Modern. (Bayren)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Energy eff Buildings (Berlin)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	EFRE (Brandenburg)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Modernization (Bremen)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Forder. (Nordrhein-Westfalen)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Kommunales (Trier)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

Figure 31: Regional programmes and their linkage to mitigation actions in Germany

In terms of the connection between these 6 regional programs and SDGs, the most related SDGs are SDG7, SDG8, SDG9, and SDG11 as highlighted by red colour in Figure 32. In particular, SDG7 is linked with all national and regional programmes.

Programmes		Link to SDGs																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Germany Regional Programmes	Bay. Modern. (Bayren)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Energy eff Buildings (Berlin)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	EFRE (Brandenburg)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Modernization (Bremen)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Forder. (Nordrhein-Westfalen)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	Kommunales (Trier)	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

Figure 32: Regional programmes and their linkage to SDGs in Germany

3.5 Austria

3.5.1 Key challenges and opportunities

According to EU analysis⁵⁷ Austria's long-term renovation strategy (LTRS) contains milestones, stocktaking and policies. It sets out a clear list of milestones until 2050, expressed in greenhouse gas emission reductions. The strategy is in line with an overall CO2 reduction approach. According to the LTRS modelling, the set of measures is adequate to achieve an 80% decarbonisation of the buildings stock. Austria is applying a comprehensive set of measures to address building renovation which includes regulatory requirements, fiscal and economic incentives and information measures. The strategy focuses on phasing out the use of coal and oil for heating. Austria's LTRS is highly decentralised. It is structured around federal and regional obligations and measures. This requires strong coordination between the Federal states and the Federal government, especially on financing.

Based on Austria's Country Profile of the Renovate2Recover study⁵⁸ that focuses on the building elements of Austria's National Recovery and Resilience Plan (NRRP) endorsed by the Commission in June 2021, limited funding is allocated to building renovation. Based on this study, the Plan can benefit from strengthening its targets and delivery through further supply chain and project support, and by better integrating its building strategy. Austria's existing renovation funding landscape is complex, with overlapping regional and national-level initiatives.

A strong transformational element, according to the above-mentioned study, is Austria's implementation framework. The existing administrative capacities are sufficient for effective compliance with the requirements of the Regulation on the Recovery and Resilience Facility (RRF). Due to the relatively low allocation of RRF funds compared to other countries, and the fact that the expenditure under the Plan accounts for just 0.2% of annual public spending, Austria regards it as expedient for this time-limited instrument to fall back on existing structures and administrative capacities for managing EU funds.

3.5.2 Evaluation of national renovation programmes

According to the Renovate Europe campaign⁵⁹ Austria's NRRP comprises measures worth EUR 3.5 billion from the grant funded element of the Recovery and Resilience Facility. The Plan allocates EUR 209 million to the Renovation Wave component, with EUR 50 million earmarked to fight energy poverty for low-income households through support for heating modernisation and thermal renovation. For enterprises the Plan

⁵⁷ Council of the European Union (2022). COMMISSION STAFF WORKING DOCUMENT Analysis of the national long-term renovation strategies. SWD (2022) 375 final.

⁵⁸ https://www.renovate-europe.eu/wp-content/uploads/2018/09/Renovate2Recover_Full-Study-1.pdf

⁵⁹ <https://www.renovate-europe.eu/monitoring-the-national-recovery-and-resilience-plans-austria/>

includes a 14% investment premium for thermal renovation with a budget of EUR 20 million. An investment proposal for climate-friendly town centres also includes the thermal renovation of commercial and communal buildings EUR 17.5 million, and measures to green facades EUR 5 million. Two projects are included to demonstrate holistic renovation of historic buildings, with a budget of EUR 13.9 million. Across those measures, thermal renovation measures amount to around EUR 106 million (~3%). Funds were also allocated for the exchange of individual oil and gas boilers in the residential sector (EUR 159 million), and grid coupled photovoltaics and electricity storage for businesses (EUR 153 million). Across the plan other measures support renewable energy, low-carbon mobility and energy system investments which may impact buildings.

Based on the Renovate2Recover study, a key challenge is that the NRRP mostly contributes to existing plans and only lays out general objectives such as climate neutrality by 2040. Although Austria's LTRS, sets clearer goals with an 80% cut in buildings emissions by 2025, the NRRP does not make strong links to it. For the residential sector, NRRP funding is targeted at meeting regulatory requirements linked to the prohibition of oil boilers and combating energy poverty. To be eligible for funding, projects will need to realise at least a 30% average reduction in primary energy savings. Nevertheless, according to the Plan, projects are expected to deliver an average of 67% reduction in energy consumption per home. For non-residential buildings, the target is to support 1,000 enterprises with thermal renovation by Q1 2025, and 250 companies and municipalities in town centres by Q2 2026. Measures will require a minimum depth of renovation, but the level is not specified in the Plan. Realised energy savings will be assessed using an updated Energiepass (energy performance certificate (EPC)), enabled through the national EPC database.

According to the Austrian National Reform Programme 2023⁶⁰, in terms of the Renovation Wave, more than 31,800 oil and gas heating systems have been replaced with climate-friendly heating systems using funds from the Recovery and Resilience Facility, reaching a target that was only scheduled for 2026. Further, with the new Renovation Offensive 2024 package, which has the aim to replace as many fossil heating systems as possible as quickly as possible, funding increased massively. The key points of the newly put together funding package are reflected in the Renovation Offensive in the form of a significant increase in the cost of heating replacement by an average of 75% through federal and state funding as well as a tripling of the federal government's flat rate for thermal building renovation.

3.5.3 Evaluation of regional renovation programmes

Austria enjoys a diverse geography which includes mountains, hills, and plains. This has created a wide range of climates and consequently different types of buildings. This

⁶⁰ Federal Chancellery Republic of Austria (2023). National Reform Programme 2023 Austria.

heterogeneity also reflects distinct socioeconomic realities shaped by historical trends in development, urbanisation, and population growth. Therefore, it is important to recognize this interplay when evaluating the regional renovation wave programs. While a unified national approach may seem efficient, it risks overlooking critical disparities across regions. Table 14 provides clustering of climatic zones and socioeconomic levels for Austrian regions. Based on this analysis we select 3 regions with different climatic and socioeconomic conditions to represent the rollout of the regional renovation wave programs in Austria.

3.5.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)⁶¹
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)⁶²
- Annual Cooling and heating degree days⁶³
- Final energy consumption in households by type of fuel⁶⁴

Table 14: Austria NUTS-2 Regions by climatic zone and economic level

Region	Climatic zone	Economic level NUTS-2	Cluster
Burgenland	Zone 4	Level 2	C4E2
Wien	Zone 4	Level 5	C4E5
Oberösterreich	Zone 4	Level 5	C4E5
Niederösterreich	Zone 4	Level 5	C4E5
Steiermark	Zone 4	Level 4	C4E4
Salzburg	Zone 4	Level 3	C4E3
Tirol	Zone 5	Level 3	C5E3
Vorarlberg	Zone 4	Level 2	C4E2
Kärnten	Zone 5	Level 3	C5E3

- Most repeated climatic zone and economic level: C4E5. **C4E5 – Niederösterreich.**
- Two opposite regions with different economic conditions and climate zones: **C5E3 - Tirol, C4E2 -Burgenland.**

⁶¹ https://doi.org/10.2908/DEMO_R_D2JAN

⁶² <https://doi.org/10.2908/TGS00005>

⁶³ https://doi.org/10.2908/NRG_CHDDR2_A

⁶⁴ <https://doi.org/10.2908/TEN00125>

3.5.3.2 Burgenland

Of Austria's nine federal states, Burgenland is the easternmost and the smallest in terms of its population. It consists of 171 independent municipalities and is divided into seven political districts and the two free cities of Eisenstadt and Rust. In Burgenland funding for renovations is in the form of housing support, with focus on thermal building renovation, through promotion of alternative energy systems and systems for saving energy, and through special funding such as the special campaign 2024 for replacing fossil fuel heating systems with highly efficient alternative heating systems and a special campaign for low-income households. Support is also provided in the form of advisory consultations.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential energy consumption (Ktoe)	GDP per capita (EUR)
301,250	3,965	2,591	95	312	28,100

3.5.3.3 Niederösterreich

Niederösterreich (Lower Austria) is the largest and second most populous federal state and surrounds and borders the federal capital Vienna. It consists of 4 statutory cities and 20 districts. The districts are divided into 573 politically independent municipalities. In Lower Austria funding for renovations is in the form of home renovation funding schemes, federal state financial support for the "Get out of oil and gas" programme, and housing subsidies for boiler replacement. Support is also provided in the form of advisory consultations.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential energy consumption (Ktoe)	GDP per capita (EUR)
1,718,373	19,180	2,808	54	1,716	33,600

3.5.3.4 Tirol

The federal state of Tyrol is divided into nine districts; one of them, Innsbruck, is a statutory city. There are 277 municipalities. In Tyrol funding for renovations are in the form of housing subsidies for renovation. Additional funding is available under the housing subsidies for renovation in the form of an eco bonus for comprehensive thermal and energy renovation of a residential property and a climate-friendly heating system bonus for the replacement of old heating systems or boilers based on fossil fuels.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential energy consumption (Ktoe)	GDP per capita (EUR)
771,304	12,534	4,038	0	624	39,800

3.5.4 Synergies between national and regional programmes in Austria

The Austrian concept of the LTRS applies individual instruments to tackle building efficiency largely at the federal state and local levels, with the federal government only providing key framework legislation. In addition, the LTRS demonstrates strongly the use of multi-level-governance and the participation in EU projects to test innovative approaches (again at the regional and local level) across the country.⁶⁵

Figure 33 shows the distribution of specific mitigation actions covered by 7 national programmes in Austria. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A05 (Increase Efficiency of Heating Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Austria.

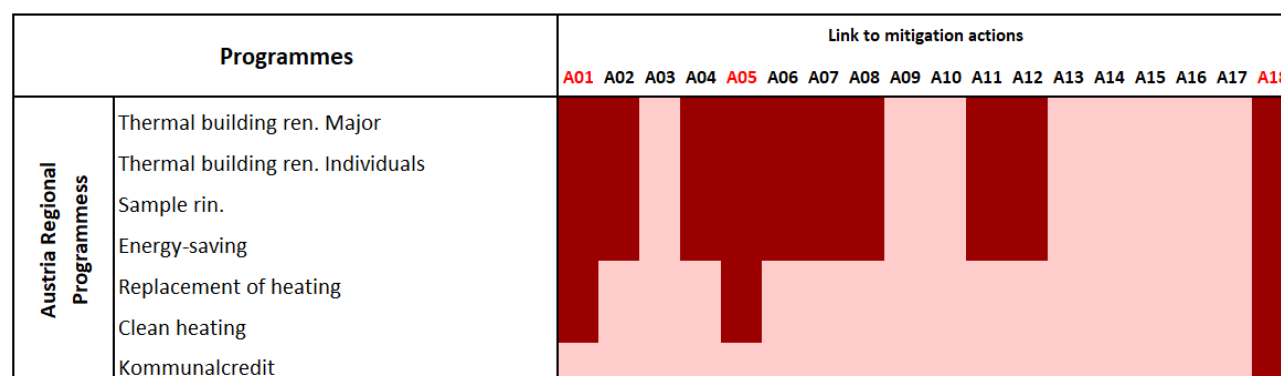


Figure 33: National programmes and their linkage to mitigation actions in Austria

In terms of the connection between these 7 national programs and SDGs, all programmes are related to SDG7, SDG9, and SDG11 as highlighted by red colour in Figure 34.

⁶⁵ Castellazzi L., Paci D., Zangheri, P., Maduta, C., Economidou, M., Riveiro Serrenho, T., Zancanella, P., Ringel, M., Valentova, M., Tsemekidi Tzeiranaki, S., Assessment of the first long-term renovation strategies under the Energy Performance of Building Directive, Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/535845, JRC128067

Programmes		Link to SDGs																
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17
Austria Regional Programmess	Thermal building ren. Major																	
	Thermal building ren. Individuals																	
	Sample rin.																	
	Energy-saving																	
	Replacement of heating																	
	Clean heating																	
	Kommunalcredit																	

Figure 34: National programmes and their linkage to SDGs in Austria

Spatial planning and housing decisions in Austria are devolved to local and regional authorities, with municipalities overseeing associated developments, such as granting permits for renovation activities. In addition to the federal subsidies, all nine federal states in Austria also offer support for renovation projects, although these mostly relate to residential renovations. The renovation competences lie very much with the regional authorities. Building regulation is devolved to municipal level.⁶⁶

Figure 35 shows the distribution of specific mitigation actions covered by 11 selected regional programmes in Austria. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A05 (Increase Efficiency of Heating Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Austria. Comparing Figure 33 and Figure 35 shows that A01, A05, and A18 are the most dominant mitigation actions in Austria both on a national and a regional level.

Programmes		Link to mitigation actions																	
		A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18
Austria Regional Programmess	Housing sub. (Bungerland)																		
	Housing supp. (Bungerland)																		
	Special campaign (Bungerland)																		
	Alt. energy system (Bungerland)																		
	Sp. Campaign for replacing (Bungerland)																		
	Home ren. (Niederosterreich)																		
	Get out of oil (Niederosterreich)																		
	Boiler rep. (Niederosterreich)																		
	Renovation (Tirol)																		
	Ren. Add. Eco bonus (Tirol)																		
	Ren. Add. Climate (Tirol)																		

Figure 35: Regional programmes and their linkage to mitigation actions in Austria

⁶⁶ European Committee of the Regions, Commission for the Environment, Climate Change and Energy, Münch, A., Badouix, M., Schuh, B. et al., Renovation wave – Guidance for local and regional implementation, European Committee of the Regions, 2022, <https://data.europa.eu/doi/10.2863/300184>

In terms of the connection between these 11 regional programs and SDGs, the most related SDGs are SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 36. Both national and regional programs are highly related to SDG7 and SDG11.

Programmes		Link to SDGs																	
		SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17	
Austria Regional Programmes	Housing sub. (Bungerland)																		
	Housing supp. (Bungerland)																		
	Special campaign (Bungerland)																		
	Alt. energy system (Bungerland)																		
	Sp. Campaign for replacing (Bungerland)																		
	Home ren. (Niederosterreich)																		
	Get out of oil (Niederosterreich)																		
	Boiler rep. (Niederosterreich)																		
	Renovation (Tirol)																		
	Ren. Add. Eco bonus (Tirol)																		
	Ren. Add. Climate (Tirol)																		

Figure 36: Regional programmes and their linkage to SDGs in Austria

3.6 Belgium

3.6.1 Key challenges and opportunities

The EU analysis regarding Belgium's long-term renovation strategy (LTRS) contains details on the timeline till 2026, as well as an assessment of different aspects. The identified challenges are based on the 2021-2016 estimates and conclude that only 1% of floor area in the residential sector renovations are considered medium depth, and 0.2% consists of deep renovations. Increasing the renovation rates remains a significant challenge, not only among households without sufficient financial resources. One of the key barriers, next to a slow permitting process, is that a lack of sufficiently scaled workers prevents scaling up renovation.

3.6.2 Evaluation of national renovation programmes

The National Energy & Climate Plan (NECP) targets CO₂ reductions in the building sector but does not quantify the impact of the renovations on emissions. According to the assessment in Renovate2Recover, there is not enough clarity on the required depth of reduction in the National Recovery and Resilience Plan.

Belgium has three Long Term Renovations Strategies, for the three regions. The NRRP generally makes use of loans and other financial instruments; NRRP investments are expected to complement other sources of EU funding. The renovation subsidy tailors to different regions: for example, simplification and bundling of schemes to support investment in Flanders, higher premiums for lower income households in Brussels. A reduced VAT rate (at federal level) supports the demolition and reconstruction of specific residential dwellings that meet some criteria.

The plan also does not explicitly address energy poverty, but the renovation of social housing can play a part here. Digitalisation measures are largely omitted from the plan, except for a proposed reform to Flanders' renovation subsidy programme. Energy renovation has not been linked with other aspects such as air pollution, urban regeneration, mobility, etc.

3.6.3 Evaluation of regional renovation programmes

Before evaluating the regional renovation programs, first the definition of what constitutes "regional" in Belgium needs to be clarified. While there is a subdivision of Belgium into 10 provinces (NUTS-2 division), the renovation wave programs are typically defined over the NUTS-1 level: these are the Flemish Region (encompassing the provinces West Flanders, East Flanders, Antwerp, Limburg and Flemish Brabant), the Brussels-Capital Region (which does not have provinces but is its own NUTS-2 region as well) and the Walloon Region (Walloon Brabant, Hainaut, Luxembourg, Namur and Liège). Some regional programs however work at the level of Communities: the Brussels-Capital Region is considered part of both the Flemish and the Walloon Community (which respectively cover the Flanders Region and the Walloon Region

except for the German speaking part of Liège); the German-speaking Community covers the German speaking part of Liège.

Here, three provinces are taken as an example: one in the Flanders Region and two in the Walloon Region. Liège, in the Walloon Region is taken as an example for the most common occurring combination of climatic zone and economic level (table ...). Antwerp (Flanders Region) and Luxembourg (Walloon Region) are two extremes in the economic level (table 15). In addition, these three provinces offer coverage of all three communities. The local programs referred to in Task 5.3 are not exclusive to the provinces but apply to the entire containing region or community.

3.6.3.1 Data sources

- Population on 1 January by age, sex and NUTS 2 region (2023)⁶⁷
- Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions (2021)⁶⁸
- Annual Cooling and heating degree days⁶⁹

Table 15: Belgium NUTS-2 Regions by climatic zone and economic level, coloured according to their containing region (orange=Flanders Region, Blue=Walloon Region)

Province	Climatic zone	Economic level NUTS-2	Cluster
Prov. West-Vlaanderen	Zone 3	Level 4	C3E4
Prov. Hainaut	Zone 4	Level 4	C4E4
Prov. Oost - Vlaanderen	Zone 3	Level 5	C3E5
Prov. Antwerpen	Zone 3	Level 5	C3E5
Prov. Vlaams-Brabant	Zone 4	Level 5	C4E5
Région de Bruxelles-Capitale	Zone 4	Level 4	C4E4
Prov. Limburg	Zone 4	Level 4	C4E4
Prov. Brabant wallon	Zone 4	Level 2	C4E2
Prov. Namur	Zone 4	Level 2	C4E2
Prov. Liège	Zone 4	Level 4	C4E4
Prov. Luxembourg	Zone 4	Level 1	C4E1

- Most repeated climatic zone and economic level: C4E4. **C4E4 – Prov. Liège.**
- Two opposite regions with different economic conditions and climate zones: **C4E1 - Luxembourg, C3E5 - Antwerpen.**

⁶⁷ https://doi.org/10.2908/DEMO_R_D2JAN

⁶⁸ <https://doi.org/10.2908/TGS00005>

⁶⁹ https://doi.org/10.2908/NRG_CHDDR2_A

3.6.3.2 Flanders

The province of Antwerp has the highest GDP of all provinces in Belgium and it is second after the Brussels-Capital region. The province of Antwerp is home to the city of Antwerp, which not only contains the second-biggest seaport in Europe (after Rotterdam in the Netherlands), but is also known for diamond trade, fashion and tourism. As any provinces located in the Flanders Region and the Flanders Community, the province of Antwerp can benefit from local programmes addressing them.

The Flanders region covers two climatic zones (zone 2 and zone 3), with Antwerp in zone 3. As the local programs cover the entire Flanders Region or Community, this difference is not reflected in the programme. It should be noted that both these zones have the same winter CSI (Table 5).

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential energy consumption (Ktoe)	GDP per capita (EUR)
6,787,969	13,625	2,225	23	N.A.	39,861

3.6.3.3 Wallonia

In the GDP ranking of provinces in Wallonia, the province of Liège is a close second (after Hainaut). It historically was known for producing crystal (Val-Saint-Lambert), sirops and cheese. In recent decades, the airport of Liège has gained importance for cargo flights, which increased the economic importance of the region.

The province of Luxembourg has the smallest GDP of all Belgian provinces, also per capita - it is however the province with the smallest number of residents. The province houses the abbey of Orval, which is one of the few abbeys that can brew Trappist and is known for several historic cities such as Bastogne, Bouillon and Durbuy.

Both Liège and Luxembourg are situated in both the Wallonia Region and the Walloon Community and as such have access to the same local programs.

Population	Area (Km ²)	annual heating degree days	Annual cooling degree days	Residential energy consumption (Ktoe)	GDP per capita (EUR)
3,701,649	16,901	2,500	31	N.A.	28,281

3.6.4 Synergies between national and regional programmes in Belgium

National programs in Belgium provide mechanisms for renovations of Federal infrastructure (e.g. public buildings owned by the state), but also create general mechanisms for e.g. tax benefits or changes to VAT that apply globally for the country.

Figure 37 shows the distribution of specific mitigation actions covered by 3 national programmes in Belgium. As indicated by red colour in this figure, actions A01 (Improve Insulation and Ventilation Barrier of Windows and Panels), A04 (Increase Efficiency of Cooling Systems), A05 (Increase Efficiency of Heating Systems), A07 (Integrate Renewable Energy Sources), A09 (Integrate District Heating), A12 (Install Smart Energy Management Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Belgium.

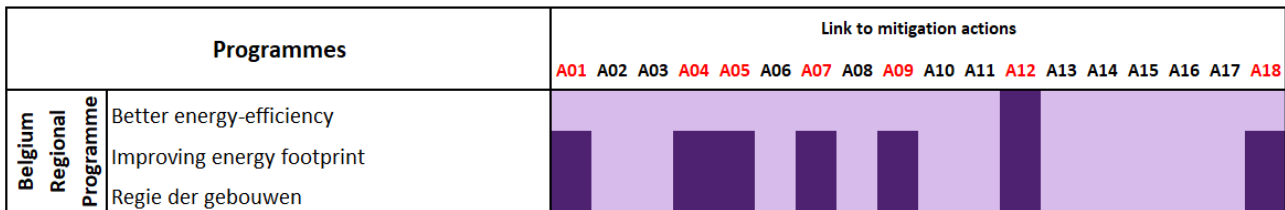


Figure 37: National programmes and their linkage to mitigation actions in Belgium

In terms of the connection between these 3 national programs and SDGs, all programmes are related to SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 38.



Figure 38: National programmes and their linkage to SDGs in Belgium

The national programs typically define measures to achieve a goal (e.g. renovation of social housing), however the implementation to reach this goal is different for different regions or communities - depending on how the measure is defined. This results in sub-measures for the local level, implying that most of the national programmes translate to regional sub-programs which are quite often combined with local programs and regional funding that aim to achieve the same goal. As such many national programs basically increase the budget for local programs.

Figure 39 shows the distribution of specific mitigation actions covered by 11 selected regional programmes in Belgium. As indicated by red colour in this figure, actions A04 (Increase Efficiency of Cooling Systems), A05 (Increase Efficiency of Heating Systems), A07 (Integrate Renewable Energy Sources), A09 (Integrate District Heating), A12 (Install Smart Energy Management Systems), and A18 (Financial, technical, and administrative support for retrofitting old buildings) are the most cited actions within the national programmes in Belgium. Comparing Figure 37 and Figure 39 shows that A04, A05, A07, A09, A12, and A18 are the most dominant mitigation actions in Belgium both on a national and a regional level.

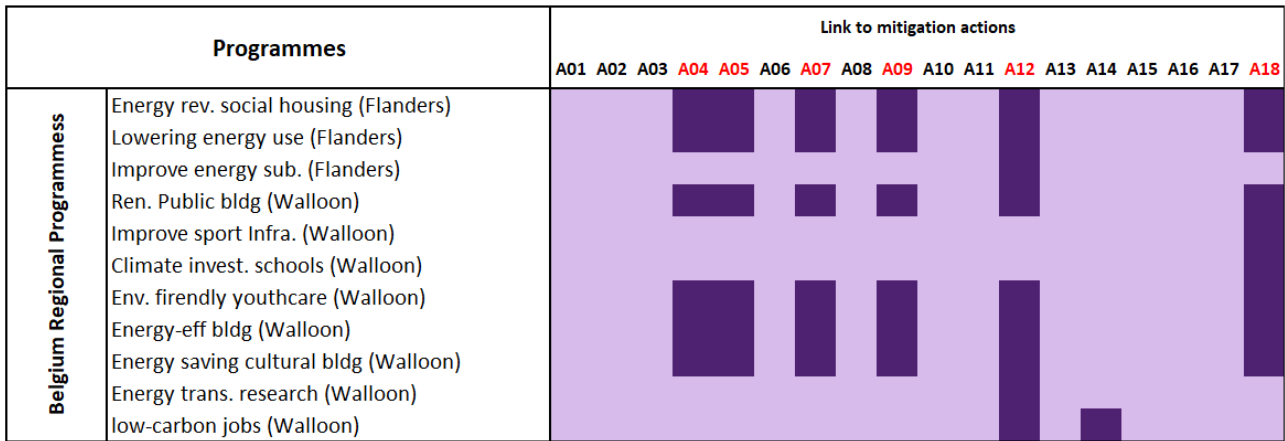


Figure 39: Regional programmes and their linkage to mitigation actions in Belgium

In terms of the connection between these 11 regional programs and SDGs, the most related SDGs are SDG7, SDG11, and SDG13 as highlighted by red colour in Figure 40. Both national and regional programs are highly related to SDG7, SDG11, and SDG13.

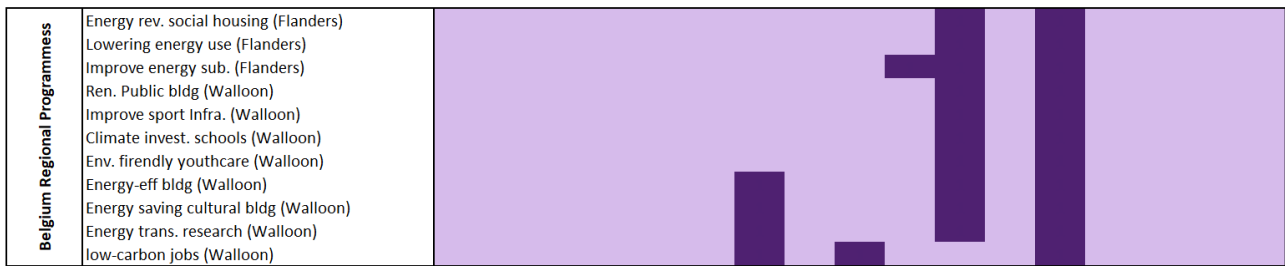


Figure 40: Regional programmes and their linkage to SDGs in Belgium

5 Conclusions

In this report, we evaluated 112 renovation wave programmes in six European countries (Italy, Spain, Poland, Germany, Austria, and Belgium). Out of these 112 programmes, 41 are at the national level while 71 are at the regional level. The programmes vary greatly in terms of duration, amount of funding, and their scope. One common pattern underlying these programmes, however, is their linkage to the UN's Sustainable Development Goals (SDGs). Renovation Wave programmes at the national and regional level offer a strong link to SDGs and specifically SDG 7 which aims at ensuring access to affordable, reliable, sustainable, and modern energy for all. Other important SDGs related to RW programmes are SDG11 (making cities inclusive, safe, resilient and sustainable) and SDG13 (taking urgent action to combat climate change and its impacts). Table 16 shows the predominance of this linkage across the six selected countries in this report.

While the linkage to SDGs shows a coherent pattern of connections to a small group of SDGs across countries and geographical scales, the main mechanisms envisaged in the RW programmes to achieve these goals exhibit a noticeable degree of heterogeneity. In the Mediterranean countries of Italy and Spain, the main mitigation actions are A02 (Install high efficiency lighting system), A04 (Increase Efficiency of Cooling Systems), and A07 (Integrate Renewable Energy Sources). On the other hand, in colder and more central European countries like Germany, Austria, and Poland, A05 (Increase Efficiency of Heating Systems) seems to come to prominence. Finally, in a small but socio-culturally diverse country like Belgium, there seems to be a tendency to achieve RW programmes' objectives through implementing modern management systems (A12) and innovative regulations and standards (A18).

In terms of SECAP KPIs, the energy poverty pillar, mitigation pillar, and energy consumption can be identified as the ones most relevant to both national and regional RW programmes.

The selected national and regional renovation programmes presented in this deliverable paint a complex picture of what is yet to come in some of the areas within the EU with the highest stock of ageing buildings in dire need of renovation. While some programmes are merely providing financial assistance for rehabilitation and renovation of the old building stock, others such as newly established energy efficiency plans, certificates, and offices are more transformative. As such programmes have been recently initiated there is not enough data to evaluate their relative success or potential failure. As indicated above, the division between programmes in countries with warmer climate and those with colder climate is also notable. Despite such heterogeneity, and based on existing evidence, we can assert that the EU countries have recognised the urge to address the low energy efficiency problem in the building sector and have taken a wide range of actions to address it in line with their decarbonisation commitments through the implementation of RW strategies.

Table 16: The linkage of national and regional RW programmes with SDGs, SECAPs, and mitigation actions

Number of programmes	Most linked SDGs	Most linked actions
Italy National: 7 Regional: 5	SDG 7 (92%) SDG 9 (92%) SDG 11 (92%)	A02 (83%) A04 (92%) A07 (75%)
Spain National: 17 Regional: 22	SDG 7 (100%) SDG 11 (95%) SDG 13 (72%)	A02 (62%) A04 (67%) A07 (67%)
Poland National: 6 Regional: 16	SDG 7 (95%) SDG 11 (77%) SDG 13 (64%)	A05 (45%) A10 (41%) A14 (41%) A18 (50%)
Germany National: 8 Regional: 6	SDG 7 (100%) SDG 8 (50%) SDG 9 (57%) SDG 11 (50%)	A01 (71%) A02 (64%) A05 (71%)
Austria National: 7 Regional: 11	SDG 7 (100%) SDG 11 (100%) SDG 13 (61%)	A01 (72%) A05 (83%) A18 (89%)
Belgium National: 3 Regional: 11	SDG 7 (50%) SDG 11 (93%) SDG 13 (100%)	A12 (86%) A18 (71%)

6 References

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7 Annex


7.1 Renovation Wave National Programmes Overview

The information provided for each programme can be summarised into 8 categories:


1. **Duration:** Short-term (1-3 years), Medium-term (4-5 years), Long-term (5+ years)
2. **Funding scheme:** Low-budget (Less than 200 Million of Euro), Medium-budget (Between 201 and 999 million of Euro), Large-budget (1+ Billion of Euro)
3. **Target group:** Municipalities and public buildings, Residential buildings, private companies
4. **Coverage:** National (country level), Regional (local level)
5. **Change:** Transformative (e.g., new procedures, entities, codes, and standards), gradual (e.g., improving the existing procedures and practices)
6. **Measures:** Link to 18 building measures from the LOCALISED mitigation/Adaptation database
7. **SDG:** Link to 16 sustainable development goals
8. **SECAP:** Link to the LOCALISED SECAP KPIs from D5.1 and D5.2

LEGEND


DURATION



SHORT - TERM




MEDIUM - TERM




LONG - TERM


FUNDING SCHEME



LOW BUDGET




MEDIUM BUDGET




LARGE BUDGET


TARGET GROUP



MUNICIPALITIES




RESIDENTIAL BUILDINGS




PRIVATE COMPANIES

COVERAGE




NATIONAL LEVEL




REGIONAL LEVEL


CHANGE



TRANSFORMATIVE CHANGE



GRADUAL CHANGE



LEGEND

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14


A15

A16

A17

















A18

A01: insulation system	A07: renewable energies	A13: water distribution
A02: lighting system	A08: electrify systems	A14: energy consumption
A03: efficiency of appliances	A09: district heating	A15: demand of construction materials
A04: cooling system	A10: heat pumps for water heating	A16: efficient construction methods
A05: heating system	A11: thermal transfer	A17: design concepts
A06: ventilation system	A12: smart management system	A18: financial and administrative support to retrofit



LEGEND


S
D
G

1 NO POVERTY 	2 ZERO HUNGER 	3 GOOD HEALTH AND WELL-BEING 	4 QUALITY EDUCATION 	5 GENDER EQUALITY 	6 CLEAN WATER AND SANITATION 	7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	10 REDUCED INEQUALITIES 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION 	13 CLIMATE ACTION 	14 LIFE BELOW WATER 	15 LIFE ON LAND 	16 PEACE, JUSTICE AND STRONG INSTITUTIONS 

SECAP

- Energy poverty pillar
- Mitigation pillar
- Energy consumption from renewable resources
- Energy generation

- Adaptation pillar
- Coefficients of different fuels
- Adaptation pillar and vulnerability



ITALY

CONTO TERMICO

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

WHITE CERTIFICATES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

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A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

GRANTS TO MUNICIPALITIES WITH LESS THAN 1000 INHABITANTS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

NATIONAL ENERGY EFFICIENCY FUND

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

PREPAC

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

BUILDING UP NEW SCHOOLS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

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A08

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A14

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A16

A17

A18

CHANGE

SDG


SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation


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RE - GENERATE


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

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A06

A07

A08

A09

A10

A11

A12

A13

A14


A15

A16

A17

A18

CHANGE




SDG

S	1	2	3	4	5	6	7	8	17
D	9	10	11	12	13	14	15	16	
G									

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources
 - Energy generation




108

PROVINCIA AUTONOMA DI TRENTO




PEAP


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14


A15

A16


A17

A18

CHANGE




SDG



SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation




PUGLIA




COVENANT OF MAYOR FUNDS


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

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A06

A07

A08

A09

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A18

CHANGE




SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources
 - Energy generation



TOSCANA



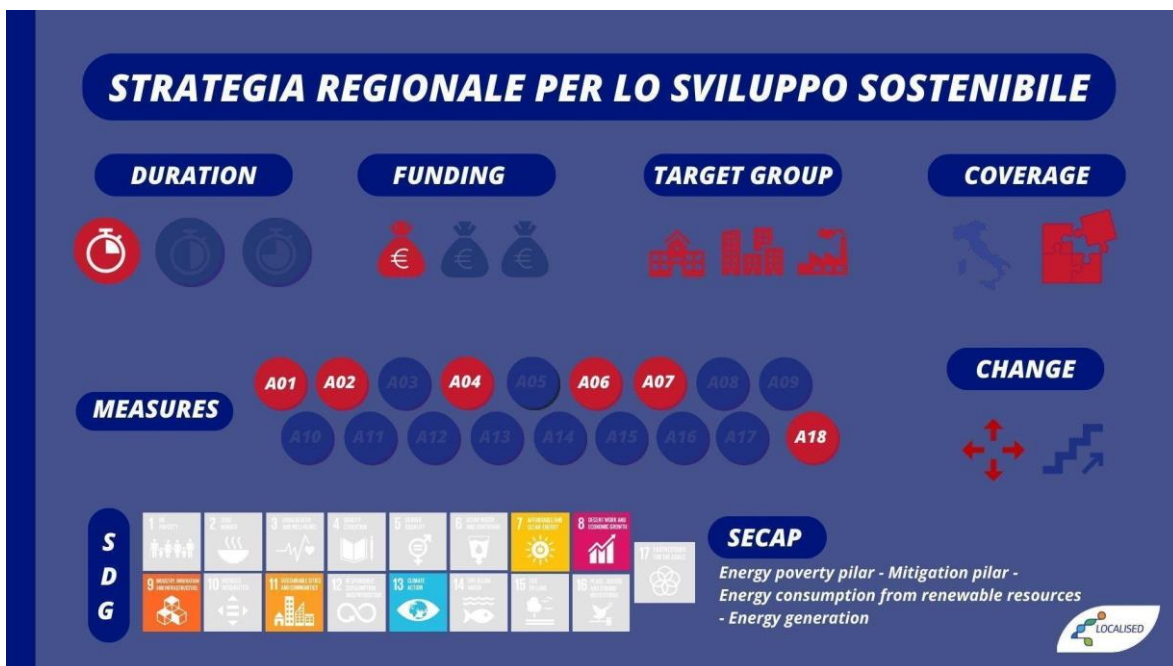
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DURATION **FUNDING** **TARGET GROUP** **COVERAGE**

MEASURES **CHANGE**

SDG **SECAP**






SICILIA




PIANO ENERGETICO REGIONE SICILIA


DURATION




FUNDING




TARGET GROUP




COVERAGE




MEASURES



CHANGE




**S
D
G**



SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation



SPAIN



PRTR

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A08

A09

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A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

NCEP

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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A09

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

SPANISH URBAN AGENDA - AUE

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A18

CHANGE

SDG

S	1	2	3	4	5	6	7	8	17
D	9	10	11	12	13	14	15	16	17
G									

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar and vulnerability - Coefficients of different fuels

ERESEE 2020

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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A18

CHANGE

SDG

S	1	2	3	4	5	6	7	8	17
D	9	10	11	12	13	14	15	16	17
G									

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

LONG DECARBONIZATION STRATEGY 2050

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels

HOUSING ACT

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

SDG

SECAP

Energy poverty pillar , adaptation pillar

NATIONAL ARCHITECTURE ACT

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

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A15

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A17

A18

CHANGE

SDG

S	1	2	3	4	5	6	7	8	11
D									
G	9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - Energy generation - Adaptation pillar - Coefficients of different fuels

RETROFITTING OFFICES (ONE - STOP SHOPS)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

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A07

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A17

A18

CHANGE

SDG

S	1	2	3	4	5	6	7	8	11
D									
G	9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - building energy consumption

FINANCING OF REHABILITATION ACTIONS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
A02
A03
A04
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A07
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A09

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A14
A15
A16
A17
A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - building energy consumption

HOUSING ACCESS STATE PLAN

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A17
A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Adaptation pillars

REHABILITATION PROGRAM FOR ECONOMIC AND SOCIAL RECOVERY

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

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A07

A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17

SECAP

Mitigation pillar - Adaptation pillars and vulnerability

PROGRAM FOR THE CONSTRUCTION OF SOCIAL RENTED HOUSING IN ENERGY EFFICIENT BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A07

A08

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A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17


SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption - Adaptation pillar - Coefficients of different fuels


120

PREE


DURATION




FUNDING



TARGET GROUP




COVERAGE




MEASURES

A01
A02
A03
A04
A05
A06
A07
A08
A09

CHANGE




SDG




SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption - Energy generation - Adaptation pillar and vulnerability - Coefficients of different fuels




PREE 5000


DURATION




FUNDING



TARGET GROUP




COVERAGE




MEASURES

A01
A02
A03
A04
A05
A06
A07
A08
A09

CHANGE




SDG



SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy consumption in all sectors - Adaptation pillar RVA component



PIREP 2022

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	POVERTY	2	ZERO HUNGER	3	GOOD HEALTH AND WELL-BEING	4	QUALITY EDUCATION	5	GENDER EQUALITY	6	CLEAN WATER AND SANITATION	7	AFFORDABLE AND CLEAN ENERGY	8	ECONOMIC GROWTH	9	INDUSTRIAL INNOVATION AND INFRASTRUCTURE	10	REDUCED INEQUALITIES	11	SUSTAINABLE CITIES AND COMMUNITIES	12	RESPONSIBLE CONSUMPTION AND PRODUCTION	13	CLIMATE ACTION	14	LIFE BELOW WATER	15	LIFE ON LAND	16	PEACE, JUSTICE AND STRONG INSTITUTIONS	17	PARTNERSHIPS FOR GOAL ACHIEVEMENT
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SECAP

Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Energy consumption in all sectors

SUPPORT PROGRAMME FOR THE ELABORATION OF PILOT PROJECTS FOR LOCAL ACTION PLANS OF THE SPANISH URBAN AGENDA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A18

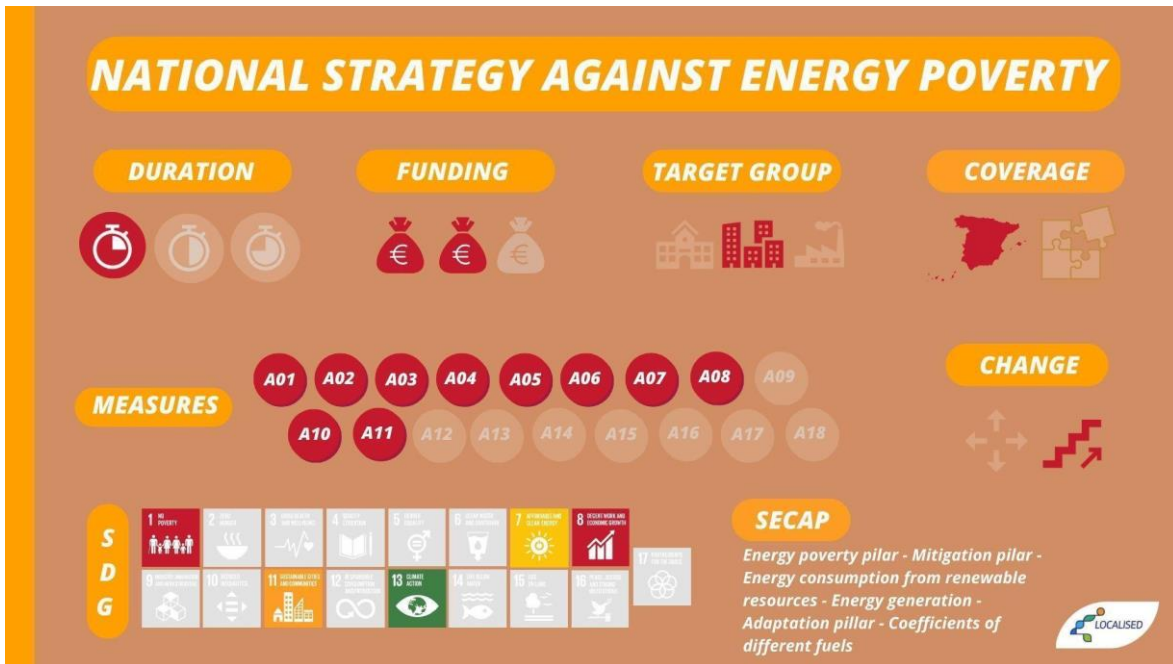
CHANGE

SDG

1	POVERTY	2	ZERO HUNGER	3	GOOD HEALTH AND WELL-BEING	4	QUALITY EDUCATION	5	GENDER EQUALITY	6	CLEAN WATER AND SANITATION	7	AFFORDABLE AND CLEAN ENERGY	8	ECONOMIC GROWTH	9	INDUSTRIAL INNOVATION AND INFRASTRUCTURE	10	REDUCED INEQUALITIES	11	SUSTAINABLE CITIES AND COMMUNITIES	12	RESPONSIBLE CONSUMPTION AND PRODUCTION	13	CLIMATE ACTION	14	LIFE BELOW WATER	15	LIFE ON LAND	16	PEACE, JUSTICE AND STRONG INSTITUTIONS	17	PARTNERSHIPS FOR GOAL ACHIEVEMENT
---	---------	---	-------------	---	----------------------------	---	-------------------	---	-----------------	---	----------------------------	---	-----------------------------	---	-----------------	---	--	----	----------------------	----	------------------------------------	----	--	----	----------------	----	------------------	----	--------------	----	--	----	-----------------------------------

SECAP

Adaptation pillar and vulnerability



SPAIN EXTREMADURA

'REHABITA' PROGRAMME FOR THE REHABILITATION OF RENTAL HOUSING

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption - Adaptation pillar

"HOUSEINVEST" FINANCING MODEL DEFINED FOR THE TOTAL ENERGY RENOVATION OF MULTI-FAMILY RESIDENTIAL BUILDINGS IN EXTREMADURA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption

PROGRAM FOR ENERGY EFFICIENCY ACTIONS IN SMES AND LARGE COMPANIES IN THE INDUSTRIAL SECTOR

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 **A02** **A03** **A04** **A05** **A06** A07 **A08** A09
A10 A11 **A12** A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption

PREE 5000 EXTREMADURA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation

DUS 5000 EXTREMADURA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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A11

A12

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A14

A15

A16

A17

A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

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INCENTIVE PROGRAMS LINKED TO RENEWABLE ENERGY SELF-CONSUMPTION

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

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A18

CHANGE

S
D
G

1 POVERTY

2 ZERO EMISSIONS

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 CLIMATE ACTION

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 LIFE BELOW WATER

14 LIFE ON LAND

15 TERRESTRIAL ECOSYSTEMS

16 CONSUMERS

17 PARTNERSHIPS FOR GOALS

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

SUBSIDIES PROGRAM IN THE FIELD OF REHABILITATION AND SOCIAL HOUSING IN THE AUTONOMOUS COMMUNITY OF EXTREMADURA (RR345 PROGRAM)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A18

CHANGE

S
D
G

1 POVERTY

2 ZERO EMISSIONS

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 CLIMATE ACTION

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 LIFE BELOW WATER

14 LIFE ON LAND

15 TERRESTRIAL ECOSYSTEMS

16 CONSUMERS

17 PARTNERSHIPS FOR GOALS

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

127

SPAIN CATALONIA

PREE 5000 - AID PROGRAM FOR THE ENERGY REHABILITATION OF BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation

DUS 5000 CATALONIA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

INCENTIVE PROGRAMS LINKED TO RENEWABLE ENERGY SELF-CONSUMPTION

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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A18

CHANGE

SDG


SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels


129

SUBSIDIES PROGRAM IN THE FIELD OF REHABILITATION AND SOCIAL HOUSING IN THE AUTONOMOUS COMMUNITY OF CATALONIA


DURATION




FUNDING




TARGET GROUP




COVERAGE




MEASURES



CHANGE




SDG



SECAP

Mitigation pillar - Energy consumption -
 Vulnerability and actions -Energy poverty
 pillar - RVA component - Energy generation
 - Coefficients of different fuels




SPAIN GALICIA




PREE 5000 - AID PROGRAM FOR THE ENERGY REHABILITATION OF BUILDINGS


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

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A18

CHANGE




SDG



SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation



DUS 5000 GALICIA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A14

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A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

APPLIANCES RENOVATION PLAN IN GALICIA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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A17

A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

132

SUBSIDIES FOR ENERGY IMPROVEMENT PROJECTS AIMED AT FREELANCERS AND SMES WITH ACTIVITY IN THE SERVICE SECTOR

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

SUBSIDIES YEAR 2021 STATE AID PROGRAM FOR ENERGY EFFICIENCY ACTIONS IN AGRICULTURAL HOLDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

STATE SUBSIDIES PROGRAMME FOR ENERGY EFFICIENCY ACTIONS IN SMES AND LARGE COMPANIES IN THE INDUSTRIAL SECTOR

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

SUBSIDIES CORRESPONDING TO INCENTIVE PROGRAM 1 OF R.D. 1124/2021

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

SUBSIDIES CORRESPONDING TO INCENTIVE PROGRAMS 1, 2 AND 3 OF R.D. 477/2021

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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CHANGE

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SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels

SUBSIDIES CORRESPONDING TO INCENTIVE PROGRAMS 4 AND 5 OF R.D. 477/2021

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

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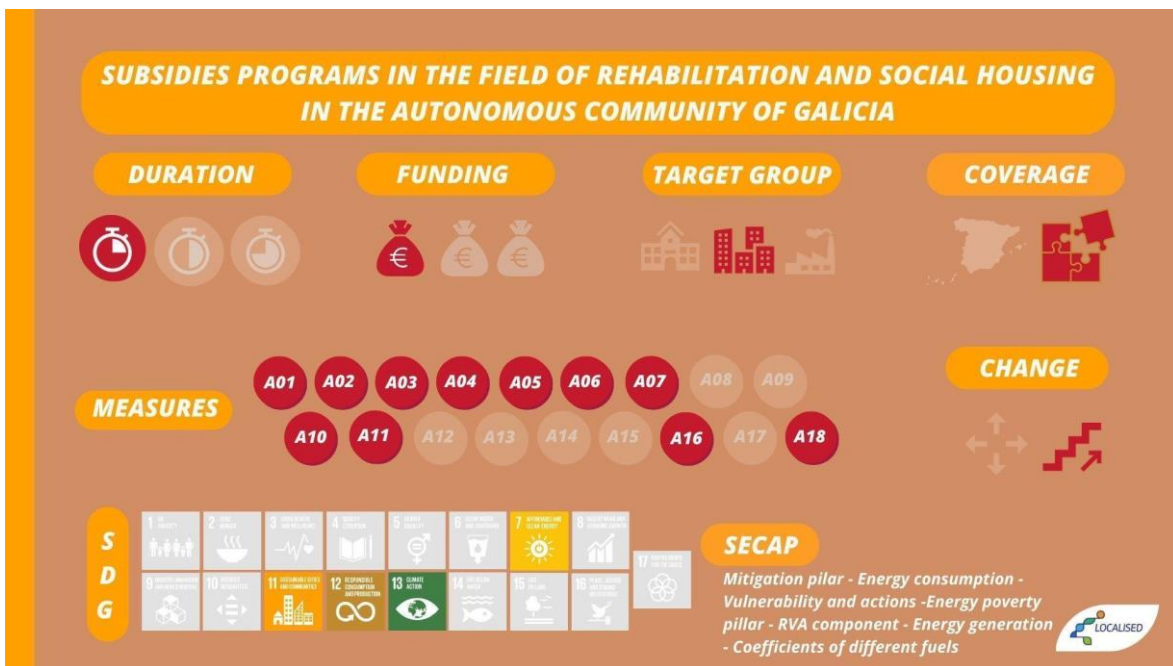
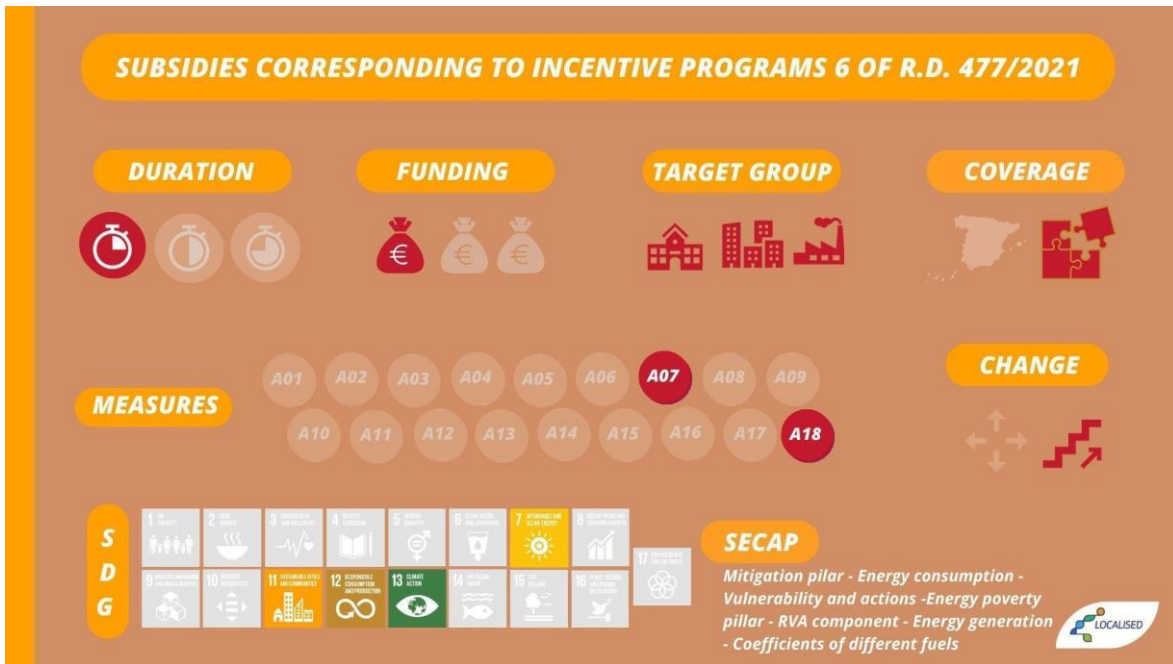
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SECAP

Mitigation pillar - Energy consumption - Vulnerability and actions - Energy poverty pillar - RVA component - Energy generation - Coefficients of different fuels



POLAND



PRIORITY PROGRAMME "CZyste Powietrze" [CLEAN AIR]

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Mitigation pillar -
Energy consumption in building

PRIORITY PROGRAMME "ENERGY EFFICIENT CONSTRUCTION"

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A06

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A08

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Mitigation pillar -
Energy consumption in building

138

THERMAL UPGRADING AND RENOVATION FUND

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 **A11** A12 A13 A14 A15 A16 A17 A18

CHANGE

S D G

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	

SECAP

Energy poverty or adaptation pillars -
Mitigation pillar energy consumption -
Mitigation pillar building section

CENTRAL REGISTER FOR BUILDINGS EMISSIONS (CEEB)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 **A08** **A09**
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

S D G

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	

SECAP

N/A

NATIONAL SUPPORT SYSTEM FOR ENERGY ADVISORS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

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A06

A07

A08

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Mitigation pillar -
Energy consumption in building

PROGRAMMES TO LIMIT AND LOWER THE EMISSIONS. (PONE)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar, Energy consumption in
all sectors and from renewable resources;
Energy generation;

WARSZAWSKI STOŁĘCZNY



PROJEKTY ZINTEGROWANYCH INWESTYCJI TERYTORIALNYCH METROPOLII WARSZAWSKIEJ (ZIT)

DURATION



FUNDING



TARGET GROUP



COVERAGE



MEASURES



CHANGE



S D G



SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all
sectors;



WARSAW GREEN CITY AND CLIMATE ACTION PLAN

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A17
A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11	13	14	15	17
People	Climate	Health	Quality	Gender	Water	Energy	Economic	Buildings	Life	Oceans	Land	Partnerships

SECAP

clean water and an efficient sewage network, climate action, affordable and clean energy, responsible consumption and production, industry, innovations and infrastructure

DOTATIONS FOR INSTALLING OF RES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11	13	14	15	17
People	Climate	Health	Quality	Gender	Water	Energy	Economic	Buildings	Life	Oceans	Land	Partnerships

SECAP

Energy poverty or adaptation pillars - Mitigation pillar energy consumption - Mitigation pillar building section

POMORSKIE



EUROPEAN REGIONAL DEVELOPMENT FUND

DURATION



FUNDING



TARGET GROUP



COVERAGE



MEASURES



CHANGE



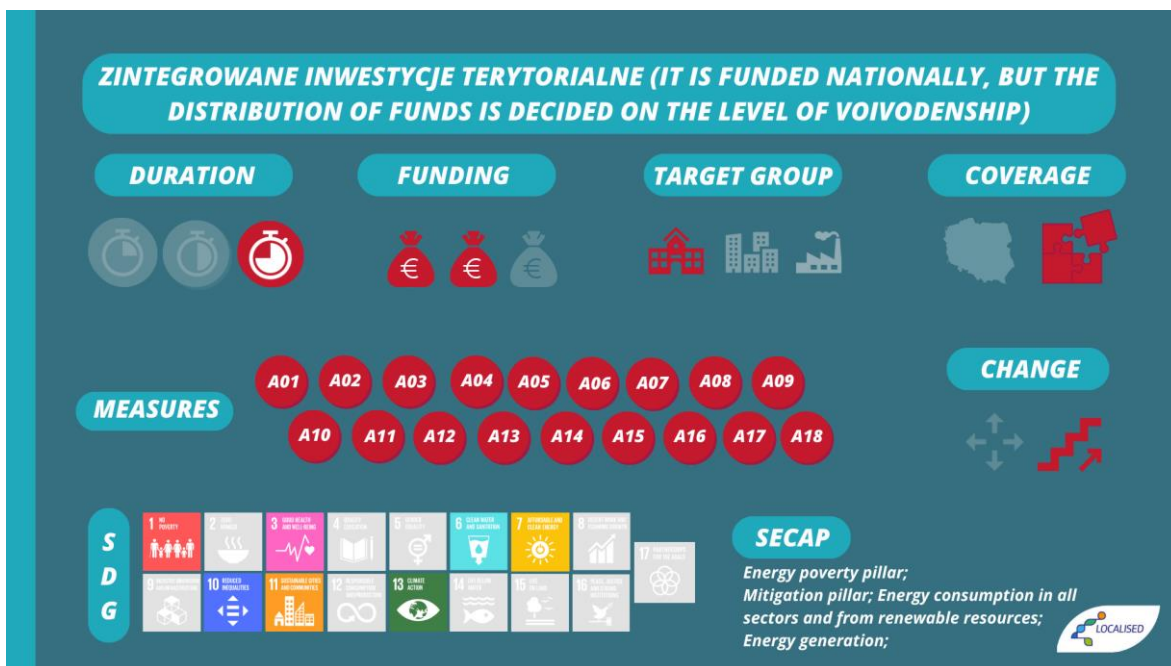
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SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors and from renewable resources;
Energy generation;






OPOLSKIE




EUROPEAN PARTICIPATORY BUDGET


DURATION




FUNDING




TARGET GROUP




COVERAGE




MEASURES



CHANGE




SDG



SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors and from renewable resources;
Energy generation;



MARSZAŁKOWSKI BUDŻET OBYWATELSKI (MARSHAL'S PARTICIPATORY BUDGET)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

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CHANGE

SDG

SDG	1	2	3	4	5	6	7	8	17
	9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors and from renewable resources;
Energy generation;

MARSZAŁKOWSKA INICJATYWA SOŁECKA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A05

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A18

CHANGE

SDG

SDG	1	2	3	4	5	6	7	8	17
	9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors and from renewable resources;
Energy generation;

PROJECT LIFE

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 **A07** A08 **A09**

A10 A11 A12 A13 **A14** A15 A16 A17 A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	

SECAP

Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;

REWITALIZACJA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 **A02** A03 A04 **A05** **A06** A07 A08 A09

A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	

SECAP


Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;

SLASKIE




MAZOVIA FOR CLEAN HEAT 2023


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

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A03

A04

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A14


A15

A16

A17

A18

CHANGE




SDG

1	2	3	4	5	6	7	8	17
3	10	11	12	13	14	15	16	

SECAP

Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;



ŚLĄSKIE. BLUE SKY RESTORED

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

S D G

SECAP

Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;

MUNICIPALITY FOR FULL BREATH

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

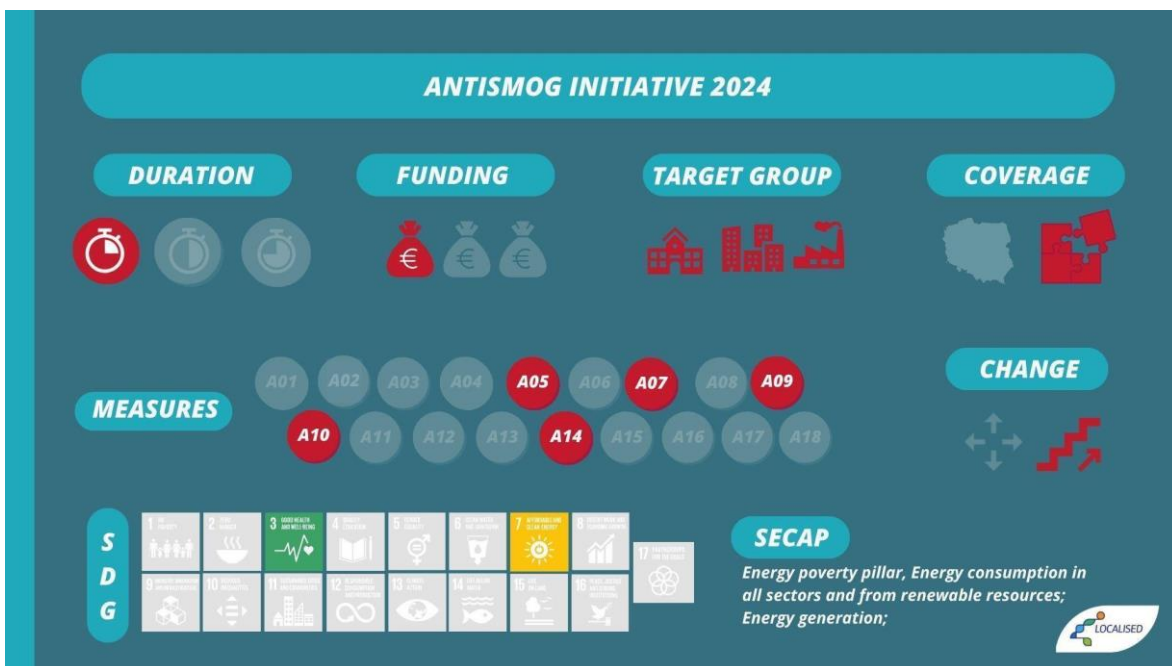
A01 A02 A03 A04 **A05** A06 **A07** A08 **A09**
A10 A11 A12 A13 **A14** A15 A16 A17 A18

CHANGE

S D G

SECAP

Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;




MAZOWIECKI REGION




MAZOVIA FOR CLEAN AIR


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

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A18

CHANGE




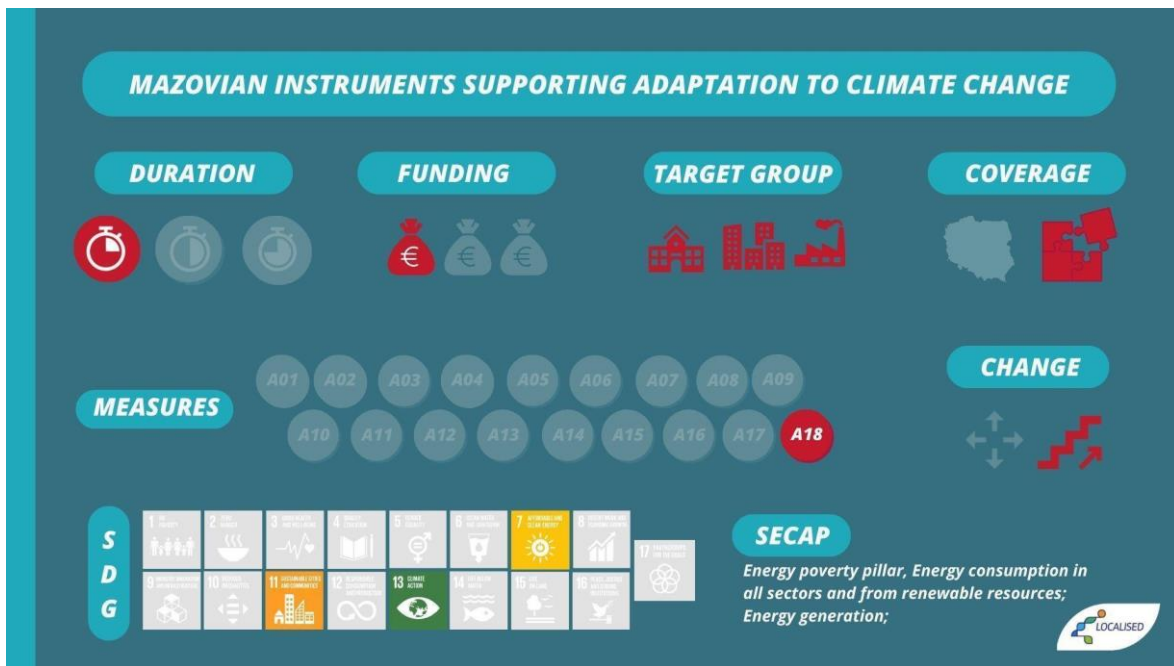
SDG

1	2	3	4	5	6	7	8	17

SECAP

Energy poverty pillar, Energy consumption in all sectors and from renewable resources; Energy generation;





GERMANY

FEDERAL FUNDING FOR EFFICIENT BUILDINGS - INDIVIDUAL MEASURES (BEG EM) FOR MUNICIPALITIES


DURATION	FUNDING	TARGET GROUP	COVERAGE
MEASURES	A01 A02 A03 A04 A05 A06 A07 A08 A09 A10 A11 A12 A13 A14 A15 A16 A17 A18		CHANGE
SDG			SECAP Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation

FEDERAL SUPPORT FOR EFFICIENT BUILDINGS - MUNICIPALITIES (LOANS AND GRANTS)


DURATION	FUNDING	TARGET GROUP	COVERAGE
MEASURES	A01 A02 A03 A04 A05 A06 A07 A08 A09 A10 A11 A12 A13 A14 A15 A16 A17 A18		CHANGE
SDG			SECAP Mitigation pillar - Energy consumption buildings Mitigation pillar - Energy consumption coming from renewable sources - Energy Poverty pillar

ENERGY EFFICIENT BUILDING AND RENOVATION – GRANT FOR FUEL CELLS


DURATION




FUNDING



TARGET GROUP




COVERAGE



MEASURES

A01
A02
A03
A04
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A07
A08
A09

CHANGE




SDG

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SECAP

Mitigation pillar - Energy consumption coming from renewable sources




FEDERAL SUPPORT FOR EFFICIENT HEAT NETWORKS (BEW)


DURATION




FUNDING



TARGET GROUP




COVERAGE



MEASURES

A01
A02
A03
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A07
A08
A09

CHANGE




SDG

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SECAP

Mitigation pillar. Energy consumption buildings - Mitigation pillar. Energy consumption coming from renewable sources



RENOVATION OF MUNICIPAL BUILDINGS IN THE FIELDS OF SPORTS, YOUTH AND CULTURE

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A07

A08

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A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
3	10	11	12	13	14	15	17	

SECAP

Mitigation pillar. Energy consumption buildings
- Mitigation pillar. Energy consumption coming from renewable sources

FEDERAL FUNDING FOR ENERGY ADVICE FOR NON-RESIDENTIAL BUILDINGS, PLANTS AND SYSTEMS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A07

A08

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A17

A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
3	10	11	12	13	14	15	17	

SECAP

Mitigation pillar - Energy consumption buildings

156

FEDERAL FUNDING FOR ENERGY ADVICE FOR RESIDENTIAL BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01A02A03A04A05A06A07A08A09

A10A11A12A13A14A15A16A17A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
People	Climate	Health	Quality	Gender	Water	Energy	Work	Partnerships
9	10	11	12	13	14	15	16	
Industry	Inequality	Urban	Consumption	Life	Oceans	Land	Justice	

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

GERMANY RECOVERY AND RESILIENCE PLAN

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01A02A03A04A05A06A07A08A09

A10A11A12A13A14A15A16A17A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
People	Climate	Health	Quality	Gender	Water	Energy	Work	Partnerships
9	10	11	12	13	14	15	16	
Industry	Inequality	Urban	Consumption	Life	Oceans	Land	Justice	

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

BAYERN



BAYERISCHES MODERNISIERUNGSPROGRAMM: STAATLICHE FÖRDERUNG ZUR SANIERUNG VON MIETWOHNUNGEN UND PFLEGEPLÄTZEN IN BAYERN

DURATION



FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

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A06

A07

A08

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A16

A17

A18

CHANGE



SDG




SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation




BERLIN




FUNDING PROGRAMME FOR ENERGY-EFFICIENT BUILDING REPAIRS


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

A05

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A16












A17

A18

CHANGE




SDG

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources
 - Energy generation




BRANDENBURG




EFRE-FÖRDERPROGRAMM ZUR NACHHALTIGEN STADTENTWICKLUNG (NAS)


DURATION




FUNDING




TARGET GROUP




COVERAGE




MEASURES



CHANGE




SDG



SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation



BREMEN



FUNDING FOR MODERNISATION AND AND REPAIR MEASURES ON PRIVATE BUILDINGS BUILDINGS IN THE FORMALLY DEFINED REDEVELOPMENT AREAS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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A08

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A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation



NORDRHEIN- WESTFALEN



FÖRDERPROGRAMM ZU STÄDTEBAUFÖRDERUNG

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

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A17


A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation



TRIER

KOMMUNALES INVESTITIONSPROGRAMM 3.0

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

A09

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A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources
 - Energy generation

AUSTRIA



THERMAL BUILDING RENOVATION FOR MUNICIPALITIES: MAJOR RENOVATIONS, GREEN FACADES AND ROOFS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
A02
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A17
A18

CHANGE

SDG

SECAP

Mitigation pillar. Energy consumption buildings

THERMAL BUILDING RENOVATION FOR MUNICIPALITIES: INDIVIDUAL MEASURES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A16
A17
A18

CHANGE

SDG

SECAP

Mitigation pillar. Energy consumption buildings

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SAMPLE RENOVATION

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

A06

A07

A08

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A16

A17

A18

CHANGE

SDG

SECAP

Mitigation pillar. Energy consumption buildings

FUNDING FOR ENERGY-SAVING MEASURES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A06

A07

A08

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A18

CHANGE

SDG

SECAP

Mitigation pillar. Energy consumption buildings

PROMOTE THE REPLACEMENT OF OIL AND GAS HEATING SYSTEMS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A18

CHANGE

S
D
G

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Mitigation pillar. Energy consumption buildings

CLEAN HEATING - PROMOTING THE REPLACEMENT OF OIL AND GAS HEATING SYSTEMS FOR LOW INCOME PRIVATE HOUSEHOLDS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A17

A18

CHANGE

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1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP


Mitigation pillar. Energy consumption buildings

KOMMUNALKREDIT PUBLIC CONSULTING INITIATIVE


DURATION




FUNDING



TARGET GROUP



COVERAGE




MEASURES

A01
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A17
A18

CHANGE




SDG

1 Poverty	2 Zero Hunger	3 Good Health and Well-being	4 Quality Education	5 Gender Equality	6 Clean Water and Sanitation	7 Affordable and Clean Energy	8 Decent Work and Economic Growth	11 Sustainable Cities and Communities	12 Responsible Consumption and Production	13 Climate Action	14 Life Below Water	15 Life on Land	16 Peace, Justice and Strong Institutions	17 Partnerships for the Goals
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SECAP

Mitigation pillar. Energy consumption buildings




BUNGERLAND




HOUSING SUBSIDIES BURGENLAND: RENOVATION ADVICE AND FUNDING POSSIBILITIES (SANIERUNGSBERATUNG)


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

A03

A04

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A17

A18

CHANGE




SDG



SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;



HOUSING SUPPORT/SUBSIDIES FOR RESIDENTIAL RENOVATIONS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
A02
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A18

SDG

SECAP

*Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;*

SPECIAL HOUSING SUPPORT CAMPAIGN 2024

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01
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A15
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A17
A18

SDG

SECAP

*Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;*

ALTERNATIVE ENERGY SYSTEMS: PROMOTION OF ALTERNATIVE ENERGY SYSTEMS AND SYSTEMS FOR SAVING ENERGY AND OTHER ELEMENTARY RESOURCES.

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 A08 A09

A10 A11 A12 **A13** A14 A15 A16 A17 **A18**

CHANGE

S D G

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

SPECIAL FUNDING CAMPAIGN 2024 FOR REPLACING FOSSIL FUEL HEATING SYSTEMS WITH HIGHLY EFFICIENT ALTERNATIVE HEATING SYSTEMS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 A08 A09

A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

S D G

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP


Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

NIEDERÖSTERREICH




HOME RENOVATION FUNDING LOWER AUSTRIA


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

A02

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A18

CHANGE




SDG



SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;



"GET OUT OF OIL AND GAS" IN LOWER AUSTRIA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 A08 A09

A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

S D G

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

HOUSING SUBSIDY BOILER REPLACEMENT LOWER AUSTRIA

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 A08 A09

A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

S D G

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

TIROL

HOUSING SUBSIDIES FOR RENOVATION IN TIROL

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01A02A03A04A05A06A07A08A09

A10A11A12A13A14A15A16A17A18

CHANGE

SDG

1	2	3	4	5	6	7	8	17
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

HOUSING SUBSIDIES FOR RENOVATION IN TIROL -ADDITIONAL FUNDING: ECO BONUS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 **A18**

CHANGE

S D G

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

HOUSING SUBSIDIES FOR RENOVATION IN TIROL -ADDITIONAL FUNDING: CLIMATE-FRIENDLY HEATING SYSTEM BONUS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 **A05** A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

S D G

SECAP

Energy poverty pillar;
Mitigation pillar; Energy consumption in all sectors;

BELGIUM

BETTER ENERGY-EFFICIENCY FOR BRUSSELS STOCKMARKET

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 **A12** A13 A14 A15 A16 A17 A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels

IMPROVING ENERGY FOOTPRINT OF HISTORICAL BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 **A04** **A05** A06 **A07** A08 **A09**
A10 A11 **A12** A13 A14 A15 A16 A17 **A18**

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels

SUPPORT ENERGY RENOVATIONS OF "REGIE DER GEBOUWEN"

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources - Energy generation -
 Adaptation pillar - Coefficients of different fuels

FLANDERS REGION



ENERGY FRIENDLY RENOVATION OF SOCIAL HOUSING

DURATION

FUNDING

TARGET GROUP

COVERAGE


MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels



LOWERING ENERGY USAGE WITH 2.5% PER YEAR IN PUBLIC BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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A08

A09

A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

	1	2	3	4	5	6	7	8	

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

IMPROVE ENERGY SUBSIDIES IN FLANDERS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

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A04

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A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

	1	2	3	4	5	6	7	8	

SECAP


Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

WALLOON REGION




FACILITATING THE PROCESS FOR RENOVATION OF PUBLIC BUILDINGS:


DURATION




FUNDING




TARGET GROUP




COVERAGE




MEASURES



CHANGE




SDG



SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels



IMPROVEMENT OF THE ENVIRONMENTAL IMPACTS OF SPORT AND LOCAL INFRASTRUCTURE

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

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A06

A07

A08

A09

A10

A11

A12

A13

A14

A15

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A17

A18

CHANGE

SDG

1	People	2	Zero	3	Good	4	Quality	5	Gender	6	Water	7	Affordable	8	Economic	9	Industry	10	Society	11	Resilient	12	Consumption	13	Climate	14	Life	15	Life	16	Peace	17	Partnership

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

CLIMATE INVESTMENTS IN SCHOOLS BELONGING TO THE FRENCH COMMUNITY

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

1	People	2	Zero	3	Good	4	Quality	5	Gender	6	Water	7	Affordable	8	Economic	9	Industry	10	Society	11	Resilient	12	Consumption	13	Climate	14	Life	15	Life	16	Peace	17	Partnership

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

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ENVIRONMENTALLY FRIENDLY RENOVATION OF YOUTH-CARE AND SPORTS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

	1	2	3	4	5	6	7	8	

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

ENERGY-INEFFICIENT BUILDINGS IN THE FRENCH COMMUNITY

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A10

A11

A12

A13

A14

A15

A16

A17

A18

CHANGE

SDG

	1	2	3	4	5	6	7	8	

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

ENERGY SAVINGS IN CULTURAL BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

ENERGY TRANSITION RESEARCH AT UNIVERSITIES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01

A02

A03

A04

A05

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A18

CHANGE

SDG

1	2	3	4	5	6	7	8	11
9	10	11	12	13	14	15	16	17

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

LOW-CARBON TRANSITION AIMS TO CREATE 6000 JOBS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

*Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels*

PORTUGAL



FIRRU 2020 - FINANCIAL INSTRUMENT FOR THE REHABILITATION AND REVITALISATION OF URBAN AREAS

DURATION	FUNDING	TARGET GROUP	COVERAGE
MEASURES	CHANGE		
A01 A02 A03 A04 A05 A06 A07 A08 A09 A10 A11 A12 A13 A14 A15 A16 A17 A18			
S D G	1 PEOPLE 2 ENERGY 3 QUALITY OF LIFE 4 KNOWLEDGE AND CULTURE 5 GENDER EQUALITY 6 ENVIRONMENTAL QUALITY 7 AFFORDABLE HOUSING 8 ECONOMIC RESILIENCE 9 SOCIAL INCLUSION AND WELLBEING 10 MOBILITY 11 ECONOMIC COHESION 12 SUSTAINABLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION 14 LIFE UNDER THE SEA 15 LIFE ON LAND 16 CLEAN AIR AND POLLUTION CONTROL 17 PARTNERSHIPS	SECAP Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels	

SUPPORT FOR RENOVATION AND INCREASED ENERGY PERFORMANCE OF SERVICE BUILDINGS

DURATION	FUNDING	TARGET GROUP	COVERAGE
MEASURES	CHANGE		
A01 A02 A03 A04 A05 A06 A07 A08 A09 A10 A11 A12 A13 A14 A15 A16 A17 A18			
S D G	1 PEOPLE 2 ENERGY 3 QUALITY OF LIFE 4 KNOWLEDGE AND CULTURE 5 GENDER EQUALITY 6 ENVIRONMENTAL QUALITY 7 AFFORDABLE HOUSING 8 ECONOMIC RESILIENCE 9 SOCIAL INCLUSION AND WELLBEING 10 MOBILITY 11 ECONOMIC COHESION 12 SUSTAINABLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION 14 LIFE UNDER THE SEA 15 LIFE ON LAND 16 CLEAN AIR AND POLLUTION CONTROL 17 PARTNERSHIPS	SECAP Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels	

SUPPORT PROGRAM TO MORE SUSTAINABLE BUILDINGS (2ND PHASE)

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

EFFICIENCY VOUCHER PROGRAM

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar - Energy consumption from renewable resources - Energy generation - Adaptation pillar - Coefficients of different fuels

ENERGY EFFICIENCY IN CENTRAL GOVERNMENT BUILDINGS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE

SDG

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels

SUPPORT FOR THE IMPLEMENTATION OF RENEWABLE ENERGY COMMUNITIES AND COLLECTIVE SELF-CONSUMPTION

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

A01 A02 A03 A04 A05 A06 A07 A08 A09
A10 A11 A12 A13 A14 A15 A16 A17 A18

CHANGE


SDG

SECAP


Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable
resources - Energy generation -
Adaptation pillar - Coefficients of
different fuels

ENERGY EFFICIENCY IN RESIDENTIAL BUILDINGS


DURATION




FUNDING



TARGET GROUP



COVERAGE



MEASURES

A01

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CHANGE




SDG

1 No poverty	2 Zero hunger	3 Good health and well-being	4 Quality education	5 Gender equality	6 Clean water and sanitation	7 Affordable and clean energy	8 Decent work and economic growth	17 Partnerships for sustainable development
9 Industry, innovation and infrastructure	10 Reduced inequalities	11 Sustainable cities and communities	12 Responsible consumption and production	13 Climate action	14 Life below water	15 Life on land	16 Peace, justice and strong institutions	

SECAP

Energy poverty pillar - Mitigation pillar -
 Energy consumption from renewable resources - Energy generation -
 Adaptation pillar - Coefficients of different fuels



THE NETHERLANDS



REFORMING ENERGY TAXATION

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

SDG

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

INTRODUCING AND MODIFICATION OF CO2 IMPOSITION OF INDUSTRY

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

SDG

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

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ENERGY LAW

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

SDG

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

CANCELING "LEEGWAARDERATIO"

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

SDG

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9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

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CANCELING FEES FOR DONATIONS RELATING TO RESIDENCES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

SDG

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

DIRECT THE SUPPLY-SIDE OF THE RESIDENTIAL MARKET

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

194

TIGHTENING THE INCOME-DEPENDENT INCREASE OF HIGHER RENTAL COSTS

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

ACCELERATING THE PROCESS AND PROCEDURES RELATED TO THE CONSTRUCTION OF RESIDENCES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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CHANGE

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

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STIMULATING CONSTRUCTION OF RESIDENCES

DURATION

FUNDING

TARGET GROUP

COVERAGE

MEASURES

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

SUBSIDIES FOR SUSTAINABLE SOCIAL REAL ESTATE

DURATION

FUNDING

TARGET GROUP

COVERAGE

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SECAP

Energy poverty pillar - Mitigation pillar -
Energy consumption from renewable resources
- Energy generation

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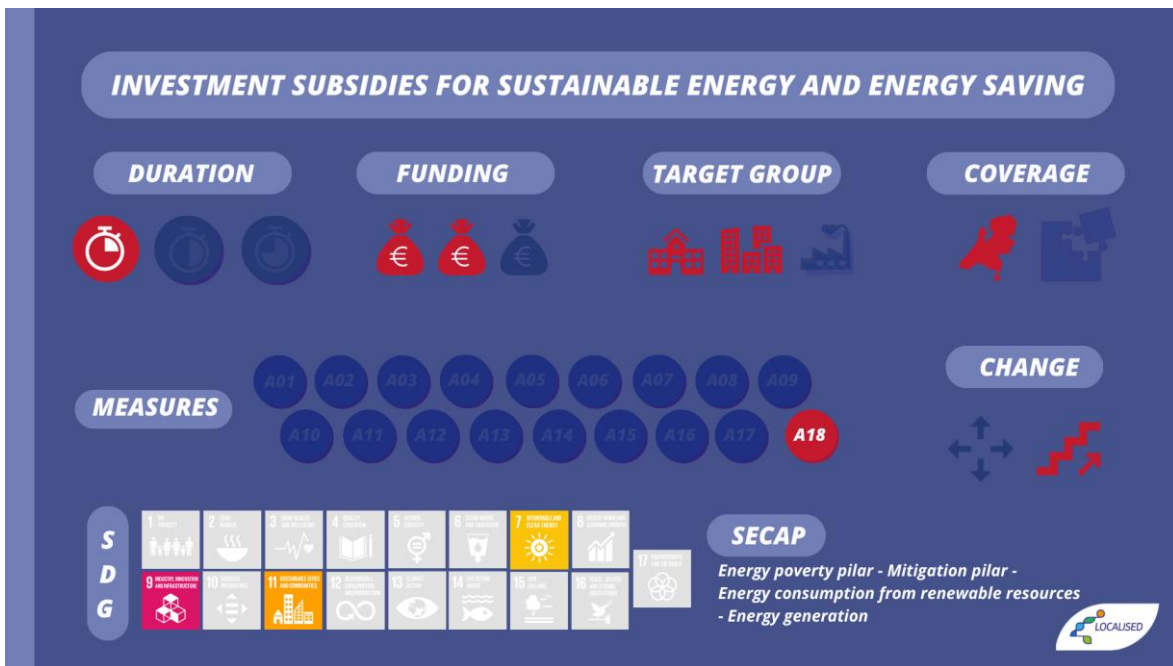


Table A1: List of national renovation wave policies in Italy

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>Conto Termico</p> <p>https://www.gse.it/servizi-per-te/efficienza-energetica/cont-o-termico</p>	<p>Short term - updated year by year but estimated until 2026</p>	<p>Public Administration (PA), companies, individuals</p>	<p>EUR 900 million yearly - of which EUR 200 million allocated to PA</p>	<p>The Conto Termico incentivizes interventions to increase energy efficiency and thermal energy production from renewable sources for small-scale installations.</p> <p>Conto termico for PA: The Conto Termico finances up to 65% of expenses incurred for maintenance work on the building envelope and systems that increase their energy efficiency.</p> <p>Interventions that allow access to the incentives include:</p> <ul style="list-style-type: none"> - the improvement of the thermal insulation of the building envelope through the replacement of window frames and glazed panels with others with less heat loss and the introduction of screens; - the replacement of lighting systems with more efficient systems; - the replacement of air conditioning systems with high-efficiency technologies; - the production of thermal energy from renewable sources; - the introduction of advanced ventilation control and management systems.
<p>White Certificates</p> <p>https://www.mise.gov.it/images/stories/documenti/PNIEC_finale_17012020.pdf</p> <p>https://luce-gas.it/quida/efficienza-energetica/certificati-bianchi</p>	<p>Long term - 2021-2030</p>	<p>PA, private companies, individuals, providers of energy and gas</p>	<p>EUR 5.6 billion</p> <p>The value of each White certificate was initially about EUR 100 but recently has risen to around EUR 250, with peaks above EUR 400</p> <p>for 1 TEP saved, more than 3 titles can be obtained.</p>	<p>The White certificates are tradable certificates certifying the achievement of savings in energy end-use through energy efficiency measures and projects. One certificate is equivalent to saving one tonne of oil equivalent (TOE).</p> <p>If you carry out an energy efficiency measure that provides substantial savings, you can obtain securities convertible into money.</p> <p>Aim: certifying the achievement of savings in energy use through energy efficiency measures and projects.</p> <p>Examples of projects eligible to obtain white certificates:</p> <ul style="list-style-type: none"> - Installation of thermal energy production systems, hot air generators, regenerative burners, power quality systems - Installation of electric motors - Energy recovery in LNG regasification systems - Efficiency upgrading of existing district heating and/or cooling networks - Purchasing fleets of electric, natural gas, LNG, LPG, hybrid or hydrogen-powered transport vehicles - Efficiency upgrading of electricity, gas and water networks - Installation of boilers and hot air

				<p>generators</p> <ul style="list-style-type: none"> - Thermal insulation interventions - Retrofit and implementation of nearly zero-energy buildings - Adoption of efficient reporting and management systems, data analysis systems on the consumption of individual facilities, initiatives aimed at the use of low-emission vehicles
<p>Grants for Municipalities with less than 1000 inhabitants</p> <p>https://dait.interno.gov.it/finanza-locale/notizie/comunicato-del-20-gennaio-2022</p> <p>Decreto 20 gennaio</p>	<p>Short term - 2022</p>	<p>Municipalities with less than 1000 inhabitants</p>	<p>EUR 168 million</p> <p>The amount of the grant to be allocated to each of the 1,996 municipalities with a population of less than 1,000 is equal to EUR 84,168.33</p>	<p>Investments for the safety of schools, roads, public buildings and municipal assets and for the removal of architectural barriers, as well as for energy efficiency and sustainable spatial development, for the year 2022</p> <p>Energy efficiency for sustainable environmental development aimed at energy conservation in public buildings</p> <p>Removal of architectural barriers for the safety of public buildings</p> <p>N.B: municipalities receiving the grant are required to begin the execution of the works by May 15, 2022</p>
<p>National Energy Efficiency Fund;</p> <p>https://www.initalia.it/cosa-facciamo/rafforziamo-le-imprese/fnee/cose</p>	<p>2017-2022</p>	<p>Private companies, PA, Energy Services Companies</p>	<p>EUR 185 million (2017 -2018) EUR 125 million (2019 - 2020) EUR 8 million (from 2022, yearly)</p>	<p>The National Energy Efficiency Fund - FNEE is an incentive that supports the implementation of interventions aimed at ensuring the achievement of national energy efficiency targets, in line with the provisions of the Kyoto Protocol.</p> <p>Initiatives concerning</p> <ul style="list-style-type: none"> • The reduction of energy consumption in industrial processes • The creation and/or implementation of district heating and cooling networks and plants • Upgrading of public services and infrastructures, including public lighting • The energy requalification of buildings. <p>Eligible expenses:</p> <ul style="list-style-type: none"> - Consultancies (to the maximum extent of 10% of eligible expenses) with specific reference to expenses for engineering designs related to building structures and facilities, construction management, statutory testing, design and implementation of energy management systems, feasibility studies as well as the preparation of the energy performance certificate for buildings and energy diagnosis of public buildings - Plant, machinery and equipment, including remote management, remote control and monitoring systems for the collection of data regarding the savings achieved including the supply of materials

				<p>and components provided for the implementation of the intervention</p> <ul style="list-style-type: none"> - Interventions on the building envelope inclusive of masonry and assimilated works, including the costs for seismic risk mitigation interventions, if concerning building elements involved in the energy efficiency interventions; - Specific infrastructure including civil works, supports, water adduction lines, electricity - including connection to the grid - gas and/or biomass fuel necessary for the operation of the plant, as well as measurement systems for the various parameters of plant operation.
<p>PREPAC – Energy Requalification Programme for Central Public Administration;</p> <p>https://www.gse.it/servizi-per-te/efficienza-energetica/prepac</p>		<p>Central, regional and local public authorities</p>	<p>EUR 355 million</p>	<p>PREPAC is the Energy Upgrading programme of the Central Public Administration, which aims to contribute to the energy upgrading of at least 3% annually of the air-conditioned useful covered area of the public building stock.</p> <p>Interventions eligible for the program:</p> <ul style="list-style-type: none"> - Insulation of the envelope; - Replacement of windows; - Installation of shading and/or shading systems; - Replacement of winter air conditioning systems with condensing boilers; - Replacement of air conditioning systems with heat pump systems; - Replacement of air conditioning systems with biomass generators; - Installation of cogeneration or trigeneration systems; - Replacement of electric water heaters with heat pump boilers; - Installation of solar thermal collectors; - Upgrading of lighting systems; - Installation of thermoregulation and heat accounting systems; - Installation of building automation technologies of thermal and electrical systems in buildings.
<p>Call for proposal “Building up new schools”;</p> <p>https://pnrr.istruzione.it/avviso/nuove-scuole/</p>	<p>Short term - 2021-2022</p> <p>Deadline for submission: by 8 February 2022</p>	<p>Regions, provinces, municipalities, public local entities</p>	<p>EUR 800 million</p>	<p>Construction of new schools, through building replacement, in order to have more innovative, sustainable, safe and inclusive classrooms.</p> <p>Of which 40% of resources are allocated to public authorities in the Southern regions. Overall, 30% of the resources on regional basis is allocated to provinces, metropolitan cities, regional decentralization bodies and the autonomous region of Valle d’Aosta for second-cycle schools, and 70% is allocated</p>

				to municipalities and/or Unions of municipalities.
<p>RE-GENERATE</p> <p>https://www.bandi.regione.lombardia.it/</p> <p>Renovation wave - Publications Office of the EU (europa.eu)</p>	<p>Short term - 2021-2023</p>	<p>Municipalities, Unions of Municipalities, Mountain Communities, Provinces in Lombardy region and Metropolitan City of Milan</p>	<p>EUR 14.4 million</p>	<p>The "Re-Generate" call is issued by Lombardy region. It aims to provide grants for the installation of highly energy-efficient plant for energy uses. Interventions should use systems based on renewable energy production systems.</p> <p>Supported interventions included: air conditioning, domestic hot water production, indoor lighting and energy distribution for and distribution of energy for electrical users in public local authority buildings.</p> <p>More in detail:</p> <ul style="list-style-type: none"> - up to EUR 200,000 for the installation of systems of air conditioning (including heating), domestic hot water, indoor lighting - up to EUR 200,000 for renovation of the building envelope.

Table A1a: List of regional renovation wave policies in Provincia Autonoma Di Trento, Italy

Name	Duration	Target group	Funding scheme	Type of measures covered
PEAP 2021-2030	Long term - 2021 - 2030	Public Administration (PA), companies, individuals	N/A	<p>PEAP strategic lines</p> <ol style="list-style-type: none"> 1) deep energy upgrading of existing civil buildings and increase of individual and collective self-consumption 2) high-efficiency industry: adoption of high-efficiency industrial production technologies combined with storage technologies, generation from renewables and integrated management approaches 3) promoting sustainable mobility 4) increasing and differentiating energy production from renewable sources 5) hydroelectric production: reallocation of concessions of large hydroelectric derivations 6) increasing distributed generation of energy from renewable sources, self-consumption and "smart" management of energy flows in buildings and energy communities 7) extending the methane distribution network 8) green hydrogen in trentino by 2030 9) urban planning and careful management of the built environment as a key factor in its energy performance and its ability to be resilient to the effects of climate change 10) synergy with the research and development system.

Table A1b: List of regional renovation wave policies in Puglia, Italy

Name	Duration	Target group	Funding scheme	Type of measures covered
Covenant of mayors funds	Long term - 2021 - 2030	Public Administration (PA)	EUR 933,000	Financial support for the drafting process of the Action Plan for Sustainable Energy and the Climate with which the signatories, following their adhesion to the new Pact, translate into actions and measures concrete actions and measures the goals of reducing greenhouse gasses by 55% by 2030 and to increase the resilience of territories, adapting to the effects of climate change.

Table A1c: List of regional renovation wave policies in Toscana, Italy

Name	Duration	Target group	Funding scheme	Type of measures covered
Riqualficazione Obiettivo "Investimenti a favore della crescita e dell'occupazione" FSE	Short term - 2014 - 2020	Individuals	EUR 300,000	<p>Education and training investments in</p> <p>Area of "Digital economy": vocational training paths aimed at issuing a skills certificate to be combined with at least one compulsory training path;</p> <p>Area of "Sustainable Economy": vocational training pathways leading to the issue of a skills certificate to be combined with at least one compulsory training pathway;</p>
Strategia regionale per lo sviluppo sostenibile	Long term - 2030	Public Administration (PA)	N/A	<p>Macro areas of interest:</p> <ul style="list-style-type: none"> - climate change and energy smart-city: sustainable cities and communities - mobility: innovation and infrastructure urban green and forestry circular economy. <p>Measures to be implemented:</p> <ol style="list-style-type: none"> 1. Cover the entire electricity demand with renewable sources by 2050 2. Improve the energy efficiency of public and private building stock 3. Promoting the circular economy and waste management 4. Supporting research for the development and dissemination of renewable energy use 5. Promoting sustainable mobility 6. Raising public awareness and promoting a culture of sustainability 7. Promoting sustainable spatial governance 8. Promoting sustainable agriculture 9. Protecting, preventing and enhancing the forest heritage

Table A1d: List of regional renovation wave policies in Sicilia, Italy

Name	Duration	Target group	Funding scheme	Type of measures covered
Piano energetico regione Sicilia	Long term - 2030	Public Administration (PA)	EUR 220 million	1) Development: the expansion of energy generation from renewable sources and the use of the new energy technologies themselves, which are radically more efficient than those adopted in the past, will guarantee concrete economic benefits for the territory, in terms of new skilled employment and lower energy costs; 2) Participation: international efforts over the past decades for the purpose of transition from fossil to renewable energy sources have shown that the social, economic and environmental consequences affect essential aspects of the lives of communities in the territory, including employment, air and water quality, transportation modes, tourist and economic attractiveness of areas where the use of distributed generation of energy from water, sun, wind and land is greater; 3) Protection: aware of the great value of Sicily's historical and artistic heritage, the Region will equip itself and promote good practices to identify cutting-edge technologies related to renewable energy sources, functional for their architectural and landscape integration.;

Table A2: List of national renovation wave policies in Spain

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>PRTR, Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</p> <p>Rehabilitación viviendas Plan de Recuperación, Transformación y Resiliencia Gobierno de España. (planderecuperacion.qob.es)</p>	Long-term (2020-2026)	<p>Multi-target national plan attending the covid sanitary crisis, structural transformation and finance, economic, social, territorial and environmental sustainable development.</p> <p>Residential buildings Non-residential buildings Private buildings Public buildings</p>	<p>EUR 69.5 Billion € (EUR 7.8 Billion €) dedicated to the building sector, from those, EUR 6.8 Billion to residential and public buildings, C2 component of the PRTR plan)</p>	<p>General plan: 1. Boost economic activity and job creation (800.000 new jobs) to counteract the short-term impact of the pandemic, 2. Support the broad structural transformation of the economy, 3. Steer the transformation towards a more sustainable and resilient growth model.</p> <p>C2 component: Urban regeneration measures: Increase building renovation rates. Increase social housing.</p> <p>Six structural reforms and six investment lines (PNIEC, ERESEE, AUE, PREE, PIREP...)</p>
<p>National Integrated Energy and Climate Plan 2021-2030 (NCEP, in Spanish PNIEC)</p> <p>Plan Nacional Integrado de Energía y Clima (PNIEC) 2021-2030 (miteco.gob.es)</p>	Long-term (2021-2030)	<p>Multi-target national plan attending the covid sanitary crisis, structural transformation and finance, economic, social, territorial and environmental sustainable development.</p> <p>Existing buildings in the residential and tertiary sectors.</p>	<p>EUR 241.412 Million €, 80 % of the investment from the private sector and 20% from the public sector (47 billion €)</p>	<p>Measures including several legislative, financial, training and information procedures with the final objective of reaching a 23% reduction of GHG compared to 1990. Accelerate de-carbonization, improve energy efficiency in all sectors, improve energy security, strengthen internal energy markets and boost competitiveness, innovation and research.</p> <p>Rehabilitation for 2030 (also stated in ERESEE):</p> <ul style="list-style-type: none"> - Improvement of energy efficiency (thermal envelope) throughout a total of 1,200,000 homes. - Improvement of energy efficiency (renovation of heating systems and DHW) of 300,000 dwellings/year on average.
<p>Implementation of the Spanish Urban Agenda (AUE)</p> <p>https://www.aue.gob.es/</p> <p>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</p>	Long-term , (2019-2030)	<p>Urban development public and private actors.</p> <p>Residential buildings Non-residential buildings Private buildings Public buildings</p>	-	<p>Urban rehabilitation, regeneration and renovation measures. Actions carried on by the national government and, on the other side, by local municipal action plans.</p>
Long-term	Long-	Residential	-	Administrative and political actions to boost

D5.4 - Report on buildings and energy strategies linked to renovation wave policies and climate change mitigation initiatives



<p>strategy for energy rehabilitation in the building sector in Spain (ERESEE 2020) Long-term strategy for energy rehabilitation in the building sector in Spain Ministry of Transport, Mobility and Urban Agenda (mitma.gob.es)</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>term (2020-2050)</p>	<p>buildings Non-residential buildings Private buildings Public buildings</p>		<p>retrofitting of public and private buildings. Ameliorate the tracking and measurement of the retrofiting processes, fight against energy poverty, and create a process of recollecting the vision of all the actors that interact with building renovation.</p>
<p>Long-term decarbonisation Strategy 2050 Long-Term decarbonisation Strategy</p>	<p>Long-term (2021-2050)</p>	<p>Multi-target national plan attending the covid sanitary crisis, structure transformation and finance, economic, social, territorial and environmental sustainable development.</p> <p>Residential buildings Non-residential buildings Private buildings Public buildings</p>	<p>-</p>	<p>1. demand reduction through energy efficiency strategies 2. highly efficient systems 3. implementation of renewable energies, mainly produced in situ.</p> <p>Main technologies considerer to achieve these objectives: - digitalization and energy management - technology solutions to reduce energy demand (such as control systems and insulating buildings) - Use of Renewable energy for thermal systems - Electrification</p>
<p>Housing act BOE.es - Código de la Vivienda del Estado</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>Released 2022</p>	<p>Residential buildings, social housing.</p> <p>People living in inadequate housing.</p>	<p>-</p>	<p>Protection of social housing, limitation of housing expenditure, Tax regulation. Access to adequate housing.</p>

D5.4 - Report on buildings and energy strategies linked to renovation wave policies and climate change mitigation initiatives



<p>Law on the Quality of Architecture and the built Environment and new National Architecture Strategy</p> <p>BOE.es - BOE-A-2022-9837 Ley 9/2022, de 14 de junio, de Calidad de la Arquitectura.</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>Released in 2022</p>	<p>All buildings.</p> <p>Citizens and construction actors.</p>	<p>-</p>	<p>Promote refurbishment, renovation and regeneration of buildings in a sustainable way. Support the construction enterprises, architecture professionals and retrofitting actors. Incentive architecture quality. Promote and disseminate Spanish architecture.</p>
<p>Retrofitting offices (One-stop shops)</p> <p>Programa de apoyo a las oficinas de rehabilitación Ministerio de Transportes, Movilidad y Agenda Urbana (mitma.gob.es)</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>Short-term (2022-2026)</p>	<p>Residential buildings.</p> <p>Communities of owners.</p> <p>Retrofitting offices.</p>	<p>-</p> <p>800€ aid to the retrofitting office for each effectively retrofitted dwelling.</p>	<p>Fund the creation of "one-stop-shop" all citizens retrofitting offices by covering design, implementation, equipment and office management costs. In addition, fund the activity of already established retrofitting offices.</p>
<p>Improving the financing of rehabilitation actions</p> <p>Ley de la propiedad horizontal Actualizada con los artículos vigentes en el BOE (leypropiedadhorizontal.es)</p> <p><i>Part of the</i></p>	<p>Released 2022</p>	<p>Residential buildings.</p> <p>Communities of owners.</p>	<p>-</p>	<p>Improve building renovation funding access to communities of owners.</p>

<p><i>Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>				
<p>Housing access state plan Disposición 802 del BOE núm. 16 de 2022</p>	<p>Short-term (2022-2025)</p>	<p>Residential buildings, social housing</p>	<p>EUR 345 Million €, + expected EUR 1717 Million € before 2025</p>	<p>Financial aids to reduce inadequate housing. Financial aids to increase housing accessibility, pay housing expenditures, offer protected social housing to the vulnerable population.</p>
<p>Rehabilitation programme for economic and economic and social recovery in residential environments Programa de ayudas para la rehabilitación integral de edificios residenciales y viviendas Ministerio de Transportes, Movilidad y Agenda Urbana (mitma.gob.es) <i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>Started in 2020, updated yearly</p>	<p>Residential buildings</p>	<p>EUR 3,420 Million (Funding included in the C2 component of the PRTR plan)</p>	<p>rehabilitate districts rehabilitate buildings Reduction of primary energy NR of 30%. Income tax reduction when investing in retrofitting actions. Six specific subsidies placed for rehabilitation: 1. Rehabilitation actions at the neighborhood level. 2. Rehabilitation offices 3. Rehabilitation actions at the building level. 4. Actions to improve energy efficiency in homes. 5. Aid for the preparation of the logbook of the building for rehabilitation and drafting of rehabilitation projects. 6. Deductions</p>
<p>Programme for the construction of social rented housing in energy efficient buildings. Programa de ayuda a la construcción de viviendas en alquiler social en edificios energéticamente eficientes Ministerio de Transportes, Movilidad y Agenda Urbana</p>	<p>Short-term (2022-2023)</p>	<p>Public buildings. Social housing.</p>	<p>EUR 1,000 Million (2022:500 M, 2023: 500 M) (Funding included in the C2 component of the PRTR plan)</p>	<p>Provision of public land and subsidies for the construction of a public social rental housing</p>

<p>mitma.gob.es</p> <p>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</p>				
<p>Building Energy Rehabilitation programme (PREE)</p> <p>Programa PREE. Rehabilitación Energética de Edificios Idae</p> <p>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</p>	<p>Short-term (3T 2020 - 2T 2021)</p>	<p>Residential buildings Non-residential buildings Private buildings Public buildings</p>	<p>EUR 300 Million + extension of 102.5 Million</p> <p>(Funding included in the C2 component of the PRTR plan)</p>	<p>Renovate existing buildings, reduce the primary energy consumption by at least 30%. Three possible eligible actions: Envelope renovation, implementation of renewable heating and cooling systems and illumination renovation. Coverage of 35% of the costs at building level, 25% at single-family house level and 15% at dwelling inside building level. +15% if there is a vulnerable situation in line with the Energy poverty national strategy.</p>
<p>Regeneration and demographic challenge programme (PREE 5000, DUS 5000)</p> <p>BOE.es - BOE-A-2021-13269 Real Decreto 692/2021, de 3 de agosto, por el que se regula la concesión directa de ayudas para inversiones a proyectos singulares locales de energía limpia en municipios de reto demográfico (PROGRAMA DUS 5000), en el marco del Programa de Regeneración y Reto Demográfico del Plan de Recuperación, Transformación</p>	<p>(2021-2026)</p>	<p>Existing buildings in municipal zones and nucleus of less than 5000 inhabitants.</p>	<p>EUR 1000 Million</p> <p>(Funding included in the C2 component of the PRTR plan)</p>	<p>Mitigate depopulation by renovating rural areas. A) PREE 5000, Energy rehabilitation programme for existing buildings. B) DUS 5000, Aid for sustainable urban development projects, improvement of energy efficiency, sustainable mobility and integration of renewables in public infrastructures. C) Aid for projects that facilitate the transition to a low-carbon economy and entail an economic reactivation.</p>

<p>y Resiliencia.</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>				
<p>Programme to Promote the Rehabilitation of Public Buildings for Local Entities (PIREP 2022)</p> <p>Programa de Impulso a la Rehabilitación de los Edificios Públicos para las Entidades Locales (PIREP local) - Programa de Impulso a la Rehabilitación de los Edificios Públicos para las Entidades Locales (PIREP local) - Subvenciones PRTR - Áreas de actividad - MITMA - Ministerio de Transportes, Movilidad y Agenda Urbana</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>	<p>Long-term (2021-2026) Deadline Line1: 30/9/2024 Line2: 31/3/2026</p>	<p>Public administrations (Autonomous Communities and Local Entities)</p>	<p>EUR 1080 Million</p> <p>Line 1: 480 M€ for autonomous communities, Line 2: 600 M€ for local entities (municipal, province and island regions)</p> <p>(Funding included in the C2 component of the PRTR plan)</p>	<p>Integral renovation of public buildings, targeting average energy savings of 30% and considering the main aspects of the new European bauhaus (Sustainability, inclusion and aesthetic quality).</p> <p>Carry on the exemplary paper that the Public Administration must exercise, fulfilling the obligation of energy renewal.</p>
<p>Support programme for the elaboration of pilot projects for local action plans of the Spanish Urban Agenda</p> <p>Ayudas para la elaboración de proyectos piloto de Planes de</p>	<p>Short-term (2021)</p>	<p>Local authorities (municipalities and provincial councils)</p>	<p>EUR 20 million</p> <p>(Funding included in the C2 component of the PRTR plan)</p>	<p>Impulse the approbation of local action plans to implement the Spanish Urban Agenda, and carry on an exemplary paper using the method, process and results of pilot projects.</p>

<p>Acción local de la AUE - Ayudas para la elaboración de proyectos piloto de Planes de Acción local de la AUE - Subvenciones PRTR - Áreas de actividad - MITMA - Ministerio de Transportes, Movilidad y Agenda Urbana</p> <p><i>Part of the Spain's National Recovery and Resilience Plan (C2 Housing Rehabilitation and Urban Regeneration Program)</i></p>				
<p>National Strategy against energy poverty 2019-2024</p> <p>https://www.miteco.gob.es/es/prensa/estrategia_nacional_contralapobreza_energetica2019-2024_tcm30-496282.pdf</p>	<p>Short-term 2019-2024</p>	<p>Residential buildings</p>	<p>-</p>	<p>Line 4. Improvement of subsidy mechanisms against poverty Energy Line 6: - Short term: subsidies for express low-cost renovations in homes, (up to 100%) - Medium Term: subsidy for the energy costs for vulnerable people, replacement of equipment with other more energy efficient, including appliances. (up to 100%) - Long Term: rehabilitation of buildings, seeks to promote measures aimed at buildings in urban regeneration and renewal areas or in rural areas where residents are vulnerable consumers. o other measures derived from ERESEE</p>

Table A2a: List of regional renovation wave policies in Extremadura, Spain

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>'Rehabita' programme for the rehabilitation of rental housing</p> <p>'Rehabita' programme for the rehabilitation of rental housing Interreg Europe - Sharing solutions for better policy</p>	Short-term	Residential buildings	<p>EUR 635.851</p> <p>From Interreg Europe.</p>	<p>Renovate and rent residential buildings.</p> <p>Consists of the transfer of ownership of a dwelling to the Junta de Extremadura for a period in exchange for the Autonomous Administration to renovate it and rent it.</p>
<p>"HousEEnvest" Financing model defined for the total energy renovation of multi-family residential buildings in Extremadura</p> <p>Houseeninvest Renovate your house (renuevatucasa.eu)</p>	-	Multi-family residential buildings	<p>N/A</p> <p>International resources coming from IEB and EU cooperation programmes.</p>	<p>Unlock investment in energy efficiency in private buildings, using adapted funds, offer technical, economical and legal experience to invest the funds in retrofitting projects of Extremadura.</p> <p>Constitution of the Housing Energy Efficiency Guarantee Fund for Extremadura (GEEVE Fund). Through this Fund, the communities of owners or private owners that want to carry out an energy rehabilitation project will be able to request and obtain loans in advantageous conditions (they have the public endorsement), from different financial entities attached to it.</p>
<p>programme for energy efficiency actions in smes and large companies in the industrial sector</p> <p>AYUDAS PARA ACTUACIONES DE EFICIENCIA ENERGÉTICA EN PYME Y GRAN EMPRESA DEL SECTOR INDUSTRIAL. CONVOCATORIA 2020 (juntaex.es)</p>	Short-term (2020-2023)	SMES and large companies in the industrial sector	<p>EUR 1.974.813,55</p> <p>from the European funds for regional development (ERDF)</p>	<p>Promote decarbonisation actions in the industrial sector through the technological improvement of equipment and processes, as well as the implementation or improvement of energy management systems. Reducing the final energy consumption and the Greenhouse gas emissions.</p>
<p>PREE 5000 Extremadura</p> <p>PROGRAMA PREE 5000 (juntaex.es)</p>	Short-term (2022-2023)	(municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000	<p>EUR 2.735.000</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the</p>	<p>Funding of rehabilitation measures in all existing buildings: improvement of the thermal envelope, energy efficiency improvement and use of renewables in heating, cooling, ventilation and DHW systems and/or energy efficiency improvement of lighting in shared zones of collective use.</p>

		inhabitants where all their population single entities have less than 5000 inhabitants, in Extremadura).	European Union-NextGenerationEU	Envelope: Requirement DB-HE of the building technical standards. Equipment: Requirement RITE, Regulation of Thermal Installations of Buildings Lighting: Requirement HE-3 of the building technical standards.
DUS 5000 Extremadura PROGRAMA PREE 5000 (juntaex.es)	Short-term (2021-2022)	Public buildings and infrastructures, sustainable mobility (municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants, in Extremadura).	EUR 4.100.000 From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU	Give a boost to sustainable urban development through actions that constitute unique clean energy projects such as energy efficiency projects in buildings and public infrastructures, promotion of green investments and, in particular, self-consumption, as well as sustainable mobility, including energy saving measures and reduction of light pollution through the improvement of public lighting.
Incentive programmes linked to renewable energy self-consumption PROGRAMAS DE INCENTIVOS LIGADOS AL AUTOCONSUMO (juntaex.es)	Short-term (2022-2023)	Residential, non-residential, private and public buildings.	EUR 13.964.232 From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU programme 1: 1.796.550 € , programme 2: 4.522.727 € , programme 3: 821.511 € , programme 4: 4.547.396 € , programme 5: 113.979 € , programme 6: 2.162.069 €	Encourage the implementation of renewable energy generation for self-consumption through financial aids. programme 1: Financial aid for the implementation of self-consumption energy renewable systems in the service sector. programme 2: " " in other productive sectors of the economy. programme 3: Financial aid for the integration of energy storage systems in existing self- consumption renewable energy systems in the service sector and other productive sectors. programme 4: Financial aid for the implementation of self-consumption energy renewable systems in residential buildings, public administrations and tertiary sector. programme 5: Financial aid for the integration of energy storage systems in existing self- consumption renewable energy systems in residential buildings, public administrations and the tertiary sector. programme 6: Financial aid for the implementation of renewable thermal energy generation in residential buildings.

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<p>Subsidies programme in the field of rehabilitation and social housing in the Autonomous Community of Extremadura (RR345 PROGRAM)</p> <p>Ayudas en materia de rehabilitación residencial y vivienda social (Plan RR_345) - JUNTAEX</p>	<p>Short-term (2022-2023)</p>	<p>Residential buildings</p>	<p>EUR 11.180.551</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p> <p>(programme 3: 6.258.330 €, programme 4: 4.172.221 €, programme 5: 750.000€)</p>	<p>Financing retrofitting actions in buildings (residential collective and single-family ones mostly), where the energy efficiency improvement can be certified (30% reduction in non-renewable primary energy consumption and a 35% reduction of the heating cooling demand in the D and E climatic zones, and 25% reduction in the C climatic zones)*. Three different programmes: P3: retrofitting at building level. P4: retrofitting actions at housing level. P5: Support in the building book elaboration and the drafting of retrofitting projects. *The percentages can vary depending on the building situation, energy vulnerability, historical buildings etc...</p>
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Table A2b: List of regional renovation wave policies in Catalonia, Spain

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>PREE 5000 - Aid programme for the energy rehabilitation of buildings</p> <p>PREE5000 - Programa de ayudas a la rehabilitación energética de edificios. Instituto Catalán de Energía (gencat.cat)</p>	<p>Short-term (2022-2023)</p>	<p>All existing buildings (municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants, in Catalonia)</p>	<p>EUR 11.565.000</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p>	<p>Reduction of final energy consumption and the level of CO2 emissions, by promoting the realization of renovation actions. Actions: increase the energy efficiency of the building envelope; improve the energy efficiency and use of renewable energy in heating, cooling, DHW and ventilation and/or improve energy efficiency of the lighting. There is an established minimum required reduction of 30% of primary energy consumption compared to the initial situation (using the energy certificate) to be able to be granted. In addition, the renovation has to result in an improvement in the energy certification of the building by at least one letter.</p>
<p>DUS 5000 Catalonia</p> <p>DUS5000 Transformació Econòmica (transformacioeconomica.cat)</p>	<p>Short-term (2021-2022)</p>	<p>Public buildings and infrastructures, sustainable mobility means (municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants, in Catalonia).</p>	<p>EUR 78.063.750</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p> <p>(6M€ per municipality, investment between 40.000 € and 3M€ per application)</p>	<p>Give a boost to sustainable urban development through actions that constitute unique clean energy projects such as energy efficiency projects in buildings and public infrastructures, promotion of green investments and, in particular, electric and heat/cold self-consumption systems, as well as sustainable mobility, including energy saving measures and reduction of light pollution through the improvement of public lighting. When implementing building energy efficiency measures, the projects must demonstrate a 30% decrease in the consumption of non-renewable primary energy and an upgrade to the energy certificate's letter addressing CO2 emissions. The measures affecting public lighting, need to prove a reduction of 15% in final energy consumption, or 45% of electric energy consumption in the case of exterior lighting, and also reach an A or B energy certification. The necessary energy savings for the mobility initiatives must be at least 5%.</p>
<p>Aid programmes linked to self-consumption and storage, with renewable energy sources and implementation of renewable thermal systems</p> <p>Ayudas del Programa de incentivos ligados al autoconsumo y almacenamiento, con fuentes</p>	<p>Short-term (2022-2023)</p>	<p>Residential, non-residential, private and public buildings.</p>	<p>EUR 114.988.848</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p> <p>programme 1: 18.946.381 € Self-consumption programme 2: 3.789.276 storage , programme 2: 26.207.506 Self-consumption €,</p>	<p>Encourage the implementation of renewable energy generation for self-consumption through financial aids. programme 1: Financial aid for the implementation of self-consumption energy renewable systems in the service sector (PV or wind power) . programme 2: " " in other productive sectors of the economy. programme 3: Financial aid for the integration of energy storage systems in existing self-consumption renewable energy systems in the service sector and other productive sectors. programme 4: Financial aid for the implementation of self-consumption energy renewable systems (PV or wind power) in residential buildings, public administrations and tertiary sectors. programme 5: Financial aid for the integration of energy storage systems in existing self-consumption renewable energy systems in</p>

de energía renovable e implantación de sistemas térmicos renovables.. Instituto Catalán de Energía (gencat.cat)			<p>4.886.513 € storage programme 3: 9.046.914 € storage, programme 4: 32.570.161 Self-consumption €, 2.442.762 € storage programme 5: 814.254 €, programme 6: 16.285.081 €</p>	<p>residential buildings, public administrations and the tertiary sector. programme 6: Financial aid for the implementation of renewable thermal energy generation in residential buildings.</p>
<p>Subsidies programmes in the field of rehabilitation and social housing in the Autonomous Community of Catalonia</p> <p>Plantilla adaptativa. Instituto Catalán de Energía (gencat.cat)</p>	<p>Short-term (2021-2026)</p>	<p>Residential buildings, social housing</p>	<p>EUR 186.036.130 (2021) + EUR 480.000.000 (2022-2026)</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p>	<p>programme 1 Subsidy to energy renovate actions at district level, a 30% reduction of the non-renewable primary energy consumption is required. (Changes depending on the climate zone). The subsidy amount varies depending on the energy savings. programme 2 Support at the retrofitting one-stop-shops: 800 € per effectively retrofitted dwelling. programme 3 Subsidy to energy renovation at building level, a 30% reduction of the non-renewable primary energy consumption is required. (Changes depending on the climate zone). The subsidy amount varies depending on the energy savings. programme 4 Subsidy to improve energy efficiency of residential buildings: Required reduction of the annual total heat and cooling building demand by 7% or a reduction of 30% of the non renewable primary energy consumption. programme 5 Subsidy to prepare the book of the existing building for the rehabilitation and drafting of rehabilitation projects: through a subsidy that covers part of the expenses of professional fees for its issuance, as well as the development of technical projects for the integral rehabilitation of buildings programme 6 Aid programme for the construction of social rental housing in energy-efficient buildings: There is a limited non renewable primary energy consumption value depending on the climatic zone. The subsidy is proportional to the dwelling surface.</p>

Table A2c: List of regional renovation wave policies in Galicia, Spain

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>PREE 5000 - Aid programme for the energy rehabilitation of buildings</p> <p>PREE 5000 - Ayudas Vivienda Galicia</p>	<p>Short-term (2022-2023)</p>	<p>All existing buildings (municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants, in Galicia)</p>	<p>EUR 3.795.000</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p>	<p>Reduction of final energy consumption and the level of CO2 emissions, by promoting the realization of renovation actions. Actions: increase the energy efficiency of the building envelope; improve the energy efficiency and use of renewable energy in heating, cooling, DHW and ventilation and/or improve energy efficiency of the lighting. This last measure needs to be accompanied by a type 1 or type 2 measure. There is an established minimum required reduction of 30% of primary energy consumption compared to the initial situation (using the energy certificate) to be able to be granted. In addition, the renovation has to result in an improvement in the energy certification of the building by at least one letter. The resulting subsidy depends on the energy certification letter, poverty criteria and type of measure.</p>
<p>DUS 5000 Galicia</p> <p>Programa DUS 5000. Ayudas para inversiones a proyectos singulares locales de energía limpia en municipios de reto demográfico Idae</p>	<p>Short-term (2021-2022)</p>	<p>Public buildings and infrastructures, sustainable mobility means (municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants, in Galicia)</p>	<p>EUR 51.232.500</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p> <p>(6M€ per municipality, investment between 40.000 € and 3M€ per application)</p>	<p>Give a boost to sustainable urban development through actions that constitute unique clean energy projects such as energy efficiency projects in buildings and public infrastructures, promotion of green investments and, in particular, electric and heat/cold self-consumption systems, as well as sustainable mobility, including energy saving measures and reduction of light pollution through the improvement of public lighting.</p>
<p>Appliances renovation plan in Galicia</p> <p>Convocatoria 2023 Ahorro y Eficiencia Energética Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>	<p>Short-term (2023)</p>	<p>Persons who carry out any of the eligible actions in a dwelling located in the Autonomous Community of Galicia.</p>	<p>EUR 3.000.000</p> <p>Funds from the Galicia government</p>	<p>Subsidies to renovate the dwelling appliances: Refrigerator and refrigerator - freezer with energy classification A, B, C or D Freezer with energy classification A, B, C or D Washing machine A, B or C Dishwasher A, B or C, induction hobs (induction technology only, not mixed).</p> <p>The amount of the subsidy depends on the vulnerability of the customer.</p>
<p>Subsidies for energy improvement projects aimed at freelancers</p>	<p>Short-term (2023)</p>	<p>Small and medium-sized companies legally constituted</p>	<p>EUR 1.670.000</p> <p>From FNEE (Fondo nacional de eficiencia energética)</p>	<p>Funding investments in energy-consuming equipment or elements that contribute to efficient energy management included in the types of action detailed below: Energy diagnostics & Energy audits,</p>

<p>and SMEs with activity in the service sector (SME energy bond program)</p> <p>Convocatoria 2023 Ahorro y Eficiencia Energética Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>		<p>and self-employed entrepreneurs who have their registered office or workplace in Galicia</p>		<p>envelope, lighting, electrical installations, appliances, climatization, Home automation and/or building automation systems.</p>
<p>Subsidies year 2021 state aid programme for energy efficiency actions in agricultural holdings</p> <p>Convocatoria 2021 Ahorro y Eficiencia Energética Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>	<p>Short-term (2021-2023)</p>	<p>Agricultural sector</p>	<p>EUR 1.670.000</p> <p>From FNEE (Fondo nacional de eficiencia energética)</p>	<p>Improving the energy efficiency of irrigation systems, Improvement of energy efficiency and use of renewable energies on farms, Actions on the thermal envelope that reduce the demand for heating and cooling, Actions in heating, cooling, ventilation and domestic hot water thermal installations, Improvement of the energy efficiency of generation, distribution, regulation and control subsystems and terminal elements of thermal installations, Substitution of conventional energy in thermal installations by thermal renewable energies, engine and lighting renovations.</p> <p>Actions must ensure a 10% reduction in the final energy consumption.</p>
<p>State subsidies programme for energy efficiency actions in SMEs and large companies in the industrial sector (programme of energy efficiency actions in industry in Galicia)</p> <p>Convocatoria 2019 Ahorro y Eficiencia Energética Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>	<p>Short-term (2019-2023)</p>	<p>Industrial sector</p> <p>With tax residence or a permanent establishment in the territory of the autonomous community of Galicia.</p>	<p>EUR 30.700.000</p> <p>FNEE & FEDER (Fondo Nacional de Eficiencia Energética, Fondo Europeo de Desarrollo Regional)</p>	<p>Improvement of technology in industrial equipment and processes. Minimum investment 100.000€</p> <p>Implementation of energy management systems. Minimum investment 50.000€</p>
<p>Subsidies corresponding to incentive programme 1 of R.D. 1124/2021, linked to the</p>	<p>Short-term (2022-2025)</p>	<p>Industrial, agricultural, service and other sectors of the economy, including the</p>	<p>EUR 6.145.270,60</p> <p>From the National Recovery, Transformation and Resilience</p>	<p>Implementation of new renewable thermal installations, extensions and substitutions of existing production systems to supply demand for cold and / or heat in buildings. Also for low, medium and high temperature applications in production processes or other thermal applications. Eligible</p>

<p>realization of thermal renewable energy installations in the industrial, agricultural, services and other sectors of the economy, including the residential sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422N)</p> <p>Convocatoria 2022 Energías Renovables Subvenciones Inega: Instituto Enerxético de Galicia</p>		<p>residential sector.</p>	<p>Plan, funded by the European Union-NextGenerationEU</p>	<p>technologies: solar thermal (subsidy 1070 €/kW), biomass (100 €/kW boiler 500€/kW), geothermal (subsidy 2130 €/kW), hydrothermal (subsidy 2130 €/kW), aerothermal (subsidy 1130 €/kW) and microgrids of heat and/or cold district (450 €/kW). In municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants the subsidy values increase by 5%.</p> <p>Also the subsidy value varies depending on the enterprise size.</p>
<p>Subsidies corresponding to incentive programmes 1, 2 and 3 of R.D. 477/2021, linked to self-consumption and storage in the services sector and in other productive sectors, within the framework of the European recovery, transformation and resilience plan (procedure code IN421W)</p> <p>Convocatoria 2021 Energías Renovables Subvenciones Inega: Instituto Enerxético de Galicia</p>	<p>Short-term (2021-2023)</p>	<p>Economic activity sector</p>	<p>EUR 39.614.236</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p>	<p>programmes 1 and 2, subsidies to implement photovoltaic and/or wind installations for self-consumption, with or without storage.</p> <p>programme 3, subsidies for the incorporation of storage in existing photovoltaic and/or wind installations.</p> <p>Requirements: It cannot be connected directly to the network.</p> <p>Capacity / power ratio generated ≤ 5 kWh/kW except isolated installations of the network.</p> <p>Lead-acid technologies will not be eligible.</p> <p>In municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants the subsidy values increase by 5%.</p> <p>Also the subsidy value varies depending on the enterprise size.</p>
<p>Subsidies corresponding to incentive programmes 4 and 5 of R.D. 477/2021, linked to self-</p>	<p>Short-term (2021-2024)</p>	<p>Horizontal property community buildings, entrepreneurs, third sector and public</p>	<p>EUR 22.999.354</p> <p>From the National Recovery, Transformation and Resilience</p>	<p>Incentive programme 4: realization of self-consumption installations, with renewable energy sources in the residential sector, public administration and in the third sector, with or without storage.</p> <p>Incentive programme 5: incorporation of storage in self-consumption facilities, with</p>

<p>consumption and storage in the residential sector, public administrations and the third sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422K)</p> <p>Convocatoria 2021 Energías Renovables Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>		<p>buildings.</p>	<p>Plan, funded by the European Union-NextGenerationEU</p>	<p>renewable energy sources, already existing in the residential sector, public administration and in the third sector.</p> <p>Requirements: It cannot be connected directly to the network.</p> <p>Capacity / power ratio generated ≤ 5 kWh/kW except isolated installations of the network.</p> <p>Lead-acid technologies will not be eligible.</p> <p>In municipalities with less than 5000 inhabitants or non-urban municipalities with less than 20.000 inhabitants where all their population single entities have less than 5000 inhabitants the subsidy values increase by 5%.</p> <p>Also the subsidy value varies depending on the enterprise size.</p>
<p>Subsidies corresponding to incentive programmes 6 of R.D. 477/2021, linked to the realization of thermal renewable energy installations in the residential sector within the framework of the European recovery, transformation and resilience plan (procedure code IN422M).</p> <p>Convocatoria 2021 Energías Renovables Subvenciones Subvenciones Inega: Instituto Enerxético de Galicia</p>	<p>Short-term (2021-2024)</p>	<p>Residential buildings</p>	<p>EUR 11.363.342</p> <p>From the National Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU</p>	<p>Incentive programme 6: realization of thermal renewable energy installations in the residential sector.</p> <p>The installations carried out must comply with the requirements established in the RITE as well as any other regulations that are applicable. In the case of electrically driven heat pumps, they must have an Average seasonal yield greater than 2,5.</p> <p>All installations, except the type of Biomass local heating appliances, must have a monitoring system for the electrical or thermal energy produced by the installation subject to the subsidy.</p> <p>In the case of biomass installations, a reduction in greenhouse gas emissions of at least 80% must be achieved.</p>
<p>Subsidies programmes in the field of rehabilitation and social housing in the Autonomous Community of Galicia</p> <p>Fondos EU.</p>	<p>Short-term (2022-2025)</p>	<p>Residential buildings</p>	<p>Dwelling level EUR 13.455.190</p> <p>Building level EUR 22.873.822</p> <p>District level EUR 11.485.814</p> <p>From the National</p>	<p>These grants are intended to finance works or actions in which a proven improvement in energy efficiency is obtained, with special attention to the building envelope in buildings of collective residential typology, including their homes, and in single-family homes.</p>

D5.4 - Report on buildings and energy strategies linked to renovation wave policies and climate change mitigation initiatives



Next Generation - IGVS (xunta.gal)			Recovery, Transformation and Resilience Plan, funded by the European Union-NextGenerationEU	
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Table A3: List of national renovation wave policies in Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
Priority programme "Czyste Powietrze" [Clean air] programme Czyste Powietrze – STOP Smog	Clean air: 2018-2029 Stop smog: 2019-2024	Clean air: single family house Stop smog: Municipalities Warm apartment: Municipalities	Total PLN 103 billion, Clean air: PLN 30,37 to 69k Stop smog: 70% of the cost Warm apartment: PLN 17,500 - PLN 26,900f - PLN 39,900	replacement of heat sources and thermal modernization of the houses
Priority programme "Energy efficient construction" Part 1) Reduction of energy consumption in construction NABÓR 1/2019 - National Fund for Environmental Protection and Water Management - Portal Gov.pl (www.gov.pl)	2019-2023	Hospitals, museums, student dormitories, historical buildings	PLN 400 000 (total) Grant: PLN 350,000 Loan: PLN 50,000 thousand.	reducing energy consumption in buildings increasing the production of energy from renewable sources
Thermal Upgrading and Renovation Fund Thermal Modernization and Renovation Fund (FTiR) - BGK	2008-...	Thermo-modernization bonus: Residential building owners Renovation bonus: Communities and municipalities compensatory premium: Residential building owners	Thermo-modernization bonus: 16%-21%(with RES) of the cost Renovation bonus: 50%-60%(historical) of renovation cost compensatory premium: 2% of the cost	Financial aid for thermo-modernization and renovation projects (bonus and compensation)
Central Register for Buildings Emissions (CEEB) menu view Main Office of Construction Supervision (gunb.gov.pl)	Long-term	Citizens, entrepreneurs, municipalities	N/A	Registration of the heat and hot water sources as a database for further analysis.
National support system	Long-term	Municipal Energy	Free training	Training programmes

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<p>for energy advisors</p> <p>Offer of advisers - Projekt Doradztwa Energetycznego (doradztwo-energetyczne.gov.pl)</p>		<p>Specialist</p>		
<p>Programmes to limit and lower the emissions.</p> <p>Programy ograniczenia niskiej emisji (PONE)</p> <p>Low Emission Reduction Program (PONE) - what is it? - Heiztechnik</p> <p>PONE (mae.com.pl)</p>	<p>Long-term</p>	<p>Municipal</p>	<p>N/A</p>	<p>Program is part of a broader project of Environmental Protection Programs that are implemented in various municipalities throughout Poland. PONE serves as a platform for them to receive various types of national and EU subsidies. Its goal is to reduce emissions of air pollutants. This applies especially to harmful dust substances coming from old types of coal furnaces. As part of the program, activities are undertaken to change heating devices and heating systems fired with solid fuel to more ecological ones:</p> <ul style="list-style-type: none"> - district heating, - gas heating, - electric heating, - oil heating, - renewable energy sources, - introducing renewable energy sources, - connecting hot water to the municipal heating network

Table A3a: List of national renovation wave policies in Warszawski Stołeczny, Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
Projekty Zintegrowanych Inwestycji Terytorialnych metropolii warszawskiej (ZIT)	Short-term: 2014-2020	Individuals, Businesses, Municipalities	EUR 116 million	There were 22 projects connected to creation or modernization of bicycle paths and 33 projects to create Park and Ride zones and parking spaces.
Warsaw Green City and Climate Action Plan - Annex to Resolution No. LXXX/2648/2023 Council of the Capital City of Warsaw from 20th April 2023 on adoption of the "Green City & Climate Action Plan"	Long-term: 2023-2030	Individuals, Businesses, Municipalities	N/A	preparation, but also actions that are very technical like, e.g. continued replacement of high-emission heat sources.
Dotations for installing of RES	Short-term	Individuals, Businesses, Municipalities	N/A	It is a grant programme to increase the amount of renewable energy sources in Warsaw.

Table A3b: List of national renovation wave policies in Pomorskie, Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
European Regional Development Fund	Short-term: 2017-2020	Municipalities	N/A	Energy efficiency
Zintegrowane Inwestycje Terytorialne (it is funded nationally, but the distribution of funds is decided on the level of voivodenship) (ZIT)	Long-term: 2021-2027	Municipalities	EUR 24 mln for supporting poor households and housing support.	All aspects of increasing the energy efficiency of buildings, but also many other activities such as improvement of public transport and accessibility to social services.

Table A3c: List of national renovation wave policies in Opolskie, Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
European Participatory Budget	Short-term: 2022	Individuals	EUR 1.5 million	
Marszałkowski Budżet Obywatelski (Marshal's Participatory Budget)	Short-term: 2024	Individuals	EUR 800,000	It is an initiative where citizens propose a project to improve their well-being. There are many projects to increase sustainability, energy efficiency and safety.
Marszałkowska Inicjatywa Sołecka	Short-term: 2023-2025	Local communities	EUR 1.7 million	Creation and development of the local communities in the region. It is creating meeting places for people, promoting organized activity.
Project LIFE	Short-term: 2020-2024	Municipalities	EUR 3 million	Creation of a programme of air quality protection. Increasing knowledge about air pollution.
Rewitalizacja	Short-term: 2014-2020	Municipalities	EUR 220,000	The aim of the programme was to support the renovation activities of the public spaces in municipalities. There were mainly training courses and courses on how to plan, realise and monitor the renovations. Usually, renovation are made to make the city centers greener.

Table A3d: List of national renovation wave policies in Śląskie, Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
Śląskie. Blue sky restored (Śląskie. Przywracamy błękit)	Long-term: 2022-2027	Individuals, Businesses, Municipalities	EUR 16 million	"Śląskie. Blue sky" is the largest air protection project in Europe, covering the entire Silesian Voivodeship. 89 partners and associated beneficiaries take part in it. The project is co-financed by the LIFE Programme of the European Union - an action program for the environment and climate and the National Fund for Environmental Protection and Water Management.
Municipality for Full Breath (Gmina pełną piersią)	Short-term: 2024	Municipalities	EUR 160,000	Competition for municipalities for the projects that improve the air quality, can be renovation of buildings, have to have some educational aspect.
Antismog initiative 2024 as a part of the the improvement of Air Quality Programme ("Inicjatywa Antysmogowa" w 2024 roku w ramach Marszałkowskiego Programu Poprawy Jakości Powietrza)	Short-term: 2024	Municipalities	EUR 3 million	Support for municipalities to: expand air quality monitoring, renovation of public building to improve their energy efficiency, exchange of boilers, exchange ventilation system, performing energy audits.

Table A3e: List of national renovation wave policies in Mazowiecki, Poland

Name	Duration	Target group	Funding scheme	Type of measures covered
Mazovia for clean air (Mazowsze dla czystego powietrza)	Short-term: 2024	Individuals, Businesses, Municipalities	EUR 2 million	113 projects were chosen to support: energy audits in households, checking if people got rid of illegal furnaces (the 'anti-smog' regulations forbid using low quality coal furnace), cleaning, installing pollution measuring, etc. 2 of the projects will be realised in Warsaw city
Mazovian Instruments supporting adaptation to climate change - Mazovia for Climate 2024 (Mazowiecki Instrument Wsparcia Adaptacji do Zmian Klimatu - Mazowsze dla klimatu 2024)	Long-term: 2024	Individuals, Businesses, Municipalities	EUR 4 million	136 project which aim to support adaptation to climate change (some applying to Warsaw - approx. 6): renovation of green areas and water reservoirs, adding plants and trees, exchange of light bulbs and lights to more energy saving, creation of brine graduation towers.
Mazovia for clean heat 2023 (Mazowsze dla czystego ciepła 2023)	Short-term: 2023	Individuals, Businesses, Municipalities	EUR 1 million	17 municipalities got the funding for: exchange of the coal boilers, supporting citizens in exchanging the coal boilers, increase of the energy efficiency of the buildings, fighting the energy poverty.

Table A4: List of national renovation wave policies in Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Federal funding for efficient buildings - Individual measures (BEG EM) for municipalities BMWK - Federal funding for efficient buildings - Individual measures (BEG EM) for municipalities (energiewechsel.de)	Long-term	Municipalities, Municipal unions, other public persons, NGOs	<ul style="list-style-type: none"> • Residential buildings: up to EUR 60,000/yr • Non-residential buildings: up to EUR 1,000/m2/yr • 5 Million maximum financing per year. • Both individual as well as combination of individual measures are financed. 	Insulation of the building envelope (exterior walls, roof surfaces, floor ceilings, floor surfaces) Renewal of windows, exterior doors and gates Summer thermal insulation with optimum daylight supply Use of renewable energies in heating systems Construction, conversion or expansion of a building network for the exclusive supply of heat Installation, renewal and optimisation of ventilation and air-conditioning systems with heat/cold recovery Installation of refrigeration technology for room cooling or energy-efficient interior lighting systems Installation of digital systems for operating and consumption optimization measures for heating optimisation
Federal support for efficient buildings – municipalities (loans and grants) Kommunen – Kredit KfW Kommunen – Zuschuss KfW	Short-term (2023)	municipalities, other local public authorities and their enterprises	<p>Loans: max. EUR 30 million for non-residential buildings, max. EUR 150,000 per unit in residential buildings Low-interest loan with a maximum of 30% repayment subsidy</p> <p>Grants: max. EUR 15 million for non-residential buildings, max. EUR 75,000 per unit in residential buildings up to 45% grant funding</p>	Construction and purchase of a new efficiency building Complete renovation to an efficient building Conversion of non-residential space into living space
Energy efficient building and	Cancelled in January	Homeowners	Grants 40% of the eligible	Installation of stationary fuel cell heating systems with an output of 0.25 kW to 5kW

<p>renovation – grant for fuel cells</p> <p>BMWK - BMWK - Increasing energy efficiency with fuel cell heating systems (energiwechse l.de)</p>	2023	municipalities, companies	costs – a maximum of 34,300 euros per fuel cell	
<p>Federal support for efficient heat networks (BEW)</p> <p>BAFA - Heating networks</p> <p>Factsheet</p>	Long-term (started September 2022)	Municipalities, public enterprises, associations.	<p>Grants</p> <p>Module 1: up to 50% of the eligible costs. Max. funding of €2 million per application</p> <p>Module 2: up to 40% of eligible investment costs. Max. funding of €100 million per application</p> <p>Module 3: same as module 2</p>	<p>Module 1 and 2 (systemic funding)</p> <p>Transformation plans, feasibility studies, planning services.</p> <p>Deep geothermal energy, biomass plants (limited), solar thermal systems, waste heat integration, heat pumps, heat accumulator, grid extension & heat transfer, new heat networks, control systems, heat transfer stations.</p> <p>Module 3 (individual measures)</p> <p>Solar thermal systems, pipelines for connecting renewable energy generators, heat pumps, piping for the integration of waste heat, biomass boilers, expansion of heat networks, heat storage, heat transfer stations.</p>
<p>Renovation of municipal buildings in the fields of sports, youth and culture</p> <p>PtJ: Renovation of municipal facilities in the fields of sport, youth and culture</p> <p>FAQ document</p>	Long-term	Cities and municipalities.	<ul style="list-style-type: none"> The federal share of the funding should generally be between EUR 1 and 6 million. Funding from federal funds will be up to a maximum of 45% (for municipalities in budgetary this can go up to 75%). Contributions between 55 and 25% from municipalities depending on their budget conditions. 	<p>Thermal insulation of walls, ceilings and roof areas</p> <p>Renewal, replacement or installation of windows and external doors</p> <p>Renewal of the heating system in the building, installation and renewal of a ventilation system,</p> <p>Installation of energy-efficient interior lighting systems</p> <p>Construction of a heat storage facility.</p> <p>In addition, especially for outdoor pools: water-saving fittings, energy efficient pumps, use of renewable energy.</p>
<p>Federal funding for energy advice for non-residential buildings, plants and systems</p> <p>Bundesförderung für Energieberatung für Nichtwohngebäude, Anlagen</p>	Long-term	Municipalities (non residential buildings only)	<ul style="list-style-type: none"> Max. 80% of eligible costs, max. EUR 6000 to 10000 depending on module (energy audit, energy advice & renovation concept, contracting orientation advice) and net floor area. 	Energy consulting for non-residential buildings, plants and systems.

und Systeme				
<p>Federal funding for energy advice for residential buildings</p> <p>Bundesförderung für Energieberatung für Wohngebäude (EBW)</p>	Long-term	Residential building owners, homeowners associations, tenants and leaseholders	<ul style="list-style-type: none"> • Max. 80% of the eligible consulting fee. • Max. EUR 1300 for one- and two-family houses and a Max. EUR 1700 for residential buildings with at least three residential units. 	Energy consulting activities.
Germany recovery and resilience plan	Short-term	Residential buildings	<p>EUR 2.5 Billion for large-scale renovation programme to increase the energy efficiency of residential buildings.</p> <p>EUR 57 Million investment in living labs for the energy transition</p> <p>EUR 70 Million for the development climate-friendly timber construction</p>	<p>Not clearly defined, aspirational goal of:</p> <p>Improving energy and resource efficiency in public and private buildings</p> <p>Create jobs</p> <p>Promote digital management of building energy.</p> <p>Double the renovation rate by 2025.</p>

Table A4a: List of national renovation wave policies in Bayern, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Bayerisches Modernisierung sprogramm: Staatliche Förderung zur Sanierung von Mietwohnungen und Pflegeplätzen in Bayern	Short-term: 2022-2025	owners, leaseholders and usufructuari es of rented residential buildings and authorized residential care facilities	funding up to 60% (in justified individual cases up to 75%) of comparable new construction costs and must amount to an average of at least EUR 5,000 per flat or care place.	modernisation and renovation (repair) of buildings with low-interest capital market loans. For particularly sustainable and energy-efficient construction (efficiency house standard according to the federal subsidy for efficient buildings - BEG)

Table A4b: List of national renovation wave policies in Berlin, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Funding programme for energy-efficient building refurbishment	Short-term: 2021-2024	natural and legal persons under private and public law as well as partnerships with legal capacity who are owners or otherwise authorised to dispose of owner-occupied or rented buildings AND Homeowners 'associations (WEG)	maximum funding amount per project and calendar year for non-residential buildings is EUR 500,000 For residential buildings, it is also generally EUR 500,000 per project	"Thermal insulation of the building envelope" includes measures such as insulating external walls or upgrading or replacing windows. funding for the creation of a building-specific refurbishment roadmap. "Replacement and optimisation of plant technology" includes measures to optimise or renew system technology such as heating and ventilation systems, but also the installation of small local heating networks. funding of digital systems for energy-related operational and consumption optimisation. funding for the comprehensive refurbishment of buildings to achieve an efficiency house level

Table A4c: List of national renovation wave policies in Brandenburg, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
EFRE-Förderprogramm zur Nachhaltigen Stadtentwicklung (NaS)	Long-term: 2021-2027	Any entity, but program is aimed primarily at central locations, but also at their functionally linked surrounding areas and other partners → Each individually declared measure defines the most important target groups	EUR 785 million	Qualification and adaptation of the social and cultural infrastructure - Investment projects to improve social and cultural services (conversion, expansion and utilization projects), including the creation of barrier-free accessibility - Exemplary pilot projects in the area of educational facilities that have functional added value - Projects to utilize derelict and underused buildings or areas in easily accessible locations in the town centre through redevelopment and reactivation, including the removal of contaminated sites - Projects to upgrade urban open spaces (especially green spaces) and make them accessible and connected for broad public use - Projects for the preservation and further development of the urban natural and cultural heritage Ecological and climate-friendly development and climate adaptation as well as sustainable mobility solutions - Investment projects to upgrade, redesign, expand and network urban open spaces and infrastructure with particular relevance for local climate-friendly adaptation, including the redevelopment and reactivation of abandoned areas and the targeted further development of existing open spaces (e.g. shading, trees and the creation of water areas for cooling) - Investment and non-investment projects in the field of local mobility and local public transport (ÖPNV) that serve to reduce transport-related CO ₂ and NO ₂ emissions both within the city and in urban-rural relationships - Projects that serve climate protection, adaptation to the requirements of climate change and the promotion of resource efficiency Example: Energy-efficient refurbishment of swimming facilities - Energy-efficient refurbishment of the building shell - Modernisation of heating systems based on renewable energy sources - Renewal of drinking water/domestic hot water heating systems - Conversion/renewal of lighting - Renewal of the ventilation and air conditioning systems

Table A4d: List of national renovation wave policies in Bremen, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Funding for modernisation and repair measures on private buildings in the formally defined redevelopment areas	<p>NA</p>	<p>Natural (private) person are eligible to apply as building/apartment owners or other persons authorised to dispose of property</p>	<p>If the total costs of the measures to be subsidised exceed EUR 5,000, up to 40 or 50% of the eligible costs will be reimbursed, up to a maximum of EUR 40,000 per building</p>	<p>Modernization and repair measures on the building shell to eliminate defects and deficiencies and to improve the external design of the buildings in terms of their impact on the cityscape and public space</p> <ul style="list-style-type: none"> - Facade refurbishments, - Dismantling of facade paneling, - Restoration of window opening formats to the original style of the building, - Renewal of windows, doors and gates, flaps, shutters, - roof coverings <p>Construction measures on outdoor facilities can be subsidized if they are required in the general interest and to enhance the townscape.</p> <ul style="list-style-type: none"> - Greening that improves the townscape (e.g. orchard greening), - Enclosures that improve the townscape, - Removal of soil sealing, - Improvement of access roads and entrances, - noise protection measures, - lighting.

Table A4e: List of national renovation wave policies in Nordrhein-Westfalen, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Förderprogramm zu Städtebauförderung	Short-term: 2024	Municipalities and - with the approval of the Ministry - municipal associations	10 % to 15 % of the investment costs → no funding scope mentioned	The aims of urban development funding are 1. Strengthening inner cities and town centres in their urban development function, also taking into account the protection of historical monuments 2. Creating sustainable urban development structures in areas affected by significant loss of urban development functions, such as vacant housing or derelict areas in city centres, especially industrial, conversion and railway sites 3. Urban development measures to remedy social problems → those measures include: - Measures to protect the climate, adapt to climate change and improve green infrastructure (including energy-efficient building refurbishment, soil unsealing, land recycling, climate-friendly mobility, use of climate-friendly building materials, creation/preservation or expansion of green spaces and open spaces, networking of green and open spaces, greening of building surfaces, increasing biodiversity), - Building and organisation measures, - Measures to upgrade public spaces (streets, paths, squares), renovation of existing buildings, - Measures for the revitalisation of brownfield sites including subsequent use or interim use, - Measures for the protection and preservation of urban monuments, for the preservation and safeguarding of the architectural and horticultural heritage as well as buildings that characterise the cityscape, - Measures to safeguard services of general interest, - Measures to minimise or eliminate barriers, - Measures for the use of digital technologies (urban networking of infrastructures, data), - Neighbourhood management, services provided by commissioners, advice for owners, - Inter-municipal measures, especially for smaller towns and municipalities, as well as urban-rural cooperation, including measures to form inter-municipal networks, - Measures to improve building culture, in particular planning and process quality, - Measures with a highly innovative and experimental character in extraordinary.

Table A4f: List of national renovation wave policies in Trier, Germany

Name	Duration	Target group	Funding scheme	Type of measures covered
Kommunales Investitionsprogramm 3.0	Short-term: 2015-2023	Financially disadvantaged municipalities, determined by financial vulnerability criteria	EUR 253.197 million	Financial assistance is granted for measures in the following areas, irrespective of the funding organisation: <ol style="list-style-type: none"> 1. investments focusing on infrastructure <ul style="list-style-type: none"> - Hospitals, - Noise abatement, in particular for roads, excluding protection against behaviour-related noise, - urban development (excluding wastewater) including age-appropriate conversion, barrier removal (including in local public transport), brownfield revitalisation, - Information technology, limited to financially weak municipalities in rural areas, to achieve the <ul style="list-style-type: none"> - to achieve the 50 Mbit expansion target, - Energy-efficient refurbishment of other infrastructure investments, - Air pollution control. 2. investments focussing on educational infrastructure <ul style="list-style-type: none"> - Early childhood infrastructure facilities, including the connection of this infrastructure to an existing network from which heat is obtained from renewable energy sources, - Energy-efficient refurbishment of school infrastructure facilities, - Energy refurbishment of municipal or non-profit institutions of further education, - Modernisation of inter-company vocational training centres.

Table A5: List of national renovation wave policies in Austria

Name	Duration	Target group	Funding scheme	Type of measures covered
Thermal building renovation for municipalities: Major renovations, green façades and roofs Thermische Gebäudesanierung für Gemeinden	Long-term	Municipalities	for thermal renovation = funding lump-sum (in EUR/m ³) * gross volume (in m ³) of the building before thermal renovation; for façade or roof greening: 50% of the additional investment costs Public buildings older than 20 years are eligible.	Insulation of the outer walls, the top floor ceiling or roof and the bottom floor ceiling or basement floor or the basement floor Renovation or replacement of windows and exterior doors Voluntary installation of ventilation units with heat recovery Exterior shading systems to reduce the building's cooling requirements
Thermal building renovation for municipalities: individual measures Thermische Gebäudesanierung - Einzelmaßnahmen	Long-term	municipalities	funding lump-sum (in EUR/m ²) * size of the renovated areas (in m ²), max. 18 to 30% of the eligible costs Public buildings older than 20 years are eligible.	Insulation of the top floor ceiling or roof with a maximum U-value of 0.14 W/m ² K. The renovation or replacement of windows, skylights and exterior doors.
Sample renovation Mustersanierung	Short-term	All natural and legal persons for the exercise commercial activities (but not limited to the trade regulations) Denominational institutions and associations Public institutions and local authorities	max. 40% of the eligible costs (without surcharges)	Funding is provided for comprehensive renovation projects for buildings used for business purposes and public buildings. Measures to improve thermal insulation Measures for the application of renewable energy sources Measures to increase energy efficiency

<p>Funding for energy-saving measures</p> <p>Energiesparmaßnahmen</p>	Long-term	municipalities	18% of the funding base, max. funding: EUR 600/t CO2 saved, max. per project: EUR 4.5 million	Funding is provided for measures for the efficient use of energy in commercial and industrial production processes as well as in existing buildings and heat recovery systems with predominantly operational use
<p>Promote the replacement of oil and gas heating systems</p> <p>[national funding with regional application]</p>	Short-term	Private households Housing companies (cooperatives) in multi-storey residential construction Housing owner communities in multi-storey residential construction	<p>EUR 400 million (+EUR 126 million of EU funds from 01.01.2021-30.06.2025)</p> <p>A flat-rate surcharge of 2,000 euros is granted for the exchange of a gas-fired heating system.</p>	<p>The funding campaign is intended to facilitate private households from switching from a fossil space heating to a sustainable heating system.</p> <p>Promoted: highly efficient local heating connections, wood central heating devices, heat pumps. If there is a connection to a highly efficient local heating network, only the switch or connection to the level can be promoted.</p>
<p>Clean heating - promoting the replacement of oil and gas heating systems for low income private households</p> <p>[national funding with regional application]</p>	Short-term	Proof of social need in the form of confirmation of receipt of social assistance or the existence of GIS exemption	EUR 140 million	The funding campaign is intended to make it easier for low-income private households to switch from fossil-fuelled space heating to a sustainable heating system.
<p>Kommunalkredit Public Consulting Initiative</p> <p>[national funding with regional application]</p>	N/A	Businesses, municipalities, individuals	N/A	Advisory services about the funding processes and funding opportunities offered by the federal government and the federal states

Table A5a: List of national renovation wave policies in Burgenland, Austria

Name	Duration	Target group	Funding scheme	Type of measures covered
Housing subsidies Burgenland: renovation advice and funding possibilities (Sanierungsberatung)	Long-term	Natural and legal persons	N/A	Consultation with energy consultants before starting with renovation works.
Housing support/subsidies for residential renovations (Wohnbauförderung/Sanierung)	Long-term	Natural persons who are Austrian citizens or those with equal status (e.g. EU citizens).	Natural persons who are Austrian citizens or those with equal status (e.g. EU citizens).	Natural persons who are Austrian citizens or those with equal status (e.g. EU citizens).
Special housing support campaign 2024 (Wohnbauförderung/Sonderwohnbauförderungsaktion 2024)	Short-term	Privately owned homes, terraced houses and apartments owned by natural persons who, on the basis of energy advice, have the goal of renovating the residential building to make it suitable for the efficient use of alternative heating systems.	Privately owned homes, terraced houses and apartments owned by natural persons who, on the basis of energy advice, have the goal of renovating the residential building to make it suitable for the efficient use of alternative heating systems.	Privately owned homes, terraced houses and apartments owned by natural persons who, on the basis of energy advice, have the goal of renovating the residential building to make it suitable for the efficient use of alternative heating systems.
Alternative energy systems: Promotion of alternative energy systems and systems for saving energy and other elementary resources. (Alternativenergieanlagen)	Long-term	Natural and legal persons (e.g. private households) who are Austrian citizens (or equivalent) and have their main residence in Burgenland	Natural and legal persons (e.g. private households) who are Austrian citizens (or equivalent) and have their main residence in Burgenland	Natural and legal persons (e.g. private households) who are Austrian citizens (or equivalent) and have their main residence in Burgenland
Special funding campaign 2024	Short-term	The prerequisite	The prerequisite for funding is that the	The prerequisite for funding is that the property is a one- or two-family home or a

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<p>for Replacing fossil fuel heating systems with highly efficient alternative heating systems</p> <p>(Alternativeenergieanlagen/Sonderförderaktionen 2024 – Tausch von fossilen Heizsystemen auf hocheffiziente alternative Heizsysteme)</p>		<p>for funding is that the property is a one- or two-family home or a terraced house</p>	<p>property is a one- or two-family home or a terraced house</p>	<p>terraced house</p>
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Table A5b: List of national renovation wave policies in Niederösterreich, Austria

Name	Duration	Target group	Funding scheme	Type of measures covered
Home Renovation funding Lower Austria	Long-term	Natural persons (private households)	For both renovation options, a 4% annuity subsidy is granted on the eligible renovation costs to support the repayment of a bank loan over a period of 10 years.	<p>The state of Lower Austria offers two variants as part of the "Lower Austria Home Renovation" funding program: WITH and WITHOUT an energy certificate.</p> <p>Renovation WITH an energy certificate is recommended for a planned overall thermal-energetic renovation. In this case, higher funding is possible. The focus is on measures to improve thermal protection and increase energy efficiency. This leads to a noticeable decrease in heating and overall energy requirements. The improvement in heating requirements must result in at least a 40% increase in the thermal insulation standard on the building envelope.</p> <p>Funding WITHOUT an energy certificate is applied for individual measures such as replacing a heating system, renovating a roof, individual thermal insulation measures, etc.</p>
<p>"Get out of oil and gas" in Lower Austria</p> <p>(Raus aus Öl und Gas)</p> <p>[national funding with regional application + Lower Austria financial support]</p>	Long-term	Private individuals, companies, municipalities	<p>A one-off grant of €15,000 up to €18,000 is possible for heating replacement. This funding increases by further flat-rate amounts if, for example, a solar system is installed and/or deep drilling is carried out at the same time.</p> <p>In addition, the state of Lower Austria supports all residents of Lower Austria who replace their heating from a fossil fuel heating system with a new climate-friendly heating system with an annuity subsidy of 4%. As part of the home renovation funding, the focus is on annuity subsidies to support those who cannot afford renovation without a bank loan.</p>	<p>Private individuals, municipalities: The replacement of a fossil heating system (oil, gas, coal/coke all-purpose burners and electricity-powered night or direct storage heaters) with a new climate-friendly heating system. What is primarily supported is the connection to highly efficient or climate-friendly local/district heating. If this connection option is not available, switching to wood central heating or a heat pump is encouraged.</p> <p>Companies: The construction, conversion and renewal of environmentally and climate-friendly heat generators is supported.</p>
Housing subsidy boiler replacement Lower Austria	N/A	Natural persons with their main residence who are the owners of	Low-income households in one- or two-family homes and terraced houses can receive up to	This funding campaign enables low-income households to convert their heating system from fossil (non-renewable) energy sources (e.g. oil and gas) to heating systems with renewable energy sources (e.g. wood

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		<p>the building to be supported (reporting date December 31, 2022) and who do not exceed a certain net income</p>	<p>100% of the eligible switching costs.</p> <p>The funding takes the form of a one-off, non-repayable investment grant.</p> <p>Depending on the heating system used, this subsidy varies between €25,383 (air/water/heat pump) and €37,252 (brine/water or water/water heat pump) and is made up of state, federal and additional funding from federal funds.</p>	<p>pellets, heat pumps or biogenic district heating).</p> <p>Replacement of the existing oil or gas boiler, a gas boiler or an all-purpose burner with a heating system based on solid biogenic fuels (wood products only), an electrically operated heat pump or a district heating connection.</p>
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Table A5c: List of national renovation wave policies in Tirol, Austria

Name	Duration	Target group	Funding scheme	Type of measures covered
Housing subsidies for renovation in Tirol	Long-term	Natural persons (private households)	For both renovation options, a 4% annuity subsidy is granted on the eligible renovation costs to support the repayment of a bank loan over a period of 10 years.	<p>The state of Lower Austria offers two variants as part of the "Lower Austria Home Renovation" funding program: WITH and WITHOUT an energy certificate.</p> <p>Renovation WITH an energy certificate is recommended for a planned overall thermal-energetic renovation. In this case, higher funding is possible. The focus is on measures to improve thermal protection and increase energy efficiency. This leads to a noticeable decrease in heating and overall energy requirements. The improvement in heating requirements must result in at least a 40% increase in the thermal insulation standard on the building envelope.</p> <p>Funding WITHOUT an energy certificate is applied for individual measures such as replacing a heating system, renovating a roof, individual thermal insulation measures, etc.</p>
Housing subsidies for renovation in Tirol -additional funding: Eco bonus	N/A	House residents	Funding in the form of a one-off (non-repayable) grant. The amount of the eco-bonus depends on the eco-level and the usable area of the building.	Grant for comprehensive thermal and energy renovation of a residential property, if possible including the entire building shell: At least three of the following components must be renovated together: facade, windows, insulation of the lowest floor ceiling, insulation Roof or top floor ceiling, energetically relevant building technology system
Housing subsidies for renovation in Tirol -additional funding: climate-friendly heating system bonus	N/A	House residents	<p>Grant of a maximum of EUR 3,000.</p> <p>This funding is granted in addition to the funding for individual components or the eco-bonus funding (comprehensive thermal-energetic renovation).</p>	The replacement of old heating systems or boilers based on fossil fuels (oil, gas, coal/coke all-purpose burners, electricity-powered night or direct storage heaters) with a highly efficient alternative system.

Table A6: List of national renovation wave policies in Belgium

Name	Duration	Target group	Funding scheme	Type of measures covered
Better energy-efficiency for Brussels Stockmarket: Betere energieprestaties voor Brusselse Beurs - NEXT GEN BELGIUM	Long-term	Public buildings	10.81 million EUR (Federal government) + 31.2 million EUR (public funds)	Lowering primary energy needs (no further specification on technical details).
Improving energy footprint of historical buildings: De energieprestaties van historische gebouwen verbeteren - NEXT GEN BELGIUM	Long-term	Historical buildings	EUR 170 million	Renovation of buildings (facade of Palace of Justice in Brussels, heating of Royal Palace, ...)
Support energy renovations of "Regie der Gebouwen": Description non communiquée par le responsable du projet. - NEXT GEN BELGIUM	Long-term	Specific government buildings	EUR 4.892 million	Renovation of specific government buildings (no technical details)

Table A6a: List of national renovation wave policies in Flanders, Belgium

Name	Duration	Target group	Funding scheme	Type of measures covered
Energy friendly renovation of social housing: Energievriendelijke renovatie van sociale woningen in Vlaanderen - NEXT GEN BELGIUM	Short-term	Citizens (social housing)	30 million EUR for direct funding, 5 million EUR to lower the interest rate on housing company's loans	Lowering primary energy needs (no further specification on technical details). 4010 dwellings in Flanders, to lower the average EPC-rating with 75%, aiming to reach EPC-rating A by 2050 (summary mentions 4010, text mentions 4010 social housing in phase 1, 127220 residential in phase 2, 194954 social housing in phase 3, and additional social and residential housing in phase 4)
Lowering energy usage with 2.5% per year in public buildings: https://nextgen.belgium.be/nl/project/2-5-minder-energiegebruik-in-openbare-gebouwen-per-jaar-in-vlaanderen	Short-term	Public buildings	20 million EUR	Lowering primary energy needs in public buildings (no further specification on technical details).
Improve energy subsidies in Flanders: Improved energy grant scheme in the Flemish region (R-1.01) - NEXT GEN BELGIUM	Short-term	Residents (families)	243 million EUR	Increasing subsidies for renovation, home batteries and smart systems

Table A6b: List of national renovation wave policies in Walloon, Belgium

Name	Duration	Target group	Funding scheme	Type of measures covered
Facilitating the process for renovation of public buildings: https://nextgen.belgium.be/nl/project/vereenvoudigd-proces-voor-renovatie-openbare-gebouwen-in-brussel	Short-term	Citizens (social housing)	30 million EUR for direct funding, 5 million EUR to lower the interest rate on housing company's loans	Lowering primary energy needs (no further specification on technical details). 4010 dwellings in Flanders, to lower the average EPC-rating with 75%, aiming to reach EPC-rating A by 2050 (summary mentions 4010, text mentions 4010 social housing in phase 1, 127220 residential in phase 2, 194954 social housing in phase 3, and additional social and residential housing in phase 4)
Improvement of the environmental impacts of sport and local infrastructure: https://nextgen.belgium.be/nl/project/verbetering-milieu-effecten-van-sport-en-lokale-infrastructuur-in-wallonie	Long-term	Public buildings	EUR 151.83 million	Lower environmental impact, e.g. decrease GHG with 55% by 2030 (no further specification on technical details)
Climate investments in schools belonging to the French Community: Klimaatinvesteringen in 349.000 m² aan schoolgebouwen - NEXT GEN BELGIUM	Long-term	Public buildings (schools owned by the French Community of Belgium)	EUR 230.8 million	Investment plan + infrastructure renovations (no technical details)
Environmentally friendly renovation of youth-care and sports: https://nextgen.belgium.be/nl/project/milieuvriendelijke-renovatie-van-infrastructuur-voor-jeugdzorg-en-sport	Long-term	Public buildings	EUR 32.65 million + EUR 20.04 million (public funds)	Lowering primary energy needs in public buildings (no technical details)
Energy Efficient Buildings in the	Long-term	Public buildings	EUR 50 million + EUR 8 million (public)	Lower primary energy with >30% (no technical details provided)

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French Community: 50 miljoen euro voor energievermindering universiteitsgebouwen in Franstalig België - NEXT GEN BELGIUM		(universities)	funds)	
Energy savings in cultural buildings: Energiebesparingen in Fransvloeiën terug naar culturele sector - NEXT GEN BELGIUM	Shor-term	Public buildings (cultural sector)	EUR 48.65 million + EUR 14.9 million (private)	Lower primary energy with >30% (no technical details provided)
Energy transition research at universities: Franstalige universiteiten onderzoeken energietransitie - NEXT GEN BELGIUM	Short-term	Research	EUR 26.45 million	Creation of an interdisciplinary platform for research actions on e.g. energy storage, smart grid, energy efficiency, etc.
Low-carbon transition aims to create 6000 jobs: https://nextgenbelgium.be/nl/project/koolstofarme-transitie-mikt-op-6000-banen	Long-term	Industry (lowering CO2 emission)	EUR 50 million + EUR 50 million (private)	Promoting projects to lower CO2 emissions from energy-usage and industrial processes

Table A7: List of national renovation wave policies in Portugal

Name	Duration	Target group	Funding scheme	Type of measures covered
<p>FIRRU 2020 - Financial Instrument for the rehabilitation and revitalisation of urban areas</p> <p>IFRRU 2020 - Instrumento financeiro para a reabilitação e revitalização financeira Instrument for the rehabilitation and revitalisation of urban areas</p>	<p>Long-term</p>	<p>Any entity, whether natural or collective person, public or private, with a title that gives her/it the power to carry out the intervention.</p> <p>Buildings must be located in the territories defined by the Municipality: Urban Rehabilitation Area (ARU)/Action Plan for Urban Regeneration (PARU).</p> <p>Application requires the existence of a Energy Certificate of the property by an expert qualified by ADENE (Portuguese energy agency).</p>	<p>IFRRU 2020 offers loans under more favorable conditions compared to the market, for the comprehensive rehabilitation of buildings intended for housing or other activities, including the most suitable integrated energy efficiency solutions within this rehabilitation scope.</p> <p>Total investment capacity of 1.400 M€</p> <p>Loans - provided by the financial entities selected to manage IFRRU 2020 support, with maturities of up to 20 years, grace periods equal to the investment period + 6 months (max. 4 years), and interest rates below market rates.</p> <p>Guarantees - associated with loans provided by the same selected financial entities, for projects that do not have sufficient guarantee.</p>	<ul style="list-style-type: none"> Overall rehabilitation of buildings aged 30 years or more (or in the case of younger buildings, with a conservation level of 2 or less. Rehabilitation of abandoned industrial spaces or units. <p>Rehabilitation of private units integrated in an overall rehabilitation of a social housing building.</p>
<p>Support for Renovation and Increased Energy Performance of Service Buildings.</p> <p>Apoio à Renovação e Aumento do Desempenho Energético dos Edifícios de Serviços</p>	<p>Short-term</p>	<p>Legal entities and individuals who are owners of commercial and service buildings in the private sector and engage in commercial activities in those buildings, including entities</p>	<p>The allocation for this program is 20 M€</p> <p>Max allocation of financial support per beneficiary is 200 thousand.</p>	<p>Extensive list of eligible measures. Some of the main ones are:</p> <ul style="list-style-type: none"> Replacement of glazed openings (windows and doors) with more efficient ones. Application or replacement of thermal insulation as well as the replacement of entrance doors. Installation of systems that promote natural ventilation and lighting. Installation or replacement of HVAC and/or DHW

		operating in the tourism sector and social economy entities.		<ul style="list-style-type: none"> • Installation of electricity production systems for self-consumption, using renewable sources with and without energy storage. • Installation and/or replacement of heating and/or cooling systems and/or hot water systems that use renewable energy <p>Energy audits and issuance of Ex-ante and Ex-post Energy Performance Certificates.</p>
<p>Support program to more sustainable buildings (2nd Phase)</p> <p>Programa de apoio a edifícios mais sustentáveis (2ª fase).</p>	Short-term	Existing residential buildings, both single-family and multi-family buildings or their individual units, constructed and licensed up until December 31, 2006.	<p>The current total allocation for the program is 135M€</p> <p>Each beneficiary is limited to a maximum total incentive of €7,500 per single-family building or individual unit, and €15,000 for multi-family buildings in full ownership.</p>	<ul style="list-style-type: none"> • Replacement of inefficient windows with efficient windows, with an energy class rating of "A+" • Application or replacement of thermal insulation in roofs, walls, or floors, using natural-based materials • Heating and/or cooling systems for indoor environments and domestic hot water (DHW) that utilize renewable energy, with an energy class rating of "A+" or higher; • Installation of photovoltaic panels and other renewable energy production equipment for self-consumption with or without storage; • Interventions aimed at water efficiency through the replacement of water-use devices in housing with more efficient ones, installation of solutions that enable monitoring and intelligent control of water consumption, or installation of rainwater harvesting systems; <p>Interventions to incorporate bioclimatic architecture solutions involving the installation or adaptation of fixed elements of the building, such as shading devices, greenhouses, roofs, or green facades, prioritizing nature-based solutions.</p>
<p>Efficiency voucher program</p> <p>Apoio ao Programa "Vale Eficiência"</p>	Short-term	Economically vulnerable families that are under the Social Electricity Tariff scheme (a social support that consists of a discount on the low-voltage electricity network access tariff)	Targets the provision of 100.000 "efficiency vouchers" each worth €1,300. Total financial allocation 130M€.	<ul style="list-style-type: none"> • Replacement of inefficient windows with efficient windows, with a minimum energy class rating of "A"; • Application or replacement of thermal insulation in the building envelope • Installation of heating and/or cooling systems for indoor environments and DHW, with an energy class rating of "A" or higher. <p>Installation of photovoltaic panels and other renewable energy production equipment for self-consumption.</p>
Energy Efficiency in Central Government Buildings	Short-term	Entities of the Central Public Administration	Allocation for this program is 40M€.	Similar to the previous program.

<p>Eficiência Energética em Edifícios da Administração Pública Central</p>		<p>State, Central Administration Services and Funds</p> <p>Non-Profit Institutions of the Central Administration</p> <p>Public Business Sector</p> <p>Regulatory Entities</p> <p>Public Entities that carry out administrative activities pursuing State purposes</p>	<p>Maximum funding per application is 5M€.</p> <p>Applications that show a reduction in primary energy consumption of less than 15% are not eligible.</p>	
<p>Support for the implementation of Renewable Energy Communities and Collective Self-Consumption.</p> <p>Apoio à concretização de Comunidades de Energia Renovável e Autoconsumo Colectivo</p>	<p>Short-term</p>	<p>Renewable Energy Communities</p> <p>Self-consumers - end consumers who produce renewable energy for their own consumption</p> <p>Self-consumption management entities</p>	<p>Allocation for this program is 30M€ (10M€ per typology, see right).</p> <p>Maximum support per typology is: 70% for residential buildings, 100% for central public administration buildings, and 50% for service and commerce buildings.</p>	<p>Electricity production systems for self-consumption, through renewable sources on the following typologies:</p> <p>Residential buildings</p> <p>Service and commerce buildings</p> <p>Central public administration buildings</p>
<p>Energy efficiency in residential buildings.</p> <p>Eficiência energética em</p>	<p>Short-term</p>	<p>Residential Condominiums and individual owners in the case of buildings under full ownership (both single-</p>	<p>Allocation for this program is 12M€.</p> <p>Grants with a limit of 150.000 per beneficiary. Maximum support for technical advice</p>	<p>Application or replacement of thermal insulation in roofs</p> <p>Application or replacement of external thermal insulation in walls</p> <p>Application or replacement of thermal insulation in floors</p>

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<p>edificios residenciales.</p>		<p>family and multi-family buildings constructed and licensed up until December 31, 2006).</p>	<p>is 400€ per beneficiary. Support with energy certification up to 125€.</p>	
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Table A8: List of mitigation actions and their link to the measure database D4.1

ID	Top-Level Actions	D4.1 Code	Detailed Measures
A01	Improve Insulation and Ventilation Barrier of Windows and Panels	M231	Improve Ventilation Barriers of Attic and Cellar Spaces, Improve Ventilation Barriers of Windows and Doors
		M232	Improve Attic and Roof Insulation
		M233	Install Double Skin Facades (Non-Residential)
		M235	Replace Standard Windows With High Efficiency Glazed Options
		M130	Install Window Shading Systems..
		M145	Install Window Shading Systems..
		M013	Install Window Shading Systems..
		M028	Install Window Shading Systems..
A02	Install High Efficiency Lighting Systems	M236	Install High Efficiency Fluorescent Lighting Options, Install High Efficiency LED Lighting Options, Install Luminaries and Reflectors
A03	Increase Efficiency of Appliances	M237	Install High Efficiency Fluorescent Lighting Options:
A04	Increase Efficiency of Cooling Systems	M238	Retrofit Cooling Systems, Install Evaporative Cooler Systems, Install Economizer Systems, Replace AC Cooling with Fan Systems
A05	Increase Efficiency of Heating Systems	M239	Retrofit Heating Systems, Install Radiant Ceiling Systems, Optimize Performance of Boilers with a Flue Gas Analyzer and Compensation Controller, Install Condensing Boilers to Integrate Waste Heat Recovery
A06	Increase Efficiency of Ventilation Systems	M368	Adopt Night Ventilation
		M240	Renovate Ventilation Systems to Include Heat Recovery
A07	Integrate Renewable Energy Sources	M154	Integrate Rooftop and Facade Solar PV Systems
		M155	Integrate Rooftop and Facade Solar PV Systems
		M242	Replace Oil and Gas Boilers with Biofuel Boilers
A08	Electrify Non-Electric Systems and Appliances	M243	Replace Oil and Gas Boilers with Electric Boilers, Replace Oil and Gas Cooking Units with Electric Alternatives
A09	Integrate District Heating	M244	Install Natural Gas or Biogas District Heating System
		M391	Install Geothermal District Heating System
A10	Integrate Heat Pumps for Water Heating	M018	Install Air Source Heat Pump (ASHP)
		M391	Install Ground Source Heat Pump (GSHP)
		M397	Using groundwater as external heat source for heat pumps
A11	Decrease Thermal Transfer with External	M115	Install Green Roofing
		M135	Install Cool Rooftops
		M049	Install Cool Pavement
		M245	Install External Facades

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ID	Top-Level Actions	D4.1 Code	Detailed Measures
A12	Install Smart Energy Management System	M246	Utilize a BMS, Integrate Dynamic Heating and Cooling Scheduling in Non-Residential Buildings, Integrate "Smart" Thermostat Controls in Residential Buildings with Occupancy Sensing, Integrate "Smart" Thermostatic Valves in Radiator Network, Install "Smart" Lighting Controls.
A13	Install High Efficiency Water Distribution	M247	Install Low Flow Tap Aerators, Install Low Flow Showerheads, Install Low Flow Toilets, Install Waterless Urinals in Non-Residential Buildings, Install Rainwater Capture System, Install Grey Water Collection System
A14	Alter Habits to Reduce Energy Consumption	M249	Increase Occupant Density in Office Buildings, Reduce Heating Set Point on Non-Use Days in Non-Residential Buildings During Winter, Increase Cooling Set Point on Non-Use Days in Non-Residential Buildings During Summer
A15	Reduce Production Energy Demand of Construction Materials	M250	Replace Construction Materials of Load Bearing Structures, Replace Construction Materials of Flooring, Recycle Industrial Fly Ash & Slag in Concrete Production, Recycle Industrial Gypsum Waste in Plasterboard Production, Replace Facade Plaster with Clay-Based Alternatives
A16	Apply Efficient Construction Methods	M251	Recycle Construction Waste, Increase Efficiency of Construction Sites, Localize Sourcing of Construction Materials
A17	Apply Efficient Building Design Concepts	M252	Reduce Thickness of Concrete Slabs; Construct External Walls with High Thermal Inertia Materials; Redesign Foundation Structure; Increase Space Efficiency in New Builds; Increase Adaptability in Building Concept Design
A18	Financial, technical, and administrative support for retrofitting old buildings		