advancing with ESIF financial instruments

The potential for investment in energy efficiency through financial instruments in the European Union

Member States analysis

June 2020

European Commission

European Investment Bank The EU bank

Disclaimer

Objective of the document

The objective of this report is to give an overview of the state and progress of energy efficiency developments in the 27 Member States (MS), and a preliminary assessment of investment needs and potential use of ESIF financial instruments to cover them.

This document is mainly based on data and information released prior to the outbreak of the Coronavirus (COVID-19) pandemic, that is currently (June 2020) forecasted to lead to a severe economic recession in 2020 in the EU.

The recession may have deep repercussions in the years to come in the economic and financial systems of EU MS, therefore economic and financial context reported in the document may sharply deteriorate in the near future. Cohesion Policy resources, and public resources in general, are expected to play a crucial role to support the economic recovery in the next programming period.

Energy efficiency (EE) investments can play an important role to support the economic recovery, as (i) they have a considerable job creation effect; (ii) they contribute to reduce energy costs and greenhouse gas emissions; and (iii) they increase MS energy security.

An appropriate use of financial instruments to support EE investments enables the use of Cohesion Policy resources in a revolving way and to generate leverage by crowding-in private co-financing in order to meet significant investment needs.

Austria

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final version of the National Energy and Climate Plan of Austria;*
- *EC assessment of the draft National Energy and Climate Plan of Austria;*
- *Österreich Energieeffizienz im Gebäudesektor - Neubau und Sanierung Zielmarktanalyse; 2018.*

Context overview

Austria has a population of about **8.85 million inhabitants** (2.0% of the EU27) **increasing** over time (+6.2% in the last 10 years)[1] and this positive trend is expected to continue: by 2030 the population is expected to increase to 9.33 million[2].

In 2018, Austria's real **GDP** per capita was about **EUR 37,810** (137% of the EU27 average) and it reported a 4.2% increase in the last 10 years[3].

Final energy consumption in Austria in 2018 was 27.9Mtoe (2.8% of the EU27) and it has decreased **by 0.5% in last 10 years (**while at the EU27 level it decreased by 4.5%) and by 0.4% compared with 2005 (while at the EU 27 level it decreased by 4.9%)[4].

- Consumption per capita at 2018 (3.2toe/person) was 43% higher than the EU average (2.2 toe/person), and over the last 10 years it decreased by 5%, compared with -6% reported by the EU27[5];
- Energy productivity (GDP over the gross available energy) at 2018 was 9.8 Euro per Kg of oil equivalent (21% higher than the EU average of 8.2 Euro per kilogram), showing lower reliance on energy to generate GDP compared with the EU average (this index increased by 10% in the last 5 years)[6];
- Sectors contributing to final consumption are: transport (31.5%), industry (28%), households (23%) and services (9%).

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[7] is 3.9 million (2% of EU27); • Only 22.5% of the oresidential buildings are built after 1990 making Austria one of the EU;	• In 2018, households' energy consumption was 6.5Mtoe (2.7% of EU27)[9];	• 90% of the building stock needs renovation[11];

1 EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

2 National Energy and Climate Plan

3 EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

4 EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020

5 Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

6 EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

7 Odyssee database, stock of dwellings (permanently occupied) year 2016

9 EUROSTAT; Final consumption - other sectors - households - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

11 ÖSTERREICH Energieeffizienz im Gebäudesektor - Neubau und Sanierung Zielmarktanalyse 2018

	countries with a rather old housing stock[8].	• Consumption per dwelling is 1.8toe (29% higher than EU average)[10].	• During 2000-2016, energy savings in residential buildings were estimated in 2.5Mtoe, or 40% of 2000 consumption[12]; • Energy savings were mainly achieved in the beginning of 2000s (80% of 2000-16 savings were achieved before 2007).
Industry	• The share of industry in GDP is 28.4%[13].	• In 2018, consumption of industry was 7.7Mtoe (3% of EU27) and it increased by 1.5% in the last 5 years (2018 – 2013) vs +2.5% in EU 27[14].	• During 2000-2016, energy savings undertaken in industry were worth 1.4Mtoe or 21% of 2000 consumption.
Public Sector	• Limited information on the stock of public buildings was found.	• In 2018, consumption in services (including public administration) was 2.5Mtoe (1,9% of EU27) decreasing over time (-15.2% last 10 years vs -0.5% in EU27)[15].	• Information about the new strategy of Austria on public buildings will be reported in the new national long term renovation strategy, to be released in the first semester 2020.

EE targets, measures in place/proposed

EE is a priority in Austria of the nine regional governments (having a primary role in establishing the relevant policies) and the federal government, therefore reaffirming the commitment to the Paris Agreement by putting particular emphasis on the transition to a low-carbon society).

There are many EE dedicated programmes on the federal level and several smaller regional EE programmes. Examples include financial support programmes for residential buildings renovations supported by the regions ('Wohnbauförderung'), the Austrian Federal Government's Renovation Grant ('Sanierungsscheck') and the national klimaaktiv Programme. These programmes are further described in the following table.

According to legislation passed in 2014, the energy savings obligation is set at 1.5% on yearly basis between 2014 -2020. The Ministry of Science, Research and Business should in cooperation with the Regional Governments decide about all relevant actions to achieve this objective. However, the legislation in question did not elaborate on any specific measures.

The above mentioned legislation gave the impetus to initiate the clean mobility program, with an envelope of EUR 645 million. In 2017, 12,400 projects with total value EUR 775 million related to EE have received support in the form of grants utilising EU and national resources from the federal and local governments.

NEW POLICIES (2020–2030)

The new government programme of the Conservative-Green Coalition (Grüne-ÖVP) of January 2020 foresees that Austria becomes a pioneer for climate action and EE, and will be climate neutral by 2040. This entails the support of all sorts of renewable energies through a renewable energy-expansion law that will ensure that 100% of the (national balance) supply will be provided by green electricity by 2030. This will be accompanied with further development of the energy efficiency law that will guarantee that Austria will – in accordance with economic development – be in demand of considerably less energy than today. Measures will specifically target

8 ÖSTERREICH Energieeffizienz im Gebäudesektor - Neubau und Sanierung Zielmarktanalyse 2018
10 Odyssee database, Consumption per dwelling with climatic corrections, year 2016
12 Odyssee database, technical final energy savings
13 CIA, The world fact-book (data refers to 2017)
14 EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
15 EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

the building/housing sector (thermal renovation, transition to heat and cooling systems based on renewable energies), agriculture and forestry, industry as well as the sectors waste and transport.

Incentives for investments into renovations and new construction should make Austria one of the leading European countries with regard to EE and the use of sustainable building materials. Furthermore, the budgets for the climate and energy fund and the tools for the implementation of the NECP will be increased. Research into integrated, digital and smart energy systems will also be supported[16].

The final version of the NECP has increased the saving targets for 2030 (reported in the following table) compared with the draft version of the document (submitted in the beginning of 2019) and that was considered to be modest by the EC.

EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy cons	31.8	31.5	28.0-30.0
Final energy cons	27.9	25.1	24.0-25.0

In the following table some of the main EE schemes and measures are reported.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	The thermal renovation of existing buildings built during particularly energy inefficient construction eras (1950s-1980s).	<u>Existing measures:</u> There are several programmes to support EE in the residential sector, both at the regional and federal level, examples include[17]: • *Wohnbauförderung* - regional subsidies for EE in residential buildings, in place since 1969 and provided in the form of grants and soft loans. In 2018 the budget of the program was equal to EUR 2.1bn. In 2017 the programme supported 14,000 deep renovations; • *Sanierungsscheck* - Austrian federal government's renovation grant provided for different type of recipients (e.g. companies, public, and households). For private individuals, subsidies support thermal renovations in residential buildings which are more than 20 years old. The subsidy amounts to up to 30% of eligible costs, with a ceiling of EUR 6,000 in detached houses and up to EUR 3,000 per apartment in multi-storey residential buildings. In 2018, the programme granted EUR 36.2m to 5,782 private individuals and 180 enterprises, leading to a total investment volume of circa EUR 283m. <u>New planned measures/priority objectives:</u> • Existing measures are expected to be continued; • Newly constructed buildings are supposed to do entirely without fossil fuels; • New residential loan scheme to be provided by the retail banks, the actual details will be formulated in 2020. No further details currently available; • Promotion of use of photovoltaic and biogas/biomass installations; • New tax incentives to be defined in 2020.
Industry	Heat recovery by thermal renovation of existing commercial buildings.	<u>Existing measures:</u> • Since 1990, emissions have fallen by 25% due to investments in alternative fuels and EE;

16 Die neue Volkspartei und die Grünen (2020). Aus Verantwortung für Österreich – Regierungsprogramm 2020-2024.

17 Economidou, M., Todeschi, V., Bertoldi, P., Accelerating energy renovation investments in buildings – Financial & fiscal instruments across the EU, EUR 29890 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-12195-4, doi:10.2760/086805, JRC117816.

		• Companies can benefit from different support schemes mainly funded with national resources (such as the aforementioned *Sanierungsscheck,* and other schemes, such as the *klimaaktiv Programme*, that supports EE in all sectors). New planned measures/priorities (NECP): The NECP does not provide information about additional schemes that will be implemented.
Public Sector	The thermal renovation of existing buildings built during particularly energy inefficient construction eras (1950s-1980s).	Existing measures: • Austria, is operating EE measures to renovate 3% of government buildings each year, as prescribed by Art.5 of the EE Directive; • Some supporting programmes are in place in the public sector, as like as the aforementioned *Sanierungsscheck* programme. New planned measures/priorities (NECP): Although the NECP does not report detailed information about future supporting measures (that will be provided in the Long Term Renovation Strategy, to be released in 2020), Austria aims to renovate public buildings including social housing at an accelerated pace until 2030.

Market failures, main issues and barriers to investment

A number of issues preventing EE activities in Austria are briefly explained in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments (besides externalities and asymmetric information) are related to: - limited financial resources to devote to EE initiatives; - limited financial returns of EE interventions (in particular for deep renovations).	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions; - Difficulties, especially in large multi apartment buildings, to agree on renovation activities. • In Austria a scarcity of sufficiently qualified technical staff to perform EE works was reported.	• Considering the limited experience with financial instruments, awareness raising and coaching activities may be needed; • Instruments combining grants and repayable component could be better received (considering the strong reliance on grants).
Industry	• Typical barriers to EE investments include: - long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities.	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	
Public Sector	• The Austrian public sector is considered to have a similar support and control mechanisms to the German one, therefore enabling Austrian entities to have access to	• Typical non-financial barriers preventing EE investments: - lack of capacity to develop preparatory activities (e.g. baseline, project structuring, contractual framework, etc.);	

	external financing at terms and conditions almost identical to the sovereign entities.	- difficulties to manage procurement process and monitoring activities, in particular for Energy Performance Contracts.	

ESIF resources and existing financial instruments

Austria benefits from ESIF funding of EUR 4.9 billion (circa EUR 579 per person) during the 2014 – 2020 period.

ESIF backed EE related support is estimated in EUR 137 million[18] .

In the 2014 – 2020 period, Austria contributed EUR 3 million[19] of its ESIF (circa 0.06% of its budget) to one financial instrument under the ERDF. This financial instrument targets SMEs developing high tech solutions and is managed by OÖ HightechFonds GmbH.

There are no ESIF financial instruments for EE in Austria.

Investment needs

According to the final version of the NECP, circa EUR 173bn investment (over the 2021 – 2030 period) will be needed to reach the 2030 targets:

- EUR 97bn are budgeted for the transport sector;
- EUR 27bn are planned for the energy sector (e.g. production of clean energy);
- EUR 30bn for EE in buildings;
- EUR 1bn will be needed in 'other sectors';
- EUR 7bn will be invested in Research, Development and Innovation.

According to Annex D in the Austrian 2019 Country report, there is a particular investment need in the improvement of EE in SMEs, including their premises, installations and processes.

[18] Data provided by DG Regio based on an analysis of fields of intervention
[19] www.fi-compass.eu/financial-instruments/Austria

Belgium

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final version of the National Energy and Climate Plan of Belgium;*
- *EC assessment of the draft National Energy and Climate Plan of Belgium;*
- *Belgian Energy Efficiency Action Plan (2017);*
- *Belgium: 2019 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Belgium; IMF Country Report No. 19/74; February 19, 2019.*

Context overview

Belgium has a population of about **11.5 million inhabitants** (2.6% of the EU27) **increasing** over time (+6.2% in the last 10 years)[20] and the positive trend is expected to continue: by 2028 population is expected to increase to 11.8 million[21].

Belgium's **GDP** per capita is about **EUR 35,600** (29% higher than the EU27 average) and it reported a 5.8% increase in the last 10 years[22].

Final energy consumption (FEC) in Belgium is 36.3Mtoe (3.7% of the EU27) and it has **decreased by 0.7% compared to 2005** data**,** while at the EU28 level it decreased by 4.9%.

- **Consumption per capita** (3.2toe/person) is 43.7% higher than the EU average (2.2 toe/person), however, it decreased by 8% in the last 10 years (while at the EU27 level it decreased by 6%);
- **Energy productivity** (GDP over the gross available energy) is 6.4 Euro per Kg of oil equivalent (21.7% lower than the EU average), showing a strong reliance on energy to generate GDP (this index increased by 7% in the last 5 years);
- **Sectors** contributing to final consumption are: households (33% of total), transport (25%), industry (29%) and services (13%).

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[23] is 4.8 million (3% of EU27); • Only 13% of residential buildings are built after 1990, making Belgium one of the EU	• In 2018, households' energy consumption [25] was 8.1Mtoe (3.3% of EU27); • Consumption per dwelling was 1.8toe (28% higher than EU average)[26];	• 90% of the building stock needs renovation[6]; • During 2000-2015, energy savings achieved in residential buildings is estimated at 3.2Mtoe, or 36% of 2000 consumption[29];

[20] EUROSTAT
[21] Federal Planning Bureau
[22] EUROSTAT
[23] Odyssee database, stock of dwellings (permanently occupied) year 2016
[25] EUROSTAT
[26] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[29] Odyssee database, technical final energy savings

	countries with the oldest housing stock[24].	• An average annual reduction of around 10% is estimated for the period 2018 - 2020 on consumption in the residential sector[27]; • High electricity prices for household consumers, (39% higher than the EU-28 average)[28].	• EE activity was more intense in the beginning of 2000s and 95% of 2000-16 savings were achieved prior to 2011.
Industry	• The share of industry in the GDP is 20%, slightly down by 2% in the last 10 years[30].	• In 2018, industry consumed 10.7 Mtoe (4.4% of EU27)[31] and it slightly decreased (-1%) in the last 5 years.	• Since 1990, emissions have fallen by 25 % due to investments in alternative fuels and in energy efficiency, and as a result of carbon leakage; • During 2000 – 2015, energy savings undertaken in industry were worth 5.2Mtoe or 38.5% of 2000 consumption; • With respect to the 2000 – 2015 period, important savings were achieved until 2010, since then limited savings (or even negative savings) were recorded.
Public Sector	• The stock of buildings of the federal government is about thousand buildings and 6.9 million sqm[32]; • Limited information is available on public buildings of the regional governments.	• Consumption in services (including public administration) is 4.6Mtoe (3.4% of EU27) decreasing over time (-6.2% last 5years VS +4.2% in EU28).	• Art.5 of the Energy Performance in Buildings Directive (EPBD) requires 3% of the floor area of central administration buildings to be renovated every year, or alternative solutions reaching the same target to be implemented. According to the NECP, all federal buildings should be carbon neutral by 2040 and 40% should be by 2030.

EE targets, measures in place/proposed

EE is declared to be a priority in Belgium by the three regional governments (having a primary role in establishing the relevant policies) and the federal government, therefore reaffirming the commitment to the Paris Agreement by putting particular emphasis on the transition to a low-carbon society.

Belgium plans to reduce its GHG emissions by 35% in 2030 compared with 2005 levels for sectors not subject to the Emissions Trading Scheme (non-ETS sectors). In the past, Belgium has taken considerable steps to reduce greenhouse gases in the economy, to the point where several sectors have already adopted the most cost-effective measures possible.

With respect to EE, particular attention will be paid to the following strategic measures, including: the development of modernisation strategies; the exemplary role of the state authorities; further policy development around energy service companies (ESCOs).

[24] Pathway to Energy Efficiency in Belgium; McKinsey&Company; 2009

[27] Belgian Energy Efficiency Action Plan

[28] Please see: https://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_price_statistics

[30] EUROSTAT

[31] EUROSTAT

[32] http://www.regiedesbatiments.be/sites/default/files/content/regiebatiment_ra18_fr_br.pdf

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• Based on the NECP, with the new measures, consumption in the household sector at 2030 will be 30% lower than in 2005 (10% with existing measures only); • The decrease will reach 40 % in relation to natural gas and district heating consumption.	Existing measures: • Incentives have been defined at the federal and regional levels; • Federal measures include tax rebates and deductions and reduced VAT rates for EE renovations, the construction of low energy and passive houses, and the installing of condensers, high efficiency HVAG systems, thermal insulation and double glazing; • Regional and local authorities also offer incentives for such measures. East Flanders, for example, offers 6% VAT rate for renovations that improve EE in houses older than 5 years. This is in addition to a Flemish renovation premium of up to 30% of the investments, federal tax incentives of EUR 790 per year if the renovation reaches passive standards and – for many communes - 2 hours of free advice from an architect. New planned measures/priority objectives (NECP): • A decision has been taken to make maximum use of green heat capacity for the various different heating technologies available; • Promotion of district heating that facilitates the use of renewable or residual heat; • The investment needs by 2050 are estimated at almost EUR 29 billion in order to achieve the target of making residential buildings energy neutral.
Industry	• With new policy measures, energy consumption in the industrial sector at 2030 is planned to be 21% lower in Flanders and 10% for the Walloon region.	New planned measures/priority objectives (draft NECP): • With respect to the use of Energy Performance Contracting (ECP) type solutions, Walloon region is planning to use this model for the tertiary sector, supporting also setting up a dedicated fund (EUR 250million – 300million) to provide soft loans.
Public Sector	• The Flemish Region has decided the following levels for 2030 in public buildings, compared with 2015: - a reduction in CO2 emissions of at least 40%; - a reduction in primary energy consumption of at least 27%. Walloon Region and Brussels capital Region have committed to an accelerating pace for the renovation of public buildings.	Existing measures: • Requirement to renovate at least 3% of central government buildings each year. New planned measures/priorities (draft NECP): • The intention to make stronger use of Energy Performance Contracting type solutions is also reported, as presented above, Walloon region is planning to set up a dedicated fund in this respect; • According to the NECP, all federal building should be carbon neutral by 2040 and 40% should be by 2030; • Total investment of EUR 17 billion are estimated to be needed to make all public buildings energy neutral.

Market failures, main issues and barriers to investment

A number of issues hindering EE activities in Belgium are briefly reported in the following table. The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments (besides externalities and asymmetric information) are related to:	• Typical non-financial barriers preventing EE investments are related to: – limited awareness about benefits of EE interventions;	• TA programmes, to promote and to quantify EE benefits, to increase the likelihood of EE initiatives;

	– limited financial resources to devote to EE initiatives (in particular for poor households); – limited financial returns of EE interventions (in particular for deep renovations) although electricity price in Belgium is very high compared to the EU average, therefore a slighter higher return on EE investment could be achieved, compared with other countries; • There seems also to be a reluctance of banks to provide long tenor unsecured loans for EE renovation.	– Difficulties, especially in large multi apartment buildings, to agree on renovation activities.	• Financial support in order to reduce the pay-back period could be useful and provide additional incentives to undertaken works; • Support to the development of the ESCO model.
Public sector	• The already relatively high levels of debt (especially for Walloon region) limits to borrowing capacity of municipalities and other public entities and often prevents from investing in EE related measures in forms different from grants; • Limited appetite for banks to provide resources to ESCO for EPC type transactions (to this aim, activities both in Walloon and Flemish region are in place to develop EPC related de-risk solutions).	• Difficulties to manage both the preparatory activities (e.g. identification of the baseline, project structuring, etc.) and the procurement (especially for EPC) of EE intervention; • A lack of skilled construction workers may also prevent performing EE interventions at a sustained pace.	
Industry	• Typical barriers preventing EE investments include: – long pay-back period of several EE interventions; – difficulties to obtain financing based on cash flows generated by EE activities.	• Typical non-financial barriers preventing EE investments: – limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; – reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	

ESIF resources and existing financial instruments

Belgium benefits from **ESIF funding of EUR 2.7 billion** (an average of 242 euro per person) **over the period 2014-2020**[33] of which **EE related support** has been estimated in circa **EUR 111.8 million**[34].

In the 2014 – 2020 period, Belgium contributed **EUR 283.2 million**[35] **of its ESIF** (circa 10% of its budget) **to financial instruments** (all funded with ERDF) however no **EE related financial instruments** have been created.

[33] https://cohesiondata.ec.europa.eu/countries/BE

[34] Data provided by DG Regio based on an analysis of fields of intervention

[35] www.fi-compass.eu/financial-instruments/belgium

Although no ESIF backed financial instrument is operating in Belgium, an important experience was developed with the **PF4EE instrument**, as briefly reported below

The centrally managed PF4EE instrument was implemented in Belgium, with an endowment of EUR 75 million though the national bank Belfius[36].

Belfius joined the PF4EE instrument in 2017 and since then deploys it through the Belfius Energy Efficiency Package (BEEP), a new loan product to finance EE. BEEP is intended to directly finance EE projects of enterprises as well as social profit and education institutions. Further, indirect financing, channelled through energy service companies (ESCOs) and third investors, is provided to public EE projects. The main target sectors of the BEEP product include cogeneration, public lighting, district heating and renewable energy projects related to existing buildings. As per March 2019, more than 25 projects for an amount of about EUR 25 million were realised through the PF4EE product BEEP.

Investment needs

The investment pact announced by the federal government provides an overview of the investments required to achieve the EE targets: (a) renovating buildings to make them smarter and more energy efficient, with a focus on public buildings; (b) a change in the energy mix; (c) the adjustment and expansion of networks; (d) the development of storage facilities for heat and electricity; (e) the development of alternative fuels; (f) the decommissioning of Belgium's nuclear power plants and nuclear waste management.

These **energy-related projects represent a total investment requirement of EUR 66 billion between now and 2030**. **Moreover, another EUR 29 billion is needed by 2050 for the residential sector**. Almost half of the overall investment is estimated to be dedicated to the transport sector (EUR 27billion), renewable energy (EUR 19billion), public buildings (EUR 17billion) and networks (EUR 17billion) being the main sub sectors.

The NECP estimates that the private sector will provide around 55% of the capital funding. Some of this funding will be spent on innovation, research and development.

[36] https://pf4ee.eib.org

Bulgaria

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan of Bulgaria 2019;*
- *Final version of the National Energy and Climate Plan of Bulgaria 2020;*
- *EC assessment of the draft National Energy and Climate Plan of Bulgaria;*
- *Investment Strategy for the Bulgaria Fund of Funds-Operational Programme 'Regions in Growth';*
- *Odyssee-Mure, Energy efficiency trends and policies in Bulgaria;*
- *Building performance Institute Europe (BPIE), Accelerating the Renovation of the Bulgarian Building Stock, 2016;*
- *Building performance Institute Europe (BPIE), Implementing Nearly Zero-Energy Buildings in Bulgaria, 2012;*
- *Ministry of Finance Bulgaria, Ex-ante Assessment and Strategy for the Effective Implementation of the financial Instruments from the Operational Program Innovation and Competitiveness 2014-2020;*
- *EU building stock observatory;*
- *EU Energy Poverty Observatory Member State Report Bulgaria;*
- *JRC Science for Policy Report, Accelerating energy renovation investments in buildings 2019;*
- *JRC Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies, 2016;*
- *European Commission-European Structural and Investment Funds-Bulgaria factsheet;*
- *Commission Staff Working Document Country Report Bulgaria 2019, Including in-depth review on the prevention and correction of macroeconomic imbalances;*
- *Commission Staff Working Document Country Report Bulgaria 2020;*
- *European construction sector observatory - Country profile Bulgaria 2018;*
- *National Energy Efficiency Action Plan 2014-2020-Updated 2017;*
- *World Bank, Bulgaria national Residential Energy Efficiency Programme Phase 2, 2018;*
- *Allocation of Cohesion policy funding to Member States for 2021-2027. European Court of Auditors. March 2019;*
- *Commission staff working document. The EU Environmental Implementation Review 2019 Country Report Bulgaria 2019;*
- *Commission Spring 2020 economic forecasts;*

The following interviews were conducted:

- *Fund manager for financial instruments in Bulgaria-FMFIB;*
- *Meeting with the Deputy Minister of Energy Stankov, Veneta Tzvetkova (Director, Energy projects and international cooperation directorate), Milena Evtimova (Chief Expert, Energy Projects and International Cooperation Directorate), Ivaylo Aleksiev (Executive Director, Sustainable Energy Development Agency), Momchil Vanov (CFO of the Bulgarian Energy Holding);*
- *Bulgaria geographic desk in DG Regional and Urban Policy.*

Context overview

Bulgaria has a population of about 7m inhabitants (1.4% of the EU27). However, it is important to note that Bulgaria has been experiencing a constant population decline over time (population reduced by more than 500.000 people or 6.63% in the last 10 years)[37]. This negative trend is expected to become less intense, but still it is foreseen that by 2035 the population will have dropped to 6m inhabitants[38].

Bulgaria's economy was influenced by the economic crisis after 2008. However, sound macroeconomic policies implemented in recent years combined with an increase in private domestic consumption succeeded in fuelling steady growth rates up until the COVID crisis. The economy was gradually recovering and unemployment was reducing.

Overall, Bulgaria's GDP increased by 66% between 2000 and 2015, but only 3.4% above the pre-crisis level of 2008, while GDP per capita is about EUR 7.800 (26% of the EU27 average) and remains the lowest in EU27[39].

Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Bulgaria will suffer a sharp recession in 2020 with the gross domestic product **(GDP) expected to contract by 7.2%,** before rebounding and grow by 6% in 2021.

The **unemployment rate** is expected to increase from 4.2% (2019) to 7.0% (2020) and it is expected to be 5.8% in 2021.

To support the national economy, a **Government deficit** of circa 2.8% is expected in 2020 GDP, to be then diminished in 2021 (1.8%).

Due to the combined impact of the decrease of the GDP and the increase in the government deficit, the **debt/GDP ratio is expected to increase to 25.5% in 2020** (it was 20.4% in 2019).

The crisis could have a dual negative impact on EE investments, by both **reducing the demand** (e.g. households and enterprises may decide/be forced to postpone investments) **and the financial supply** (e.g. financial intermediaries may become more selective in their lending activity) **therefore increasing the importance of EE related supporting schemes.**

Final energy consumption (FEC) in Bulgaria **in 2018** was 9.91Mtoe (1.0% of EU27 consumption)[40]. In the period 2008 to 2010, the FEC had a declining trend probably due to the financial crisis. As part of the process of recovery, the period 2013 to 2018 reported an increase of almost 13% reaching the FEC level of 2005. It is important to highlight that while the number of dwellings has remained the same between 2005 and 2016, the number of people living in the country is steadily reducing (700.000 fewer people in 2019 than in 2005).

- **Consumption per capita** (1.41toe/person) is 37% lower than the EU average (2.2 toe/person) however, while this rate has a declining tendency in the EU as a whole in the last ten years, in Bulgaria it increased by 6% (while at the EU27 level it decreased 7%);
- **Energy productivity** (GDP over the gross available energy) is 2.35 Euro per Kg of oil equivalent (the lowest in EU), showing a strong reliance on energy to generate GDP (this index increased of 3% in the last 5 years);
- **Sectors** contributing to final consumption are: transport (3.3 toe/person - 34% of total), industry (2.7 toe/person -28% of total), households (2.2 toe/person - 23% of total), and services (1.2 toe/person - 12%)[41].

[37] EUROSTAT
[38] National Energy and Climate Plan
[39] EUROSTAT
[40] National Energy and Climate Plan
[41] EUROSTAT

The building sector (residential and non-residential) accounts for about 23% of the final energy consumption with remaining high energy saving potential. Regarding energy efficiency (EE), during the 2001-2016 period, Bulgaria reported about 0.29 Mtoe of cumulative (technical) final energy savings42, which implies a very poor performance.

	Overview	Consumption	EE
Residential Sector	• Stock of dwellings[43] is 3.1 million (2% of EU27), circa 91% built before 2000; • The total building floor area in the country is 262m sqm of which 212m sqm;correspond to the residential sector[44]; • The majority of dwellings (about 1.8m) are detached single family homes[45] with 66% of them located in rural areas; • 91% of dwellings were built before 2000; • About 70.000 buildings are multi apartment buildings, and 96% of those are built in urban areas; • About 500.000 buildings remain inhabited in the country[46]; • About 68% of residential buildings were built after the second world war and during communism era; • As a result, the quality of insulation is very low. About 22% of residential buildings are made with external walls from prefabricated elements[47].	• Households[48] are responsible for 2.3Mtoe (1% of EU28); • Consumption per dwelling is 0.74Mtoe (47% lower than EU average)[49]; • A characteristic of energy use in households is the very low use of natural gas at below 5% compared to 55% average in Europe; • A large percentage (34%) of dwellings are heated with the use of wood.	• During 2000-2015, EE unit consumption for space heating decreased by about 20% in conditions of significant growth of household expenditures. Since the final energy consumption remains constant, it can be assumed that households improved their EE[50].
Industry	• Data is scarce about the number of buildings in industry; • From the total floor area of approximately 260m sq. meters, 50m correspond to non-residential buildings; • Some data suggests that from the entire stock of non-residential floor area, 36.8% of floor area covers office buildings (commercial and public) and 18.4% retail activities.	• Consumption related to industry is 2.7Mtoe (1% of EU28)[51] from 3.3Mtoe in 2000[52]; • The **industrial sector** accounts for 24% of the national GDP. It is important to mention that Bulgaria, as many former communist countries underwent a transition from a	• During 2000-2015, EE undertaken in industry was 2.7Mtoe due to shift towards less intensive branches.

[42] This data refers to technical final energy savings
[43] Odyssee database, stock of dwellings (permanently occupied) year 2016
[44] Building performance Institute Europe (BPIE), Implementing Nearly Zero-Energy Buildings in Bulgaria, 2012
[45] Building performance Institute Europe (BPIE), Implementing Nearly Zero-Energy Buildings in Bulgaria, 2012
[46] World Bank , Bulgaria national Residential Energy Efficiency Programme Phase 2, 2018
[47] Building performance Institute Europe (BPIE), Implementing Nearly Zero-Energy Buildings in Bulgaria, 2012
[48] EUROSTAT
[49] Odyssee-Mure, Bulgaria Energy Profile 2018
[50] Odyssee-Mure, Bulgaria Energy Profile 2018
[51] EUROSTAT
[52] Odyssee-Mure, Bulgaria Energy Profile 2018

		primarily industrial economy to a service based economy. As a result, the final energy consumption in industry is gradually reducing, with 25% since 2005 and 20.9% in the last ten years; • However, an increase is reported in the last five years of 5.2% which can be attributed to the recovery of the country from the financial crisis[53].	
Public Sector	• In addition to the public buildings included in the category of office buildings (a breakdown between private and public is not available), it is reported that 25% of non-residential buildings are used for health and educational purposes.	• According to the National Energy Efficiency Action Plan 2014-2016, Bulgaria is following obligations arising from the EU Directive on EE including in public buildings; • Measures are being implemented to renovate public buildings used by the central government, regional administrations, and other public bodies. The building stock targeted by these measures is composed of 2329 buildings.	• Only 662 buildings are certified as per their energy class. Only 150 buildings meet the minimum energy requirements; • The renovation of this building stock is expected to produce substantial savings. As such, the potential from the renovation of public buildings is very wide.

EE targets, measures in place/proposed

During a meeting with the administration of the Ministry of Energy, in early February, it was communicated to the EIB team that the indicative reduction target for 2030 is 27.89% for primary energy and 31.67% for final energy consumption. Moreover, it was stated that a main component of this effort is going to be the national strategy for the renovation of the buildings stock which should be finalized at the end of March 2020. These targets were confirmed by the final version of the NECP released in March 2020.

The main bulk of measures mentioned in the NECP originate from the National Energy Efficiency Action Plan 2014-2020. The framework for the period 2014-2020 was based on the EE obligation schemes in place as well as so –called alternative measures such as imposed energy taxes, definition of standards and norms for EE, energy labelling schemes, and several training and education programmes (more measures mentioned below). In addition, financing schemes primarily targeting multi apartment buildings and public buildings were put in place.

EXISTING POLICIES

Under the **existing policy measures**, final energy consumption will only slightly reduce between 2016 and 2030.

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy cons	18.36	18.52	17.46
Final energy cons	9.91	9.98	10.32

According to the NECP, in order to achieve the objectives set for EE, Bulgaria has defined EE obligation schemes (that started in 2014 and will be gradually extended to 2030) with specific binding targets (according to the relevant EU Directive). In addition, two alternative measures have been defined. The first refers to individual

[53] EUROSTAT

energy savings targets for owners of industrial systems and of state and municipal buildings (only applicable under the obligation scheme 2014-2016), while the second to the national programme for EE of multi-family residential buildings. The later seems to be the main driver to achieve EE in residential buildings.

The relevant EU Directive 2018/44 regarding the renovation of building stocks in the EU, will be transposed to the Bulgarian national legislation in 2020. This means that the country has not yet developed a national strategy to support the renovation of the national stock of residential and non-residential buildings. However, some initiatives currently implemented are presented in the table below.

Bulgaria developed the third national Energy Efficiency Action Plan (NEEAP) 2014-2020 in order to set the framework and achieve two specific targets for 2020 namely (a) achieving energy savings of 25% and (b) reducing energy intensity by 41% compared to 2005. In order to achieve these targets, the State launched in 2005 a National Programme for Energy Efficiency in Multi-Family Buildings. This Programme, with a total budget of EUR 1bn, provided a 100% grant for building renovation targeting initially the prefabricated multi apartment buildings. In 2016, the Programme was expanded to include other residential buildings as well. As a result of this Programme, more than 2000 buildings were or are being renovated, out of more than 5000 applications. The renovated buildings correspond to 11.4m sqm of floor area, close to 150.000 apartments with more than 340.00 residents. According to the World Bank, the Programme has been successful.

NEW POLICIES (2020–2030)

Regarding the period 2020-2030, according to the Ministry of Energy, efforts will continue to renovate the national building stock. In addition, measures will aim at deploying smart systems and digitalisation in the construction sector. More efforts will also be placed on promoting energy audits and the involvement of ESCOs in the market.

The final NECP[54] refers also to the following measures:

- The continuation of the grant programme targeting the renovation of multi apartment buildings;
- An additional grant programme financed by the state budget and ESIF and specifically from the OP Environment targeting all sectors including households, public buildings, industry and services. The NECP refers to a grant intensity ranging from 50% to 100% and a total budget of circa EUR 700m. This programme is supposed to cover the period from 2020 to 2031 thus involving ESIF from the current and the next programming periods;
- The NECP also refers to the creation of a financing mechanism refers to as National Energy Efficiency Financing Mechanism. According to the NECP, this mechanism will implement financial instruments and will leverage funds from diverse sources and programmes including ESIF, Just Transition Fund, InvestEU and IFIs. An indicate budget of EUR 4bn is mentioned but without providing further information. This mechanism was not mentioned during interviews with the Ministry of Energy or FMFIB.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• The main driver of policies in Bulgaria for the residential sector is the obligation schemes and the national efficiency program for multi-family buildings; • Bulgaria does not yet have a long term strategy for the renovation of residential and non-residential buildings.	Existing measures: • In the context of decarbonisation, motives are provided for the gasification of households (In Bulgaria one of the lowest rates in the EU); • Measures are also taken to motivate the installation of solar roofs on buildings. It is important to note that Bulgaria has a target to produce 25% of energy consumption from renewables by 2030; • On the financing side, the national efficiency program for multi-family buildings provides grants of 100%; • The EBRD has been implementing in Bulgaria a programme called Residential Energy Efficiency Credit lines for several years supporting

[54] National Energy and Climate Plan

		homeowners and homeowners associations in improving EE. The scheme is a combination of credit lines to banks and grant payment to the beneficiaries; • Also, the Energy Efficiency and Renewable Sources Fund (financed by the government and other international donors) provides preferential loans to households for EE improvements. New planned measures/priority objectives (NECP): • The renovation of the residential building stock will continue based on the existing programme for multi apartment buildings; • However, there is the intention to move towards lower grant intensive schemes; • Obligation schemes will be updated; • More efforts are foreseen in promoting labelling and certifications for buildings.
Industry	• EE in industry and specifically SMEs has been promoted by grant schemes and financial instruments financed by ESIF and institutions such as EBRD.	Existing measures: • Investment support (ESIF) was provided to large companies under the grant scheme 'Investments in green industry' for projects directly related to the reduction of energy and resource intensity; • Mandatory energy audits of all enterprises which are not SMEs; • Financing is provided through the OP innovation and Competitiveness for EE improvements in the form of grants; • The EBRD programme is also financing SMEs; • The Energy Efficiency and Renewable Sources Fund is mostly targeting SMEs and industry in general; • There is accumulated experience with the use of financial instruments to support investments for SMEs in the last years. From JEREMIE in the previous period to FMFIB instruments in the current period, several financial instruments have supported EE investments. New planned measures/priorities (NECP): • The financing schemes described above are expected to continue however according to interview with FMFIB, a financial instrument under OPIC is also being set up in order to support projects of SMEs in diverse priorities but also including EE (assuming that the financial instrument will not be cancelled due to the COVID crisis).
Public Sector	• More than 2000 buildings are targeted by support measures; • A small portion of public buildings have energy certifications and only 150 buildings meet the minimum energy requirements.	Existing measures: • Bulgaria has developed a list of buildings to be renovated and the respective energy savings foreseen; • The owners of these buildings (respective ministries or public bodies) are under scrutiny to follow the annual renovation obligations; • Financing is available for municipalities through the OP Regions in Growth in the form of grants; • Also, the national entity called FLAG specializes in providing loans to municipalities including for EE projects. New planned measures/priorities (NECP): • Efforts will continue with the renovation of the building stock; • Since recently, a financial instrument is also being implemented through FMFIB with ESIF from OP Regions in Growth; • FMFIB is expressing the conviction that more financial instruments will be used in the next period to support the renovation of public buildings.

Market failures, main issues and barriers to investment

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The financial crisis affected all stakeholders and recovery remains slow; • ESCO have liquidity problems.	• Limited ESCO market.	• Financial instruments in EE have been implemented in the previous and current programming periods with increasing awareness in the market.
Residential Sector	• One of the highest rates of non-performing loans in the EU which includes mortgages; • High poverty rates in the country implying liquidity constraints for families; • Limited access to bank finance for families already in debt; • High transaction costs and lack of delivery mechanisms for thermal refurbishments[55].	• Poor organisation of home owners associations in multi apartment buildings and inability to make collective decisions; • According to the relevant regulation, 67% of apartment owners need to agree to form an association and 100% to conduct a renovation; • Inherited mentalities to disregard for maintenance in multi apartment buildings[56]; • Very high percentage of single family houses in rural areas where wood is the predominant heating method; • Low awareness of the benefits of EE; • High rate of mixed buildings with residential and non-residential occupancies; • Lack of properly functioning ESCO market.	• There is no implementation experience in the sector with dedicated financial instruments due to availability of grant programmes; • Implementing an financial instrument for residential sector would require an update of the regulation regarding the obligations of home owners and the framework related to home owners associations; • Technical support would be necessary to support the renovations of multi apartment buildings. The lack of such support in relevant grant programmes was the cause of low quality or less ambitious renovations in several buildings[57]; • Financial instruments could support innovative financing solutions (e.g. ESCO model), not developed in the residential sector also due to the reluctance of banks to finance them (mainly due to risk).
Industry	• 92% of companies are micro companies with very limited access to finance; • High corporate debt[58]; • ESCO companies face serious liquidity problems; • Banks requesting high collateral.	• Lack of information on EE and low awareness on the impact of EE; • Limited access to skilled workforce[59] • High percentage of companies are in the service sector rather than manufacturing; • Limited access to new best practises in EE. Outdated technology; • Small size of projects with high transaction costs.	• An financial instrument is currently being set up though FMFIB with funds from OPIC which will focus on SME financing with a component of EE; • There is already accumulated experience in the country in implementing financial instruments for SMEs and large companies; • Dedicated financial instruments for EE could also support the development of the EPC model in the industry sector and in the business sector at large.
Public Sector	• Regulatory limits to borrowing capacity of municipalities and other public entities prevent from investing in EE related measures in forms different from grants.	• Political instability and often change of ministers.	• Lists of buildings requiring renovations are available and could serve as a potential pipeline for a financial instrument; • Further technical support would be required to help prepare this pipeline; • An financial instrument is already available targeting EE in public buildings through FMFIB

[55] World Bank , Bulgaria national Residential Energy Efficiency Programme Phase 2, 2018
[56] World Bank , Bulgaria national Residential Energy Efficiency Programme Phase 2, 2018
[57] World Bank , Bulgaria national Residential Energy Efficiency Programme Phase 2, 2018
[58] Ministry of Finance, Ex-ante assessment for the OP Innovation and Competitiveness 2014
[59] Ministry of Finance, Ex-ante assessment for the OP Innovation and Competitiveness 2014

			while experience has also been gained through JESSICA and FLAG; • Financial instruments could support the development of the EPC model in the public sector, providing technical support and financial support both directly to Public Sector Entities (e.g. municipal lending) and to private or public-private entities (loans and/or equity financing).

ESIF resources and existing financial instruments

Bulgaria has been allocated **EUR 9.88bn** in ESIF (total budget with national contribution EUR 11.73bn) in the current programming period 2014-2020. The ESIF funds are implemented through 10 national (thematic) programmes. The main OPs relevant to EE in buildings are the OP Innovation and Competitiveness (OPIC) with a budget of EUR 1.18bn, the OP Regions in Growth (OPRIG) with EUR 1.3bn and to a lesser extent the OP Environment (OPE) with EUR 1.5bn[60].

For **low carbon economy**, circa EUR 1.18bn has been allocated. However, other thematic objectives (TO) are also relevant to EE such as TO3-competitveness (EUR 1bn), TO5-promoting climate change (EUR 450m), TO6-Promoting resource efficiency. In total, the resources allocated for activities in EE correspond to EUR 412m[61].

Bulgaria has been accumulating experience in the implementation of financial instruments in recent years. In the previous programming period JEREMIE and JESSICA were successfully implemented in the areas of SME financing and urban development. These instruments were managed by the EIF and the EIB and managed to generate reflows (currently reinvested in legacy funds). In addition to the ESIF instruments, financial instruments were also been implemented with national funds through state owned promotional entities such as the Bulgarian Development Bank, the National Guarantee Fund and FLAG (supporting municipalities). This experience lead to the creation of the Fund Manager for financial Instruments in Bulgaria (FMFIB) which is currently implementing all ESIF financial instruments.

In the current programming period there have not been any dedicated financial instruments for EE in buildings. However, there are two instruments with a targeting which covers this aspect:

Under OP Regions in Growth, the sub funds of the Urban Development Fund mentioned above have included in their investment strategies the potential to finance potential projects in EE for single family houses and student dormitories. So far, no projects have been financed, however according to FMFIB, 2 projects are under elaboration.

Under OP Innovation and Competitiveness, a guarantee scheme has been launched in November 2019. The purpose of this scheme is to support SMEs in their investment projects including improving their EE performance. According to FMFIB, the loans generated by the guarantees in the specific priority could reach EUR 200m. It is also foreseen that the first 161 companies to receive such loans will also benefit from a grant to cover costs for the energy audit. Currently, FMFIB is in the process of evaluating proposals received from 4 commercial banks that are interested in participating in the scheme.

[60] European Commission-European Structural and Investment Funds-Bulgaria factsheet
[61] Data provided by DG REGIO based on an analysis of fields of intervention

Investment needs

The final NECP is outlining the investment needs related to achieving the objectives, confirming the figures that were provided to the EIB team by the Ministry of Energy during a meeting on 04.02.2020.

Investment needs (EUR m)	2021 - 2025	2026 - 2030	2021-2030
Industry	829.36	806.15	1,635.51
Residential	5,523.30	6,308.62	11,831.91
Services	2,216.95	2,023.33	4,240.28
Transport	3,677.95	5,365.29	9,043.24
Non-energy	141.66	91.84	233.50
Total	**12,732.24**	**14,713.47**	**27,445.71**

Electricity only plants	1,141.50	11,780.01	12,921.51
CHP and heat plants	92.08	56.06	148.15
Storage plants	-	620	620
Power to X plants	-	3.45	3.45
Grid investments	747.99	839.04	1,587.03
Total	**1,981.57**	**13,298.56**	**15,280.13**
Grand Total	**14,713.81**	**28,012.04**	**42,725.85**

The final NECP provides an additional breakdown of investment needs for EE improvements for households and the service sector as per below

Investment needs (EUR m)	2021 - 2025	2026 - 2030	2021-2030
Households			
Equipment	5,289.37	5,285.39	11,274.76
Direct investment in efficiency	233.93	323.22	557.15
Total	**5,523.30**	**6,308.62**	**11,831.91**
Services			
Equipment	2,133.42	1,968.26	4,101.68
Direct investment in efficiency	83.53	55.07	138.60
Total	**2,216.95**	**2,023.33**	**4,240.28**
Grand Total	**7,740.25**	**8,331.94**	**16,072.20**

Cyprus

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Draft and final version of the National Energy and Climate Plan of Cyprus;*
- *EC assessment of the draft National Energy and Climate Plan of Cyprus;*
- *Assessing the potential use of financial instruments in Cyprus, EIB, 2017;*
- *Joint Research Centre, European Commission, 'Long-term strategy for mobilizing investments for renovating Cyprus national building stock' 2017.*

Context overview

Cyprus has one of the smallest populations in the EU of about **875,899inhabitants** (0.2% of the EU 27). The population of the country has increased in the last 10 years (2008–2018) by 11.32%, however the pace of this increase has been reported as slowing down in the last 5 years (decrease of -0.19 in the last 5 years)[62].

The country underwent a considerable economic slowdown during the 2008-2014 crisis. The banking system of the country was heavily exposed to Greek government bonds which lead to a radical restructuring of banks and to a haircut on all bank accounts. As a result, GDP per capita reduced between 2008 and 2014 by 17%[63]. Through an intensive reform programme, the country was able to recover and report impressive growth rates (2018 growth rate of 3.9%[64]), and GDP per capita increased in the last 5 years (2018–2013) by 16.5% almost reaching pre crisis levels.

Final energy consumption in Cyprus in 2018 was 1.86Mtoe (0.2% of the EU 27 consumption) and seems to have been influenced by the economic crisis. More specifically, consumption fell steadily between 2012 and 2016, only to recover in the last 3 years. As a result of recovery, energy consumption reached the 2006 levels, in 2017.

- **Consumption per capita** (2.15toe/person) is in line with the EU average (2.2 toe/person) however in the last 10 years (2008 – 2018), it has decreased much more sharply (15.2%) than the EU27 average (-6.1%)[65];
- **Energy productivity** (GDP over the gross available energy) in 2018 was 7.12 Euro per Kg of oil equivalent (close to the EU average), showing a moderate reliance on energy to generate GDP. This can be explained by the fact that Cyprus is not an industrial country, with the economy being more dependent on the service sector. It is however important to note that the country is heavily dependent on oil imports from third countries;
- **Sectors** contributing to final consumption are: Transport (931 toe), households (326 toe), industry (213 toe) and services (225 toe).

[62] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[63] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[64] https://ec.europa.eu/info/sites/info/files/economy-finance/ecfin_forecast_summer_10_07_19_cy_en.pdf
[65] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

	Overview	Consumption	EE
Residential Sector	• Stock of dwellings[66] is 361.000 (second smallest in EU27), circa 40% built before 1981 and 54% between 1981 and 2006[67]; • From the residential dwellings, 120.000 are single houses, 65.000 are semi-detached houses, 110.000 are row houses and 8.000 are other form of houses such as back yard houses[68]; • 67% of residential houses are occupied by owners and large part (78%) is located in coastal areas.	• FEC in the residential sector in 2018was 337TOE (0.14% of EU27) or 18% of the national consumption[69]; • Consumption per dwelling is 0.95 toe (32% lower than EU average)[70]. A characteristic of energy use in households is the predominant use of kerosene central heating systems in urban and rural areas. The use of gas is almost non-existent; • A positive characteristic is the extended use of solar panels for the heating of water (84% of single houses and 81% or apartment buildings in urban areas); • A challenge regarding the consumption is the use of electricity almost exclusively for cooling of households.	• During the period 2000-2015, consumption per dwelling has been volatile. It increased in the late 2000s due to the greater availability of electric cooling systems, while consumption decreased during the crisis years; • At the same time the number of dwellings has remained at same levels; • The EE potential of the residential sector remains untapped since energy demand could be reduced by 84%; • 50% of buildings remain without insulation[71]; • 40% of residences use air conditioner and electric heating appliances instead of more efficient central cooling or heating systems[72];
Industry	• In 2013, the occupied non-residential building stock was composed of 30.000 buildings with a floor area of 9m of m2; • 2m of m2 of floor area correspond to hotels (in coastal and non-mountainous areas, about 800 buildings); • Cyprus is primarily a service based economy focusing on the hospitality sector (accommodation, restaurants and taverns); • From the total floor area, office buildings	• Industry and services are responsible for approximately 504 toe of energy consumption; • Hotels have the highest energy needs among the buildings in the industry and services (including the public buildings); • The highest energy need of hotels is related to cooling due to seasonal aspect of tourism; • Heating is predominantly covered through the use of kerosene (oil); • 85% of energy for water heating is covered by the use of solar panels. However, the use of renewables in other forms is almost non-existent.	• The EE potential in hotels and the service sector in general is very high (this assessment is based on qualitative aspects such as the high percentage of houses lacking proper insulation-50%- and the high dependency of buildings on oil and electricity for heating and cooling); • Out of 2m of m2 of floor area that correspond to hotels, more than 1.5m were built before 2006 with low EE standards.

[66] CYSTAT, Statistical office of Cyprus
[67] Joint Research Centre, European Commission, 'Long-term strategy for mobilizing investments for renovating Cyprus national building stock' 2017
[68] Joint Research Centre, European Commission, 'Long-term strategy for mobilizing investments for renovating Cyprus national building stock' 2017
[69] EUROSTAT; Final consumption - other sectors - households - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[70] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[71] Joint Research Centre, European Commission, 'Long-term strategy for mobilizing investments for renovating Cyprus national building stock' 2017
[72] Assessing the potential use of financial instruments in Cyprus, EIB, 2017

	represent 39% and hospitality sector 25%[73].		
Public Sector	• From 9m of m2 of total floor area (of non-residential buildings), schools represent circa 1.2m of m2 (circa 900 buildings), public government buildings circa 1.9m (1087 buildings) and hospitals circa 400k.	• Schools and public buildings have the second highest energy needs after hotels.	• Same as the industry and service sector, the public buildings have been built before 2006 and have a large potential for improvements in EE; • 86% of heating for schools is conducted through kerosene fuelled heating systems.

EE targets, measures in place/proposed

Cyprus is implementing a number of policies up to 2020 which include legislative and training measures. These measures are complemented by a set of financing schemes including grant schemes and financial instruments. The NECP is also outlining an ambitious set of measures for the period 2021-2030. The final version of the NECP as compared to the January 2019 draft, has presented some more ambitious targets based on improved macroeconomic forecasts (produced prior to the COVID outbreak), but also on the belief that the foreseen measures (including a stronger penetration of natural gas in the energy mix of the country after 2021) will lead to a more efficient energy consumption in the coming years. However, a major challenge for Cyprus remains to increase the share of renewable energy sources in the energy production and consumption, which are still underexploited.

EXISTING POLICIES

Under the **existing policy measures**, final energy consumption is expected in the NECP (produced prior to the COVID outbreak) to remain the same between 2017 and 2020, while the objective for 2030 has been re-evaluated in the final version of the NECP forecasting a slight decrease.

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy cons	2.5	2.5	2.4
Final energy cons	1.9	1.9	2.0

In order to achieve the objectives set for EE, Cyprus is implementing measures covering the residential sector, the industry sector with a focus on SMEs and public buildings. Some of the measures relate to improvements in legislation for topics such as defining audit requirements, regulating the audit market, setting technical qualifications for buildings, setting efficiency standards for heating and cooling systems. Several training initiatives are also being implemented in order to certify EE professionals such as energy auditors, ESCOs, and system installers. In order to support these measures several financing schemes and tax motives have been set up as will be outlined in the table below.

NEW POLICIES (2020 – 2030)

Although transport represents 40% of the energy demand, the priorities for EE savings focus more on buildings. The NECP highlights as of main importance the continuation of generous financing schemes in the form of grants and financial instruments to motivate the renovation of buildings. The government is also examining the introduction of a green tax in order to exert more pressure on owners of less energy efficient buildings. It is important to note that the NECP in the context of the very high dependency of the country on oil imports, is

[73] Joint Research Centre, European Commission, 'Long-term strategy for mobilizing investments for renovating Cyprus national building stock' 2017

setting a very ambitious target to incorporate renewable energy into the national energy mix by 2030. Namely, the target is to increase the share of renewables from 9.9% to 19% by 2030, which is not ambitious, taking account of the high potential for solar energy sources, in particular. In addition, the final NECP version puts a strong emphasis on the penetration of natural gas in the energy mix despite the fact that this was anticipated to take place earlier, and more specifically since 2018. The new ambition is that natural gas will start influencing the energy consumption in 2021. The NECP also highlights some horizontal measures such as the introduction of the Energy Efficiency Obligation Scheme which will oblige energy suppliers to trigger energy savings actions on final customer level, and the continuation of all so called soft measures such as campaigns, trainings and workshops to increase awareness and competency in the EE fields. On the financing side, a Fund of Funds (FoFs) is being set up with the purpose to provide soft for EE projects targeting residential, SMEs and public buildings. The FoFs will be managed by the EIB and according to the NECP should continue to operate also with funds from the next programming period.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• 91% of buildings correspond to residential use (58% of total building surface)[74]; • Residential buildings have a vast potential to improve EE both for heating and cooling; • For water heating although solar panels are widely used for many years, their replacement and update is required.	<u>Existing measures:</u> • Legislation defining the compulsory issuing of energy performance certificates for new buildings but also buildings that are sold or rented; • Compulsory inspection of heating systems with boiler; • Modern legislation for the use of ESCOs in EE; • Legislation regulating auditing in buildings; • With national funds, grant scheme for the replacement of old solar panels for water heating; • Grant schemes for the insulation of roofs and for conducting energy audits • Reduced VAT for retrofitting of households; • Support scheme for installation of systems fuelled by biomass/biogas for self-consumption; • Measures to fight energy poverty with incentives for vulnerable consumers to install photovoltaics; • Support scheme 'solar energy for all'; • ESIF grant scheme for upgrade of households with second phase of the scheme being announced in 2018 providing grants for households and multi-family buildings ('Save and upgrade'); • ESIF grant scheme targeting households and supporting the replacement of solar heating systems for domestic hot water. <u>New planned measures/priority objectives (NECP):</u> • Supporting households through financing schemes for EE improvements will remain the first priority in the period 2020-2030; • Programmes with a fast market uptake focusing on roof insulation, heat pumps and solar panels, will remain a priority; • Linking these initiatives with an obligation scheme is also considered; • Renovations of residential buildings to be supported by the ESIF FoFs.
Industry	• Cyprus being predominantly a service based economy, the policy priorities seem to be on SMEs and especially tourism and the food industry.	<u>Existing measures:</u> • Legislation that defines the technical requirements for near zero emission buildings; • Legislation defining auditing requirements in industry;

[74] Assessing the potential use of financial instruments in Cyprus, EIB, 2017

		• Financing scheme for renovation of hotels; • Compulsory inspection of large air conditioning systems; • Grant scheme for the renovation of buildings under ESIF ('save and upgrade for businesses'). <u>New planned measures/priorities (NECP):</u> • Tailored initiatives will be designed to focus on tourism and the food sector; • In the agricultural sector, more effort will be put on promoting the use of renewables; • Additional space 'allowance' of 5% beyond the formal rate for new buildings targeting an energy class A; • The ESIF FoFs envisaged to target SMEs.
Public Sector	• Measures related to grant schemes are already implemented for public buildings.	<u>Existing measures:</u> • Introduction of targeted EE measures for schools; • Legislation that defines the technical requirements for near zero emission buildings; • Compulsory inspection of large air conditioning systems; • In the context of 2 INTEREG programmes between Cyprus and Greece, 11 municipal buildings are in the process of being renovated; • AN ESIF pilot scheme has been set up for combined heat and power generation in public and semi-public buildings. <u>New planned measures/priorities (NECP):</u> • The priorities during the period 2020-2030 will be on hospitals; • The ESIF FoFs also to target public buildings.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Cyprus is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The financial crisis affected all stakeholders and although recovery was swift, the crisis has left credibility problem in the financial services market; • The banking sector is recovering but still financing is in a stale condition in the market. The new COVID triggered recession could have negative impacts in this respect; • Lack of experience of financial institutions with EE.	• Very limited ESCO market; • Very high energy intensity of the economy; • High fragmentation of market stakeholders in the energy and renovation markets; • Lack of standardization in the energy sector and the ESCO market.	• Very limited experience overall on the use of financial instruments.
Residential Sector	• Households are still recovering from the crisis and the bailout programme of the banks that lead to a haircut on savings, moreover the new economic crisis	• 90% percent of residential houses are occupied by owners, however almost 20% of houses are secondary homes;	• There is more limited experience in the sector with financial instruments due to

	triggered by the COVID outbreak, could deteriorate further households economic conditions.	• Lack of trust of home owners regarding ESCO companies; • Legal issues from tenancy laws regarding energy services; • Low awareness for the benefit of EE improvements.	availability of generous grant programmes.
Industry	• Predominance of SMEs in the market which by default have limited access to finance.	• Very high dependency of hotels in electricity to generate cooling systems.	• Tourism is defined as a priority of the new loan fund to be set up with ESIF (see details in the next section).
Public Sector	• Limited public resources during the crisis years, the new government deficit, that will be generated to face the COVID crisis will deteriorate further the national budget.	• Political priorities during the crisis years were focused on fiscal recovery and this could be the case also to face the new COVID crisis; • Procurement hurdles for energy efficiency services for the public sector.	

ESIF resources and existing financial instruments

Cyprus has been allocated **EUR 899 m** in ESIF in the current programming period 2014-2020. As part of the OP 'Competitiveness and Sustainable Development', EUR 133.3m have been allocated to TO4 'supporting the shift towards a low-carbon economy in all sectors', including for the promotion of low-carbon strategies for sustainable urban mobility. As already described above, several grant schemes (financed through ESIF and national funds) have been implemented targeting SMEs, households and government buildings.

An ex-ante assessment was conducted for the use of financial instruments in Cyprus. The analysis identified the need for a Funded Loan Instrument in the areas of EE and renewable energy to address both the private (SMEs, households), and public sector (e.g. general government, local authorities).

Following the recommendations of the ex-ante assessment, a funding agreement was launched between the EIB and the responsible managing authority for the implementation of the dedicated financial instrument. Cyprus appointed the EIB to manage and operate the instrument and its respective Fund.

The Cyprus Energy Fund will primarily comprise two sources of funding, namely:

- ESIF 2014-2020 and national co-financing (EUR 40m), and
- Additional national contributions sourced from an EIB sovereign loan (EUR 40m).

In addition, the Financial Intermediaries to be selected by the Fund Manager (through which the Instrument will be deployed on the ground) are also expected to contribute a further amount of EUR 40m, raising the total Fund size to EUR 120m.

The EIB is currently evaluating the proposals submitted during the Call for Expression of Interest on behalf of the Financial Intermediaries (ended in February 2020) and it is expected that within 2020 the selected Financial Intermediaries will have the instrument available to the final recipients.

Investment needs

The NECP provides the following estimates for investment needs required to achieve the 2030 objectives (thus the figures below are estimated needs for the period 2020-2030):

- Energy Efficiency renovations for residential and commercial buildings EUR 715m;
- EE renovations for industry EUR 77m.

The NECP does not specify in the relevant section about investment needs what the foreseen investments in public buildings are. However, in the relevant section where the measure are outlined, there is an estimate for EUR 70m for the renovation of selected government and municipal buildings.

Czechia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Draft version of the National Energy and Climate Plan of the Czech Republic;*
- *EC assessment of the draft National Energy and Climate Plan of the Czech Republic;*
- *Final version of the National Energy and Climate Plan of the Czech Republic;*
- *Odysee-mure database;*
- *EU Energy Poverty Observatory; Member State Report Czech Republic;*
- *JRC; Science for Policy Report, Accelerating energy renovation investments in buildings. 2019;*
- *JRC; Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies. 2016;*
- *European Court of Auditors; Allocation of Cohesion policy funding to Member States for 2021-2027. 2019;*
- *Ministry of Regional Development, Housing in the Czech Republic in Figures, August 2018;*
- *European Court of Auditors, Energy efficiency in buildings: greater focus on cost-effectiveness still needed, Special Report 11. 2020;*
- *EC; Spring 2020 Economic Forecast; May 2020;*

The following interviews were conducted:

- *ČMRZB;*
- *State Environmental Fund;*
- *Komerční Banka;*
- *Ministry for Industry and Trade;*
- *Šance pro budovy – Association of energy efficiency construction trade associations;*
- *APES – ESCO association;*
- *DG REGIO – Czech desk.*

Context overview

Czechia has about **10.6m inhabitants** (2.4% of EU27). Over the last 10 years, the population increased by 2.6%. Czechia shows uneven population development with an increase in Prague and its surrounding and a decline in the former coal mining and rural areas[75].

Real GDP per capita is about **EUR 17,600** (64% of the EU27 average) and has grown by 14% over the last 10 years[76]. Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Czechia will suffer a recession in 2020 with the gross domestic product **(GDP) expected to contract by 6.2%,** before rebounding and grow by 5.0% in 2021. The **unemployment rate** is expected to increase from 2.0% (2019) to 5.0% (2020) and it is expected to slightly reduce in 2021 (4.2%). To support the national economy a public fiscal stimulus will be deployed, with the **Government deficit** expected to reach 6.7% of 2020 GDP and to remain high in 2021 too (4%). Due to the combined impact of the decrease of the GDP and the

[75] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[76] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

increase in the government deficit, the **debt/GDP ratio is expected to reach 38.7% in 2020** (it was 30.8% in 2019) and to remain at a similar level in 2021 (39.9%).

Final energy consumption (FEC) in 2018 was 25.3 Mtoe (2.6% of the EU27) and it has **decreased by 3.2% since 2005,** while at the EU27 level it decreased by 4.9%[77]. The reduction of consumption in the industry sector is partly off-set by increased consumption in the transport sector. Energy consumption in households remained on the same level[78].

Energy consumption per capita (2.4 toe/person) in 2018 was 7.6% higher than the EU average (2.2 toe/person) and it decreased by 6.9% since 2005 (while at the EU27 level it decreased by 7.4%)[79].

Energy productivity (GDP over the gross available energy) in 2018 was 4.3 Euro per Kg of oil equivalent (53% of the EU average), showing a strong reliance on energy to generate GDP (this index increased by 19% in the last 5 years)[80].

Sectors contributing to FEC are: households (28% of total), industry (26%), transport (26%) and services (12%)[81].

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 4,327mln dwellings(total floor area 350mln m²): ○ 55% of the dwellings are in multi-apartment buildings and 45% in single family buildings[82] .	• In 2017, households' energy consumption was 7.0 Mtoe (2.9% of EU27) [83]; • Consumption per dwelling is 1.7toe (22% higher than EU average); • Circa 3% of households in Czechia are reported not be able to keep their homes adequately warm[84].	• For the period 2000-2016, 1.74 Mtoe energy savings were achieved in households[85].
Public Sector	• Central government institutions own and occupy 772 buildings (above 250 m²) and surface area of 2.400mln m². 586 buildings with 1.6mln m² are not energy efficiency (rating lower than C)[86].	• In 2017, energy consumption in services (including public administration) was 3.1Mtoe, decreasing over time (-0.9% from 2008 to 2018 compared to -0.9% in EU27)[87].	• From 2014-2018 energy savings of 1.4ktoe where achieved in central government buildings (98% of commitment from EPBCD) with an investment CZK 645 mln (EUR 25.8mln[88])[89].

[77]EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[78] National Energy and Climate Plan. 2019
[79]Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[80]EUROSTAT; Energy productivity [T2020_RD310]; extracted on 13/02/2020
[81]EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[82] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017
[83] EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[84] EU Energy Poverty Observatory; Member State Report; Czechia. June 2019
[85] Odyssee database
[86] Long-term Strategy for Renovation of Building 2017
[87] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[88] An exchange rate of EUR 1 = CZK 25 is used throughout the document.
[89] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017

Industry	• Industry accounts for 37% of real GDP (2017)[90].	• In 2017, industry consumed 6.7Mtoe (2.6% of EU27) with an increase by almost 16% in the last 10 years[91].	• During the 2008 – 2014 period, energy savings of 0.87Mtoe were achieved (incl.-ETS sector) [92].

EE targets, measures in place/proposed

Several policy measures are in place. Under the Energy Efficiency Directive Article 7, Czechia has chosen alternative measures to achieve savings instead of obligations on energy suppliers. Public intervention is based on investment grants from both the **EU funds** (ERDF, Cohesion Fund) and national resources as well as financial instruments. Beside this there is also a range of regulatory measures. For the **2020-2030 period**, the NECP envisages the continuation of some existing measures and the implementation of new measures.

EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy consumption	40.1	44.3	41.4
Final energy consumption	25.5	25.3	23.6

The overall **primary energy** savings envisaged in the draft NECP compared to the potential identified are considered to be **of low ambition,** and for **final energy consumption** of **modest ambition** by the EC. The numbers have not changes substantially in the final version.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• From 2020, all new buildings to be near Zero Energy Buildings (nZEB)[93]; more specific requirements will come into force in 2022. <u>In 2021–2030 is expected:</u> • The estimated annual savings of the measures proposed are 310.5 ktoe for single family houses and 119.4 ktoe for multi-apartment buildings.	• **New Green Savings** (2014-2020) **grants** for energy efficiency and other environmental measures in single family buildings and multi-apartment buildings (in Prague only). In total CZK 17,200 million (EUR 688 million) are allocated. It is financed from revenues from carbon allowances and managed by the State Environmental Fund (SEF); • **Panel 2013+ soft-loans** for complex renovation of pre-fab multi-apartment buildings. The State Housing Development Fund (SHDF) has allocated CZK 4,500 million (EUR 180m) to the scheme[94]; • **Integrated Regional OP (IROP 2014-2020)** – grants for renovation in the residential sector (multi-apartment building). EUR 298m have been allocated to the programme of which 55% have been invested so far.[95] An interest rate free **loan financial instrument** has been set up with the SHDF in 2020 for energy efficiency measures in multi-apartment housing outside of Prague with minimum 20% energy savings. It can be combined with ESIF grants[96]; • **Boiler replacement programme** SEF is managing grants for replacing old boilers with less polluting heat resources. The programme is mainly aiming at reducing air pollution but has also energy efficiency effects[97];

[90] Central Intelligence Agency, the world fact book
[91] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[92] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017
[93] The requirement of 'nearly zero energy building' is a requirement coming from the Energy Performance in Buildings Directive (EPBD)
[94] State Housing Development Fund http://www.sfrb.cz/programy-a-podpory/program-panel-2013/
[95] Information from DG REGIO
[96] State Housing Development Fund,
[97] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017

		• **The Reasonable Energy Savings Programme** *(available for all sectors)* **–** is promoting best practise and of energy efficiency investments. It aims at increasing quality of projects[98]; • **EFEKT** *(available for all sectors)* promoting awareness of energy efficiency investments in the broader public and measures of energy consultancy[99]. New planned measures/priority objectives in the NECP: • Continuation of existing measures; • Information campaigns; • Banning low emission class boilers; • Upscaling of **New Green Savings** with resources of the **Modernisation Fund**; • Improvement of housing conditions and EE, combined with revitalisation of degraded areas. To be supported by using national and **EU funds**. Support to residential buildings from ERDF shall come from OP Environment in the 2021-2027 period.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • NZEB from 2020 for government buildings. More specific requirements will come into force in 2022.	Existing measures: • **OP Environment** – **grants** for energy efficiency in public buildings from ERDF and CF. Total allocation are EUR 549m 135 projects are realised and paid to beneficiaries. In terms of output indicator 22% of the target for 2023 have been achieved. And **loans** for energy efficiency in public buildings. Allocation is EUR 19m. Both schemes are managed by SEF;[100] • **New Green Savings 2014-2020** is providing grants for public building renovation and can be used to co-finance projects receiving grants from OP Environment or providing grants to OP Environment loans;[101] • **EFEKT 2 Programme –** investment grants for small-scale projects primarily in municipalities such as street lighting or projects realised via EPC; [102] • **OP Prague – grants** for energy efficiency, smart energy management and renewable energy use in public infrastructure and in public buildings. The grants are complementary to OP Environment grants, both are managed by SEF; New planned measures/priority objectives in the NECP: • **Grant support from OP Environments** is expected to focus on public entities not covered by central government (state budgetary organisations) such as regions, municipalities, universities, hospitals. Central government entities should receive support from New Green Savings; • A **financial instrument for Energy Performance Contracting (EPC)** is currently under development by ČMZRB with support from the EIB. The instrument aims at providing long-term financing to projects with funding from OP Enterprises, Innovation and Competitiveness [103]. ČMZRB has applied for ELENA support to finance project preparation cost of the programme.

[98] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017
[99] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017
[100] Information from DG REGIO
[101] State Environmental Fund, https://www.novazelenausporam.cz
[102] Ministry of Industry and Trade, https://www.mpo.cz/cz/energetika/dotace-na-uspory-energie/program-efekt/efekt-2017---2021-aktualni-vyzvy-na-rok-2019--223152/
[103] https://www.fi-compass.eu/event/5384/implementation-financial-instruments-czech-republic-and-slovakia

Industry	• No sector specific targets identified.	Existing measures: • **OPEIC -** for support of energy savings for enterprises. Allocations to instrument are EUR 1.1bn. Under the **grant scheme** 412 projects have been supported so far and EUR 214m EUR have been paid to beneficiaries. Under the **loan scheme** EUR 74m have been allocated. The instrument offers preferential loans, in combination with support for energy audits and an interest rate subsidy. Managed by ČMZRB [104]; • **The ENERG Programme** provides soft-loans to enterprises located in Prague. Managed by ČMZRB;[105] • Energy audits and energy management obligation. New planned measures/priorities in the NECP: • Continuation of existing measure and support from **New Green Savings**.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Czechia are briefly reported in the following table. The information is based on interviews with various stakeholders and the National Energy Action Plan 2017[106].

	Financial issues	Non-financial issues	Financial instrument implications
Across all sectors	• The **upfront investment cost** for energy efficiency building material and the cost of works are very high; • There is a **several national or local (Prague) initiatives for energy efficiency measures** using grants or revolving forms of support from national and EU resources.	Continued **shortage of highly qualified and reliable staff** to deliver quality construction works.	
Residential Sector	• Many house owners have a **lack of own resources**; • **Very long repayment periods** of investments; • **Lending to housing associations** is not attractive for commercial banks; • Banks are comfortable lending for EE measures from own resources through consumer loans against the **credit worthiness of the client** and not the investment, This makes the access to bank financing difficult for low income or highly indebted households and in general also for long-term investments; • Lending to housing associations is not attractive for commercial banks, as they are lending to several individuals, with individual payment risk and high administrative cost. This is only partly compensated by the risk coverage from financial instruments.	• **Low awareness** and understanding of EE measures among households; • High **administrative burden** to receive grants; • Most **measures are undertaken** without State support, resulting in generally shallow EE measures, e.g. only 30% of projects for thermal insulation and 6% of heat pumps received State support; [107] • **Lack of information** among building owners on the benefits (financial and non-financial) of energy efficiency measures.	• **Simplifying existing grant/financial instrument combination** scheme • Reducing and simplifying the number of available support schemes

[104] Information from DG REGIO
[105] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017
[106] National Energy Efficiency Action Plan for Czechia, 2017
[107] Update of the National Energy Efficiency Action Plan of the Czech Republic, 2017

Public Sector	• Public entities have little interest in taking loans for EE measures, despite their low level of debt.	• **Low level of political commitment** on central government level to renovation of central government's own buildings, in contrast to regions and cities; • **Budgetary law** prohibits the use of third party financed EPC projects in the central government sector; • **Lacking familiarity and perceived complexity of procurement** for EPC projects.	• **Project development assistance** for example through OP resources or ELENA.
Industry	• A combination of low profitability, low attractiveness of bank loans, and limited own resources have resulted in companies being largely unwilling to implement EE improvements in their production processes; • Financial instruments for energy efficiency are often provided by other institutions than commercial banks or leasing companies. For enterprises it is not attractive to do borrowing from several different institutions with different administrative procedures; • As EE investments are not the core budgeting priority for many companies. Companies do not have are no sufficiently-developed projects or long-term project portfolios; • Difficulties to combine ESIF financial instruments and grants; • Due to the limited experience in EE investment, banks tend to consider them high risk and are either not willing to provide project finance or offer it at high interest rates, limited maturity of loans, and high collateral requirements.	• **Little experience and limited knowledge** about energy efficiency in the manufacturing industry; • Limited response to support schemes; • Industry tends to replace equipment and not undertake energy efficiency measures in production buildings; • **ESCO services in enterprises** are not well known for small and medium sized enterprises.	• **Incentives for energy audits and energy management** in enterprises; • Integrating additional benefits for EE financing in general SME financial instruments.

ESIF resources and existing financial instruments

Czechia benefits from **ESIF funding of EUR 23.9 billion** (circa EUR 2.270 per person) during the 2014 – 2020 period. For the **low carbon economy, EUR 4.3bn** has been allocated (EUR 3.8bn from ERDF; EUR 0.5bn from CF and EUR 13m from EAFRD)[108]. The **EE related support** comes from four Operational Programmes and it is estimated to be **EUR 1.46bn**[109]. Support is provided for EE measures mainly for public buildings and to a lesser degree the residential sector and enterprises (incl. large enterprises).

In the 2014 – 2020 period, Czechia contributed so far **EUR 479.07m**[110] **of its ESIF** (circa 2% of its budget) **to financial instruments** (ERDF only), but several additional financial instruments have been launched recently or are under preparation.

There are four **ESIF financial instruments for EE** active or in preparation: '**Energy Savings'**, providing loans to SMEs. The instrument provides additionally an interest rate subsidy and support for energy audits. In total EUR 74m was contributed to the instrument managed by the National Promotional Bank ČMZRB. With the

[108] https://cohesiondata.ec.europa.eu
[109] Data provided by DG Regio based on an analysis of fields of intervention
[110] www.fi-compass.eu/financial-instrumentsCzechRepublic

support of the European Investment Advisory Hub, ČMZRB developing an **investment platform for the EPC market**. The aim is to provide preferential long-term financing to EPC projects. The launch is expected in 2020.

SEF has established a loan instrument under OP Environment that provides **preferential loans** combined with grants to **public sector** entities. EUR 19m have been allocated to the instrument that has been launched in 2019. For **the multi-apartment building renovation** sector, a financial instrument has been launched in 2020. A total of EUR 74m is allocated to the financial instrument that should provide long-term preferential loans, with the possibility of combination with grants. With the changes introduced by the omnibus regulation it became possible to directly awarded the State Housing Development Fund with the implementation of the instrument as commercial banks did not show any interest.

Further non-ESIF financial instruments and other sources of financing available for EE are:

- **Czech commercial banks** are comfortable with lending to energy efficiency investments and through the competitive market situation rates are attractive. The three major Czech banks received EIB loans with energy efficiency objectives for on-lending to SMEs.
- The **ENERG Programme** provides preferential loans to enterprises independent of their size located in Prague. Loans are provided for up to 70% of the expenditure and maximum CZK 20m (EUR 800,000) without fees and without collateral. The instrument is combined with a subsidy for energy audits and performance grant.[111]
- **PF4EE –** the commercial bank KB participates in the EU level financial instrument for EE measures in SMEs. The absorption is low because it is not possible to combine the instrument with ESIF grants unlike normal KB lending.[112]

Investment needs

The draft NECP includes estimates for investment needs for energy efficiency at EUR 25.4bn by 2030. EUR 5.7 billion of this are expected to come from national public and ERDF / CF resources in form of grants and financial instruments.

[111] https://www.cmzrb.cz/podnikatele/uvery/energ/
[112] Interview with Komerční Banka

Germany

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan of Germany;*
- *EC assessment of the draft National Energy and Climate Plan of Germany;*
- *Climate Action Programme 2030;*
- *Building Market Brief. Germany. Climate-KIC. 2018;*
- *National Energy Efficiency Action Plan (NEEAP). 2014;*
- *National Energy Efficiency Action Plan (NEEAP). 2017.*

Context overview

As of January 2019, Germany is the most populated country in Europe, with **83.02 million inhabitants** (18.6% of the EU27) and the population has **increased** over time (+1.2% in the last 10 years)[113].

Germany's real **GDP** per capita in 2018 was about **EUR 35,860** (30% higher than the EU27 average) and it increased by 11% in the last 10 years[114]. Germany has a services-oriented economy: 69% of the Gross Value Added in 2015 was contributed by the tertiary sector, followed by industry & manufacturing (28%) and agriculture (1%)[115].

Final energy consumption (FEC) in Germany in 2018 was 215.37Mtoe (21.8% of the EU27) with a 2% reduction compared with **2005,** while at the EU27 level, it decreased by 4.9%[116].

- **Consumption per capita** in 2018 (2.6toe/person) is 17% higher than the EU27 average (2.2 toe/person) and it has decreased by 4% compared to 10 years ago (while at the EU27 level it decreased by 6%)[117];
- **Energy productivity** (GDP over the gross available energy) in 2018 was EUR 9.4 per Kg of oil equivalent (16% higher than the EU average) and it has increased by 17% in the last 5 years[118];
- **Sectors** contribution to FEC: industry (27%), transport (26%), households (26%) and services (13%).

	Overview	Consumption	EE
Residential Sector	• Germany's residential building stock encompasses around 17.1 million buildings and 43.5 million dwellings totalling in about 3,742 million m² of heated floor area[119];	• In 2018, households consumed 55.2Mtoe (22.5% of total EU27 consumption in the residential sector)[120];	• During the period from 2006 to 2016, 4.6 million dwellings were either refurbished or constructed as energy-efficient by design[123].

113 EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
114 EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
115 Building Market Brief. Germany. Climate-KIC. 2018
116 EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
117 Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
118 EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
119 Building Market Brief. Germany. Climate-KIC. 2018 (information reported in residential sector/overview is based on this)
120 EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
123 Building Market Brief. Germany. Climate-KIC. 2018

	• Of the residential buildings, 30% are single-dwelling types, whilst the remaining are multi-dwelling; • Only 46% of residential dwellings are owner-occupied, whilst the remaining 54% are rented by private tenants; • Roughly 63% of Germany's buildings were built before 1979 (prior to the Thermal Insulation Ordinance for buildings).	• Consumption per dwelling is 1.55toe (12% higher than EU average)[121]; • For German households, the energy mix is dominated by gas (37%), followed by petroleum products (22%) and electricity[122] [the electricity mix is dominated by coal (42%), followed by renewables (29%) and nuclear (14%)].	
Industry	• Industry represents circa 30.7% of the national GDP and it employs circa 24.2% of the labour force[124].	• In 2018, industry consumed 57.4Mtoe (23.7% of total EU27 consumption in industry)[125] with an increase of 2% in the last 5 years.	• During 2000-2016, energy savings undertaken in industry were 8.4Mtoe (or 14% of 2000 consumption)[126].
Public Sector	• Non-residential buildings account for 1,678 million m^2 (31% of all buildings): 39% is used by offices, 25% by wholesale and retail trade institutions and 19% for hotels and restaurants[127]; • Public buildings account for circa 20% of the floor area of non-residential buildings and are mainly municipal non-residential buildings (14 % of the non-residential buildings)[128]; • Buildings directly used by the Federal Administration account for only 2% of the floor area of non-residential buildings[129].	• Consumption in services (including also public administration) in 2018 was 29.1Mtoe (22% of total EU27 consumption in services) with a strong reduction compared to 10 years ago (-16.4%)[130].	• The Federal Government made a voluntary commitment to reduce energy consumption and CO_2 emissions in its own buildings (CO_2 should be reduced by 50% by 2020 compared to 1990); • As of 1/1/2019, 2.9 million m^2 of buildings larger than 250 m2) owned and used by the central government not complying with the energy requirements laid down in Art. 5(1) of the EU Energy Efficiency Directive [131].

[121] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[122] Building Market Brief. Germany. Climate-KIC. 2018 (page 18)
[124] Central Intelligence Agency, the world fact book (data refers to year 2017)
[125] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[126] Odyssee database, technical final energy savings
[127] Building Market Brief. Germany. Climate-KIC. 2018 (page 16)
[128] National Energy Efficiency Action Plan; 2014 (page 9)
[129] National Energy Efficiency Action Plan; 2014 (page 9)
[130] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[131] Germany, 2019 annual report in accordance with Article 24(1) of the EED (page 2)

EE targets, measures in place/proposed

Disclaimer: at the time this document was produced, the final version of the National Energy and Climate Plan (NECP) of Germany was not available, therefore the analysis is based on the draft NECP and other policy documents.

Germany has a number of policies in the context of EE and it has recently developed a new package of measures (Climate Action Programme 2030). The draft NECP (developed in 2018) does not yet include these new measures, they are expected to be reflected in the final version of the NECP.

Several policy measures are already in place, covering all sectors and including financial and non-financial schemes. A list of these measures is reported in the following table. The main public source of funding to support EE measures in Germany is the **Energy Climate Fund** (*Energie und Klimafonds*), funded by the federal budget and emissions trading system (ETS) revenues, that for 2019 has planned expenditures for about EUR 4.5 billion[132].

The **Climate Action Programme 2030**[133] has the overall objective to reduce GHG emissions, so that in 2030, emissions will be 45% of 1990 level. Some important measures are envisaged, including: CO2 pricing mechanisms (besides the ETS sectors), the phasing out of the use of coal (by 2038) and the expansion of renewables (to account for 65% of electric power consumed in Germany by 2030). In the following table the main existing and planned measures (under the Climate Action Programme 2030) are reported.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	*14% of all CO2 emissions in Germany (120 million tonnes) come from the building sector. By 2030 this figure must be reduced to 72 million tonnes CO2 per annum*	<u>Some of the most relevant existing measures:</u> • Non-financial measures include the **energy consultation for residential buildings** programme, providing qualified energy consultants to identify the most appropriate EE actions to be undertaken in residential buildings; • The **KfW Energy-efficient Construction Programme**, a scheme from the German state bank KfW, was introduced in 2009. In 2014, 230,000 buildings have been renovated and 110,000 new buildings (about 45% of all new buildings) have been built under this scheme[134]. Between 2016 and 2017 the programme disbursed EUR 2 billion per year[135]; • Since the year 2000, the national **market stimulation program (MAP)** exists, supporting as of today the exchange of up to 1.8 million fossil heating systems with renewable heating systems[136]. Funds disbursed annually under MAP are approximately EUR 320 million[137]. <u>New planned measures/priority objectives (Climate Action programme 2030)</u> Although with limited details, the Climate Action Programme reports the main characteristics of the new planned measures: • **Tax deduction of EE related refurbishment** costs (20% reduction over three years), property owners, regardless their income class, will benefit from this measure; • The **assistance rates of KfW programmes** already in place will be **raised by 10%**; • Old oil and gas **central heating systems will be replaced** with more efficient models or by switching to renewables. A '**replacement bonus**' will be introduced with 40% assistance.

[132] https://www.bmwi.de/Redaktion/DE/Artikel/Ministerium/haushalt-2019.html
[133] The draft NECP does not include the new measures of the Climate Action Programme 2030 (that was still under discussion at the time the draft NECP was submitted). With respect to policy objectives and main new measures, this summary will consider what foreseen in the Climate Action Programme 2030
[134] Building Market Brief. Germany. Climate-KIC. 2018 (page 11)
[135] National Energy and Climate Plan - draft version (page 68)
[136] Building Market Brief. Germany. Climate-KIC. 2018 (page 11)
[137] National Energy and Climate Plan - draft version (page 68)

Industry	*By 2030 industry must reduce its emissions by about half (of the 1990 levels)*	Existing measures: • A number of EE measures - also supported by ESIF resources - have been developed at the regional (Laender) level, including also some financial instruments (more information in the next section). New planned measures/priority objectives (Climate Action programme 2030) Although with limited details, the Climate Action Programme reports the main characteristics of the new planned measures: • A new **one-stop-shop support programme** will be developed (merging and reinforcing 5 existing programmes) in order to promote EE and process heat from renewables in industry; • A **national decarbonisation programme** will be launched, to support the development of climate-friendly production processes in emission-intensive industries; • Measures to support industrial and research-based **battery cell production.**
Public Sector		Some of the most relevant existing measures: • Non-financial measures include **energy consultation for non-residential buildings owned by municipalities programme**, which entails the provision of qualified energy consultants to identify the most appropriate EE actions to be undertaken in buildings (including also information about funding-support programmes); • A number of EE measures for public buildings - also supported by ESIF resources - have been developed at the regional (Laender) level. New planned measures/priorities objectives (Climate Action programme 2030) • No information is provided regarding measures for EE on public buildings (it is expected that the 2020 update of the Long term renovation strategy will include it).

Market failures, main issues and barriers to investment

Germany is the biggest country in Europe in terms of population. However, there are considerable differences among regional states which make it difficult to identify specific issues preventing EE activities. The following table shows some of the most common barriers/issues. The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments are related to: - limited financial resources for EE initiatives; - limited financial returns of EE interventions (in particular for deep renovations). • Considering that circa 54% of dwellings are rented, the incentive split issue (i.e. the payer of EE measures would not benefit from savings) is particularly important.	• Typical non-financial barriers preventing EE investments: - Limited awareness about benefits of EE interventions; - Difficulties, especially in multi apartment buildings (that are circa 70% of the stock of residential buildings), to agree on renovation activities.	• Off-balance sheet financing mechanisms supporting EPC; • Guarantee instrument for commercial banks financing district heating upgrade and extension; • Integrating EE in SMEs and mid-cap financial instruments.
Industry	• Typical financial barriers to EE investments in industry include: - long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities.	• Typical non-financial barriers to EE investments in industry include: - limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	

Public Sector	• Many municipalities in Germany have reached their debt limits and therefore cannot undertake EE measures. In most Laender, EPC is counted into municipal debt[138]; • Many district heating systems need major upgrade or extension. Banks are reluctant to take risk of these long-term projects[139].	• Non-financial barriers to investments in EE in the public sector are usually connected to the lack of competences to manage the procurement process (in particular for Energy Performing Contracts); • Lacking capacities in medium size cities for planning and procuring complex energy efficiency projects.	

ESIF resources and existing financial instruments

Germany, through 47 national programmes, benefits from **ESIF funding of EUR 28 billion**. This represents an average of EUR 345 per person from the EU budget over the period 2014-2020[140].

ESIF support for **EE** has been estimated to account for circa **EUR 1.16 billion**[141].

In the 2014-2020 period, Germany contributed **EUR 1.06 billion[142] of its ESIF** (circa 3.7% of its ESIF budget) **to financial instruments. EE related financial instruments** received circa **EUR 50.95 million**[143], equal to circa 4.4% of EE related support.

Examples of financial instruments operating in the EE sector in Germany are reported below:

- **Bremer Aufbau-Bank (BAB), energy efficiency credit[144]**
  This financial instrument received an OP endowment of EUR 15 million, and it is managed by the Bremen regional development bank.
  Eligible investments include investments in plants and buildings, leading to energy savings of at least 10%.
  Potential recipients include: (i) commercial companies; (ii) freelance workers and all other legal and natural persons who carry out commercial energy efficiency measures; and (iii) energy service providers that provide (energy) services for a third party in the state of Bremen as part of a contracting agreement.
  The financial instrument offers loans covering up to 100% of the underlying investment (normally up to EUR 500,000) with a standard interest rate of currently 0.25% (as at: 27/6/2019); duration according to the useful life of the investment (up to 20 years) and grace period up to 3 years.
- **North Rhine-Westphalia 'heat infrastructure' credit fund[145]**
  This financial instrument received an OP endowment of EUR 80 million, and it is managed by the North Rhine-Westphalia regional development bank. Eligible investments include energy-efficient district heating and cooling networks in North Rhine-Westphalia. Potential recipients include private and public enterprises.
  The financial instrument offers loans covering up to 100% of the underlying investment (from EUR 200,000 to EUR 20 million) with a duration according to the useful life of the investment (up to 30 years) and interest rates between 1% to 5% depending on the borrower and the repayment plan.

[138] Marktanalyse Energiedienstleistungen. Bundesstelle für Energieeffizienz, 2020
[139] Ex-ante Untersuchung: NRW.BANK/EU. Wärmeinfrastrukturkredit, 2016
[140] https://cohesiondata.ec.europa.eu
[141] Data provided by DG Regio based on an analysis of fields of intervention
[142] www.fi-compass.eu/financial-instruments/germany
[143] Data provided by DG Regio based on an analysis of fields of intervention
[144] https://www.bab-bremen.de/foerderung/bab-energieeffizienzkredit-energie-sparen-kosten-senken-635.html
[145]https://www.nrwbank.de

- **Berlin SME Fund (EE compartment)**[146]
  Based on latest available information, this financial instrument is no longer operating.
  This financial instrument received an OP endowment of EUR 40 million, and it was managed by the Berlin regional development bank.
  The financial instrument supported SMEs and individuals performing EE activities.

Although not supported by ESIF, it is important to consider the **KfW Energy-efficient Construction Programme.**

The scheme is managed by the German state bank KfW, and it was introduced in 2009. Houses which met conditions to be an energy efficient house could receive a product combining grant and soft loans to support EE works on existing and new buildings (for EE standards higher than the legally required minimum). Financing is provided to a maximum of EUR 100,000 per building, to a maximum of 100% of the eligible costs. The loan conditions are highly preferential, with a tenure of up to 30 years and an initial grace period. Interest rates can be as low as 1%, depending on market rates, and are then reduced using the government's budget support[147].

Investment needs

The draft NECP does not quantify investment needs; this information is expected to be reported in the final version.

The Climate Action Programme 2030 reports that:

- Between now (2019) and 2023, the federal government is to invest EUR 54 billion in environmentally-friendly infrastructure, technologies and in ensuring that measures are socially balanced;
- By 2030, the combined total funding of […] support instruments earmarked for climate action and the energy transition will be in the three-figure billions.

Pending the final version of the NECP, information about EE investment can be found in the 2018 EIT Climate-KIC study on the building market in Germany[148]:

- The total **market volume of the energy and GHG related building** market including energy sales amounts to **EUR 110 billion per year**;
- More than 60% of this market volume comes from **energy sales** (EUR 68 billion per year), even though electricity sales for household appliances are not included in this figure;
- Circa 24% of the market comprises **buildings envelope works**, that is worth **EUR 27.1 billion** per year (42% related to new buildings, 58% to retrofitting existing buildings);
- Circa 13% of the market comprises **building technologies** that are worth **EUR 14.4 billion** per year (65% related to heating and hot water systems, 35% related to solar and ventilation systems).

[146] https://www.ibb.de/de/foerderprogramme/kmu-fonds-gruendung-wachstum.html
[147] Building Market Brief. Germany. Climate-KIC. 2018 (page 11)
[148] Building Market Brief. Germany. Climate-KIC. 2018

Denmark

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final versions of the National Energy and Climate Plan of Denmark;*
- *EC assessment of the draft National Energy and Climate Plan of Denmark;*
- *Denmark's National Energy Efficiency Action Plan, 2017;*
- *National Energy Agreement, 2018;*
- *Denmark's Energy and Climate Outlook 2019 (DECO19), Danish Energy Agency;*
- *Strategy for energy renovation of buildings, 2014.*

Context overview

As of the beginning of 2019 Denmark has a population of about **5.8mln inhabitants** (1.3% of the EU27) which **has increased** over time (+5.6% in the last 10 years).[149] The population is projected to grow by 6% between 2017 and 2030[150].

Denmark's **GDP** per capita in 2018 was 3rd highest in the EU of about **EUR 48,260** (175% of the EU27 average) and it reported a 5.6% increase in the last 10 years.[151]

Final energy consumption in Denmark is 15Mtoe (1.5% of the EU27) and it has **decreased (-3%) since 2005** (average of the EU27 is -4.9%).[152]

- **Consumption per capita** (2.6toe/person) is **16.7% higher** than the EU average (2.2 toe/person) and it decreased by 8.8% in the last 10 years (while at the EU27 level it decreased by 6.1%)[153];
- **Energy productivity** (GDP over the gross available energy) is 2nd highest in the EU of 14.7 Euro per Kg of oil equivalent – notably higher than the EU average (8.1) – and this index increased by 11.4% in the last 5 years[154];
- **Sectors** contributing to final consumption are: transport (36% of total), followed by households (31% of total) and industry (15% of total)[155].

[149] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[150] National Energy and Climate Plan
[151] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[152] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[153] EUROSTAT; Ratio between: Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[154] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[155] Odyssee database, Country Profile

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings is 2,772,000 (1.5% of EU27)[156]; • 51% of building stock is owned by private individuals[157]; • More than 80% of the stock of detached houses were built before 1979, and • Apartment buildings account for half of homes[158].	• Households are responsible for 4.6Mtoe (1.9% of EU27)[159], and • Consumption per dwelling is 1.7toe (22% higher than EU average)[160]; • Homes accounts more than 70% of energy consumption for heating[161], and • 83% of household energy consumption is used for space heating, the rest for electric appliances[162].	• During 2000-2016, energy savings achieved in residential buildings are estimated in 1.25Mtoe, or 29.6% of 2000 consumption[163].
Industry	• Danish manufacturing industry contributes significantly to the country's economy (industry generated 23% of Denmark GDP[164]).	• Consumption of industry is 2.4Mtoe (1% of EU27) and it has increased (9.8%) in the last 5 years however, it has decreased (-11.9%) in the last 10 years[165]; • The food, beverages and tobacco sector is the main contributor of energy consumption[166].	• During 2000-2016, energy savings undertaken in industry were worth 0.75Mtoe or 25.3% of 2000 consumption, and • The decrease is mainly due to energy savings due to technical improvement of the machineries and processes[167]
Public Sector	• Central government has a total of 9.7mln sqm of building area (8.7mln sqm in buildings which exceeds 250 sqm), and • 84% of central government buildings have an energy-class below the current standard for new-build[168].	• Consumption in services (including public administration) is 2Mtoe (1.5% of EU27) and it has increased (2.35%) in the last 5 years[169].	

EE targets, measures in place/proposed

The Danish National Energy and Climate Plan (NECP) is based on the new Climate Act, the Energy Agreement and the Climate and Air Proposal 'Together for a greener future'. Denmark is a frontrunner within the green energy

[156] Odyssee database, stock of dwellings (permanently occupied) year 2016
[157] Potential heat savings during ongoing renovations of buildings until 2050, Danish Building Research Institute, Aalborg University, 2014
[158] Strategy for energy renovation of buildings, 2014
[159] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[160] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[161] Strategy for energy renovation of buildings, 2014
[162] DECO19
[163] Odyssee database, technical final energy savings
[164] CIA, The world fact-book (data refers to 2017)
[165] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[166] Odyssee database, Country Profile
[167] Odyssee database, technical final energy savings, which excludes savings achieved thanks to economic or behavioural factors
[168] Denmark's National Energy Efficiency Action Plan, 2017
[169] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

transition with a large share of renewable energy in the system, high security of supply and great focus on EE and research and innovation.[170]

The NECP states that on 6 December 2019, the **Danish Government agreed** a new Climate Act (expected to be adopted by the Parliament in Spring 2020) that sets legally binding targets i) to reduce greenhouse gases by 70% by 2030 compared to the1990 level, and ii) **to reach net zero emissions by 2050 at the latest**.

Denmark has been working on energy improvements to its buildings for many years and they have built up a considerable expertise, yet even more investments are needed to meet Denmark's goals.[171]

EXISTING POLICIES

Reduction of energy consumption through increased EE and energy savings has been an important part of Danish energy policy since the 1970s. Since then, Denmark has developed a great expertise in EE, which has made it possible to keep energy consumption largely unchanged in spite of significant economic growth over the years.[172]

EE obligation scheme established since 2006 is the backbone of today's Denmark energy policy under which energy companies in Denmark are required to make large energy savings for consumers. However, to address the criticism of the current policy and to ensure greater impact, Denmark agreed that, the current EE measures will undergo a modernisation process. The current energy saving scheme will expire in 2021, as it has delivered insufficient savings, proven expensive and caused red-tape for consumers and society as a whole. In addition, a significant share of energy saving measures, particularly in households, would have been carried out regardless of the subsidy.[173]

The Danish Government acknowledges that the **current EE measures fall short of reaching energy saving obligations** under Article 7 of the Energy Efficiency Directive (EED).[174]

NEW POLICIES (2020-2030)

During the public consultation process of the final NECP, comments on EE were made by a wide range of respondents. In respect of EE, one of the key issues raised, related to energy savings requirements for all public sector buildings and it was positively noted that the Danish Government was working on a plan for EE in government buildings for the 2021-2030 period. Stakeholders also stressed that there is a need for more financing (both in terms of advisory and investment) for EE in private buildings, as many households lack the knowledge of EE and miss attractive financing options in some parts of Denmark.[175]

The most prominent new energy saving measures for the period, are two subsidy measures targeting private enterprises and buildings, which is projected to save approximately 1.2 Mtoe. Namely, the new measures will target savings in process energy in industrial and service businesses, as well as energy saving measures in buildings (40% of the funding will be earmarked for the latter) (see more information below).[176]

In addition, on December 2 2019, the Danish Government reached an agreement to establish **a new fund called 'Denmark's Green Future Fund'**, which will manage a total of DKK 25 billion / EUR 3.35 billion. The fund will contribute to the green transition in Denmark and abroad.[177]

[170] National Energy and Climate Plan
[171] Strategy for energy renovation of buildings, 2014
[172] National Energy and Climate Plan
[173] Energy Agreement, 2018
[174] National Energy and Climate Plan
[175] National Energy and Climate Plan
[176] National Energy and Climate Plan
[177] National Energy and Climate Plan

According to the preliminary assessment of the EC, the **proposed contribution in the draft NECP towards the 2030 collective EU EE targets is very low**. The EC also notes that **further efforts to increase EE, notably in buildings, would also contribute to additional emission reductions**.[178] In the final NECP, Denmark has only slightly decreased the primary energy consumption target, and instead both the primary and final energy consumption targets for 2020 have been increased compared to the draft NECP (reported in the following table).

EE targets (Mtoe)[179]	Latest data 2017	Target 2020	Target 2030
Primary energy consumption	18.1	17.5	18.3
Final energy consumption	14.9	15.2	15.8

The increase in final energy consumption is largely driven by new large data centres in Denmark as well as due to the fact that no specific EE measures for the period of 2025-2030 exist. The only sector to predict a fall in energy consumption is the residential sector (decrease of 5% between 2017 and 2030).

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• The energy requirements for new buildings have been tighten up and in 2020 they will use 75% less energy than in 2006; • Energy consumption by households is expected to fall by 0.6% annually[180], and • Estimated final energy consumption in households in 2020 would be 185 PJ; • Most of the existing building stock needs to implement energy renovation by 2050[181].	Existing measures: • The EE obligation is an important instrument to promote investment for EE solutions in existing buildings; • Economic incentives given by the taxes on energy; • The building job measure is a tax incentive for EE in buildings. The measure allows for a tax deduction of ca. 26% on up to DKK 12,200 / EUR 1,633 of the craftsmen costs; • Information and training measures. New planned measures/priority objectives: • Old wood-burning stoves must be scrapped in connection with transfers of home ownership; • Scrapping premium for old wood-burning stoves; • Scrapping premium for old oil-fired boilers for the 2021-2024 period (annual budget of DKK 20mln / EUR 2.7mln); • Subsidy for the 2021-2024 period targeting buildings with the annual budget of DKK 200mln / EUR 26.8mln (covers both residential and industry).
Industry	• Energy consumption by manufacturing industry is expected to increase by 0.4% annually[182], and • Estimated final energy consumption in industry in 2020 would be 121 PJ	Existing measures: • Energy audits for large enterprises (an obligation to carry it out every four years); • EE obligation scheme; • Voluntary agreement scheme for energy-intensive companies; • Information and training measures. New planned measures/priorities: • Subsidy for the 2021-2024 period targeting private enterprises with the annual budget of DKK 300mln / EUR 40.2mln. The measure will have a competitive bidding procedure and the subsidy will be granted based on the ratio of subsidy per saved kWh. The measure is aimed at achieving energy savings in businesses and is open to all sectors, however it primarily targets energy savings in the delivery of services and manufacturing of products, with the main focus

[178] The European Commission assessment of the draft National Energy and Climate Plan of Denmark
[179] Figures reported in the National Energy and Climate Plan
[180] DECO19
[181] Strategy for energy renovation of buildings, 2014
[182] DECO19

		on so called 'process energy'. The prerequisite is that more than 50% of the total energy savings is in process energy. This means that savings in e.g. space heating and cooling are only eligible when combined with savings in process energy. • Subsidy for the 2021-2024 period targeting buildings with the annual budget of DKK 200mln / EUR 26.8mln (covers both residential and industry)
Public Sector	• There is a general concept for OPP-projects (= Public/Private partnerships) and ESCO-projects are considered as a special class of it with focus on energy renovation; • OPP-projects play an important role (compulsory for local authorities to consider) in construction and renovation of buildings in the public sector[183], and • Over the last years 22% of the municipalities have chosen to implement EE projects using EPC[184]	<u>Existing measures:</u> • Information and training measures; • Information dissemination on ESCO-model (incl. standard contracts and manuals). <u>New planned measures/priorities:</u> • Loan scheme for energy renovations in municipal and regional buildings (DKK 100mln / EUR 13.4mln annually in the period 2021-2024) – these funds will be kept separate from the municipalities' budget limitations for construction and maintenance of property.

Market failures, main issues and barriers to investment

A limited number of specific issues preventing EE activities in Denmark is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The financing of EE initiatives is generally not a major barrier for most projects in Denmark.	• Nothing specific has been reported.	• More analysis are needed to understand the possibilities for the ESIF financial instrument.
Residential Sector	Typical barriers preventing EE investments include: • Limited financial resources to devote to EE initiatives (in particular for poor households); • Limited financial returns of EE interventions (in particular for deep renovations).	• Decisions on energy renovation require several parties to agree and decide collectively; • Various ownership arrangements in apartment buildings may pose challenges to agree and carry out energy renovations.	• More analysis are needed to understand the possibilities for the ESIF financial instrument.
Industry	Typical barriers preventing EE investments include:		

[183] Denmark's National Energy Efficiency Action Plan, 2017
[184] National Energy and Climate Plan

	• Long pay-back period of several EE interventions; • Difficulties to obtain financing based on cash flows generated by EE activities.	• Nothing specific has been reported.	
Public Sector	• Nothing specific has been reported.		

ESIF resources and existing financial instruments

Denmark is a relatively small beneficiary of EU support (ESIF support being EUR 1.55 billion, total funding of EUR 2.32 billion: on average of EUR 223 per person from the EU budget over the period 2014-2020).

For **low carbon economy (TO4)**, circa EUR 120.3mln has been allocated (EUR 41.5mln from ERDF and EUR 78.8mln from EAFRD) and **EE support accounts EUR 39mln**.

Under the 2014-2020 programming period, **Denmark has not allocated any ESIF resources to financial instruments**.

Investment needs

The total investment need identified in the final NECP is estimated in the range of DKK 100-180 billion / EUR 13.4-24.1 billion until 2030 or approximately DKK 10 billion / EUR 1.34 billion annually.

Denmark has listed the following EE-specific investment needs by sectors in the final NECP:

Sector of investment	Investment description	Investment value (in EUR billion)
Households	EE and conversion of heat supply	2.7 – 4
Industry	EE and new technology	1.34 – 4

The source of funding related to the above investments will come from both public and private capital. In particular, private capital is expected to constitute a substantial proportion of the funding as industry investments mostly are financed via capital from private financial institutions and investments.[185]

[185] National Energy and Climate Plan

Estonia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final versions of the National Energy and Climate Plan of Estonia;*
- *EC assessment of the draft National Energy and Climate Plan of Estonia;*
- *Ex-ante assessment of ESIF financial instruments under the 2014-2020 programming period, Estonia; PWC, September 2014;*
- *Reaching climate neutrality in Estonia; Stockholm Environment Institute (SEI), September 2019*[186].

Context overview

As of the beginning of 2019 Estonia had a population of about **1.32mln inhabitants** (0.3% of the EU27) which has slightly **declined** over time (-1.44% in the last 10 years)[187] and slow negative trend is expected to continue: in 2030 population is expected to decrease to 1.3mln[188].

Estonia's **GDP** per capita in 2018 was about **EUR 15,090** (54.6% of the EU27 average) and it reported a 19.4% increase in the last 10 years[189].

Final energy consumption in Estonia was 2.96Mtoe (0.3% of the EU27) in 2018 and it has **increased of 2.8% compared to 2005,** while at the EU27 level it decreased of 4.9%[190].

- **Consumption per capita** (2.24toe/person) is similar to the EU average (2.22 toe/person) and it decreased by 3.43% in the last 10 years (while at the EU27 level it decreased by 6.1%)[191];
- **Energy productivity** (GDP over the gross available energy) is 3.02 Euro per Kg of oil equivalent (second lowest in the EU), this index increased by 18.6% in the last 5 years[192];
- **Sectors** contributing to final consumption are: households (32.8% of total), transport (28%), services (16.4%) and industry (15.9%). Since 2004, energy consumption has grown by a quarter in the services and transport sector, while other sectors have remained relatively stable.[193]

[186] https://www.sei.org/publications/reaching-climate-neutrality-in-estonia/
[187] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[188] National Energy and Climate Plan
[189] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[190] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[191] EUROSTAT; Ratio between: Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[192] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[193] National Energy and Climate Plan

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[194] is 647,000 (0.34% of EU27), 91.6% built before the year 2000 and 61% built during the Soviet era between 1946-1990; • 66% of housing stock is located in cities and 34% in rural areas, and • 96% of housing stock is privately owned;[195] • A total of 22.6mln sqm heated area of apartment buildings is lower than energy performance indicator class C, and • A total of 6.5mln sqm heated area of small residential buildings is lower than energy performance indicator class C[196].	• Households are responsible for 0.94Mtoe (0.38% of EU27)[197]; • Consumption per dwelling 1.5toe (6.5% higher than EU average)[198]; • Household energy use is dominated by space heating (62%) and water heating (21%), followed by cooking (11%) and electrical appliances and lighting (6%)[199]; • During 2004-2018, the energy consumption in the households has not changed.[200]	• During 2000-2016, energy savings on residential buildings estimated in 0.26Mtoe, or 28% of 2000 consumption[201].
Industry	• Manufacturing industry generates circa 16% of the national GDP; • It is estimated that total of 4.6mln sqm of net floor area lower than energy performance indicator class C needs to be reconstructed[202].	• Consumption of industry is 0.49 Mtoe (0.2% of EU27) [203] and it decreased sharply (-23.9%) in the last 5 years (being the fastest decrease in the EU); • Sub-sectors contributing the most to consumption are the energy intensive industries – non-metallic minerals and paper (approx. 1/3), followed by chemicals and non-ferrous metals[204].	• During 2000-2016, energy savings in industry worth 0.49Mtoe or 86% of 2000 consumption[205].
Public Sector	• The total useful floor area of buildings used by the public bodies (larger than 250 sqm each) was 1.35mln sqm (as of 01.01.2018)[206].	• Consumption in services (including public administration) is 0.49Mtoe (0.37% of EU27) increasing over time (17.4% last 5 years VS +0.34% in EU27)[207].	• During 2014-2016 on average 42,587 sqm were renovated to comply with the national minimum requirements of the EE enforced in 2013.

[194] Odysse; Stock of dwellings (permanently occupied); www.indicators.odyssee-mure.eu/online-indicators.html
[195] Ex-ante assessment of ESIF financial instruments under the 2014-2020 programming period, PWC, 2014
[196] Reaching climate neutrality in Estonia, SEI, 2019
[197] EUROSTAT; Final consumption - other sectors; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[198] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[199] Odyssee database, Country Profile
[200] National Energy and Climate Plan
[201] Odyssee database, technical final energy savings
[202] Reaching climate neutrality in Estonia, SEI, 2019
[203] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[204] Odyssee database, Country Profile
[205] Odyssee database, technical final energy savings
[206] National Energy and Climate Plan
[207] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

EE targets, measures in place/proposed

EE is declared to be a priority in Estonia (e.g. the 'Climate change adaptation plan until 2050', the 'General Principles of Climate Policy until 2050', the 'Estonian National Energy Development Plan 2030' and the 'National strategy for the reconstruction of buildings to improve energy performance') with a focus on (i) reducing energy imports; (ii) improving energy security, (iii) promoting faster and broader investments in EE and iv) increasing the use of renewable energy.

To achieve the objectives of the final NECP, Estonia is proposing in total 71 measures including 6 measures related to EE in building stock and street lighting. Out of 71 measures proposed, 28 measures are either extensions of the existing ones (identified in the NECP as 'WAM' i.e. 'With Additional Measures') or completely new ones that are currently under the planning phase[208].

EXISTING POLICIES

Under the existing policy measures, the expected **primary energy consumption** in 2030 will be up to 14% lower than in 2013, **final energy consumption** will be 32 TWh, and the energy intensity of the Estonian economy will decrease from 5.6 MWh/1000 €$_{GDP2012}$ to 2 MWh/1000 €$_{GDP2012}$.

NEW POLICIES (2020-2030)

Estonia sets a contribution to the EU target of EE in terms of primary energy consumption of maximum 5.49 Mtoe. The draft NECP **2030 target** is considered to represent **low ambition** by the EC and is only slightly lower than actual primary consumption level.

It has been generally acknowledged that **during 2020-2030 Estonia needs to focus more on the cost-effective measures in key sectors** that have high emission reduction potential **and significantly accelerate investments in the EE of buildings, transport and industry**, as in the long term these measures will lead to financial savings among others.[209] The same has been echoed in Annex D of the 2019 European Semester Country Report, where priority investment needs have been identified, in particular to:

- reduce energy consumption levels in buildings;
- reduce energy consumption in businesses by improving the energy efficiency of SMEs;
- support a transition to renewables in heating and cooling, including district heating and small-scale installations[210]

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• At least 40% of small residential buildings with energy performance indicator class C or D; • A least 50% of apartment buildings with energy performance indicator class C or better.	Existing measures: • 'Apartment buildings' reconstruction grant' co-funded under the 2014-2020 CF (EUR 119.5mln) for apartment associations and local governments; • Loan guarantee for apartment associations (national resources); • Housing loan guarantee for individuals (national resources); • Small residential buildings/private home renovation support (national resources); • Solar panel investment support for apartment associations (national resources). New planned measures/priority objectives: • Additional measures for apartment buildings and small residential buildings/private homes.

[208] National Energy and Climate Plan
[209] Reaching climate neutrality in Estonia, SEI, 2019
[210] European Commission, 2019 European Semester: Country Report – Estonia

Industry	• Energy saving of manufacturing companies 460 GWh/a in 2023.	Existing measures: • 'Resource efficiency of the businesses' co-funded under the 2014-2020 ERDF (EUR 101.5mln) provides various grants for technical assistance and investments covering up to 50% per beneficiary (both SMEs and manufacturing companies); • Solar panel investment support. New planned measures/priorities: • Additional measures for renovation of business buildings.
Public Sector	• Renovation of 3% per year of total useful floor area of buildings occupied by the central government; • Total of 170,000 sqm of buildings must be renovated to achieve the target; • 22,000 renovated street lighting points in 2023.	Existing measures: • Promotion of energy efficiency and the use of renewable energy in public sector buildings (funded from GHG emission trading); • Housing development investment support for local governments (national resources); • Solar panel investment support for local governments (national resources); • Grants for reconstruction of street lighting, co-funded under the 2014-2020 Cohesion Fund (EUR 43mln). New planned measures/priorities: • Additional measure for renovation of public sector buildings.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Estonia is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• High demand (i.e. too many investments in a short period of time) may result in high rise in the cost of building materials and construction.	• Limited capacities of technical experts and construction sector (including scarcity of skilled workforce).	• Need to combine the programme with TA (including awareness raising activities).
Residential Sector	• Lack of households co-financing capacities (due to the low value of real estate in many regions); • Households' lack of willingness to undertake EE related long-term debt; • High cost of works (especially in case of comprehensive reconstruction); • Generally very long payback period and associated high investment risks.	• Households tend to have varied level of awareness of EE and have difficulties to adequately assess it; • Low quality of reconstruction projects and supervision[211]; • Difficulties to agree on the EE investments in large apartment buildings with many private apartment owners; • The EE and non-EE related renovation parts of the investments cannot are often separated and thus even lowers financial returns[212] because:	• Geographical imbalances in terms of EE renovations across the country should be addressed by targeted and combined/tailored measures and/or tailored TA programmes to promote EE benefits and to support the project preparation; • Combination of ESIF financial instrument with grants should be considered whenever commercial lending worsens to the point where ESIF soft loan makes sense; • Alternative ESCO type financing could be potentially useful (as it might be attractive to households who are reluctant to dedicate their (scarce) resources to EE).

[211] Ex-ante assessment of ESIF financial instruments under the 2014-2020 programming period, PWC, 2014
[212] Ex-ante assessment of ESIF financial instruments under the 2014-2020 programming period, PWC, 2014

		i) Often non-EE works are considered ineligible for the ESIF support and thus needs to be covered by the final recipient's own resources; and ii) In many cases the overall conditions of the buildings are so bad that non-EE works need to be done in order to start with the EE related works.	
Industry	• Lack of own resources, especially for smaller companies; • Large-scale improvement measures are very investment-intensive (should stay ideally below EUR 500,000); • Payback period of EE investments tend to be too long to be attractive (should be less than 5 years); • Banks are not able/willing to finance company's EE investments (also those that have been identified by energy audits), and often require additional securities/ guarantees.	• EE is often not a priority, instead optimisation of processes and cost savings preferred to EE investments; • Companies tend to have varied and often very low awareness of EE (also on their economic and financial impact) – information asymmetry; • Investments made in the past have resulted in low savings and have discouraged to invest more; • Lack of understanding of positive externalities.	• TA programmes to promote and to quantify EE benefits (incl. energy audits); • Financial support (e.g. financial instrument/grant combination) in order to reduce the pay-back period and reduce bank risk; • Support to the ESCO model via financial instrument could help.
Public Sector	• In general, central and local governments financial health is good (this may change due to the forecasted increase of Estonia public deficit in 2020 to balance the recession), however regulatory limits to borrowing capacity of some municipalities and other public entities might prevent from investing in EE related measures.	• Uncertainty in estimating the cost of works; • ESCO market is very limited in the public sector.	• Public sector EE investments are still relatively low, and TA programmes could be considered to structure viable EE initiatives; • To consider financial instrument targeting ESCOs as an option to public sector borrowing.

ESIF resources and existing financial instruments

Estonia is the largest beneficiary of EU support per person (ESIF funding of circa EUR 4.4 billion: on average of EUR 3,362 per person from the EU budget over the period 2014-2020). For **low carbon economy (TO4)**, circa EUR 312mln has been allocated (EUR 48.9mln from ERDF; EUR 247.1mln from CF and EUR 16.1mln from EAFRD).

Ex-ante assessment of ESIF financial instruments was carried out by PWC in Estonia in 2014 covering all TOs. This ex-ante assessment covered only partially CPR Article 37 provisions and was meant to seen as phase 1. Based on the results and recommendations of phase 1, Estonia has committed almost EUR 187mln of **ESIF resources into financial instruments** or circa 4.3% of its EU budget that is more than two times lower than the most contributed Member State.

Five financial instruments are active (3 using ERDF and 1 using EARDF and 1 using EMFF) and they are managed mainly by two main national public institutions – **KredEx** (including its subsidiary KredEx Krediidikindlustus) and **the Estonian Rural Development Foundation** – and one Fund of Funds is managed by **the European Investment Fund (EIF)**.

Despite the fact, that the ex-ante assessment covered also TO4, Estonia **has not committed resources to specific EE financial instruments under the 2014-2020 programming period** even though KredEx implemented a very successful EUR 66.71mln (out of EUR 17.74mln from ERDF) EE financial instrument 'Renovation loan for apartment buildings' under the 2007-2013 programming period. This has been also recognised by the Joint Research Centre (JRC) in their study 'Accelerating energy renovation investments in buildings' conducted by the in 2019. The Estonian EE investments in apartment buildings have been identified as an example of good practice of public schemes.[213]

The main reason for not implementing financial instruments for EE in apartment buildings under the 2014-2020 programming period was due to the fact that the banking sector was able to offer lending conditions similar to the ERDF instrument implemented under the 2007-2013 programming period. However, it was noted that should commercial lending conditions worsen, the government should step in and relaunch a dedicated financial instrument.

The ex-ante assessment also analysed the potential for ESIF financial instrument in the EE in industry sector and concluded that the combination of financial instrument together with the grant support would be probably the best solution to address identified market failures. Nevertheless, no financial instrument was established under the 2014-2020 programming period.

Investment needs

The NECP includes references to financing sources for policies and measures, notably national budget, EU funding programmes (mainly ESI Funds and Connecting Europe Facility) and Emissions Trading System allowances as the main means of financing investments. According to the final NECP, the public sector investment needs in building stock are expected to be up to EUR 1 billion (i.e. EUR 100mln per year) and thus by far the most resource-hungry sector.[214]

Based on the most recent study commissioned by the Government Office, the total public and private investment volume (including in EE) amounts needed, would be a minimum of EUR 17.3 billion for the period 2021-2050 to reach climate neutrality (approximately 4-5 billion until 2030), and EUR 13.1 billion of the total amount would fall to the private sector. Assuming the large-scale import of electricity, the need for the volume of investments would decrease by about 30-50%.[215]

[213] JRC, Accelerating energy renovation investments in buildings, 2019
[214] National Energy and Climate Plan
[215] Reaching climate neutrality in Estonia, SEI, 2019

Spain

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan (NECP) of Spain;*
- *Final version of the National Energy and Climate Plan (NECP) of Spain;*
- *EC assessment of the draft National Energy and Climate Plan of Spain;*
- *Long-term strategy for energy renovation in the building sector in Spain pursuant to article 4 of directive 2012/27/UE (2014);*
- *Update of the long-term strategy for energy renovation in the building sector in Spain (2017);*
- *Assessing the potential use of financial instruments in Low carbon economy in Spain. A study in support of the ex-ante assessment. European Investment Bank. PwC. Final Report (October 2017).*

Context overview

Spain has about **46.9mln inhabitants** as of January 2019 (10.5% of the EU27) slightly increasing over time (2.17% over the 2008 – 2018 period)[216] and over the next decade, the Spanish population is expected to experience 1% growth[217]. **Real GDP** per capita in 2018 was about **EUR 24,880** (10% lower than the EU27 average) and has increased by 2.8% in the last 10 years[218].

Final energy consumption (FEC) in 2018 was 86.8Mtoe (8.8% of the EU27) and it has **decreased by 11.5% since 2005,** while at the EU27 level it decreased by 4.9%[219]. **Consumption per capita** (1.86toe/person) in 2018 was 16% lower than the EU27 average (2.2 toe/person) and it has decreased by 10% in the last 10 years (while at the EU27 level it decreased by 6%)[220]. **Energy productivity** (GDP over the gross available energy) in 2018 was 8.4 Euro per Kg of oil equivalent (4% higher to the EU27 average), showing a moderate reliance on energy to generate GDP (this index increased by 7% in the last 5 years)[221]. **Sectors** contributing to FEC are: transport (38% of the total), industry (22.5%), households (18%) and services (12%)[222].

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[223] is 18.4 million (10% of EU27), circa 70% were built before 2000.	• In 2018, households' energy consumption was 15.0Mtoe (6.1% of EU27)[224].	• During the 2012 – 2016 period, it is estimated that almost **120,000 residential buildings** were renovated, for an overall

[216] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[217] National Energy and Climate Plan

[218] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

[219] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020

[220] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[221] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

[222] EUROSTAT

[223] Odyssee database, stock of dwellings (permanently occupied) year 2016

[224] EUROSTAT

			investment estimated at circa EUR 4.8bn[225].
Public Sector	• Central government buildings with a total useful floor area of over 500 sqm are 1,763 (more than 11mln sqm)[226].	• In 2018, consumption in services (including public administration) was 11.2Mtoe, increasing over time (15% last 5 years VS +0.3% in EU28).	• During the **2014 – 2017** period, energy renewal carried out in buildings of the General State Administration affected a floor area of **1,2mln sqm[227].**
Industry	• Industry accounts for 23% of real GDP (2017)[228].	• In 2018, industry consumed 20.2Mtoe (8.3% of EU27); • Industry consumption decreased by 19% in the last 10 years[229].	• During **2000-2016**, **energy savings** undertaken in industry were worth **6.7Mtoe** or 40% of 2000 consumption[230].

EE targets, measures in place/proposed [231]

Spain has introduced a number of policy measures for residential and services as well as industry sectors.

Current measures to promote EE include a range of legislative and/or economic support actions, aimed at producing a general or specific impact on each consumer sector.

The most important structural decision - following the obligation connected with the EE directive - was the establishment of the system of **energy efficiency obligations**, together with the creation of the **National Energy Efficiency Fund** (*Fondo Nacional de Eficiencia Energética* - FNEE), managed by the national Institute for Diversification and Energy Efficiency (IDAE), in order to finance national EE initiatives. ESIF also plays a key role to support EE policies, in particular via the national Spanish Multiregional Operational Programme (POPE).

NEW POLICIES (2020-2030)

Spain has a **2050 objective to achieve climate neutrality**, with the reduction of GHG emissions by at least 90%, as well as achieving a **100% renewable electricity system**. To that end, the objective of the National Energy and Climate Plan (NECP) is to achieve a reduction in emissions of at least 20% in 2030 compared to 1990.

Sectors subject to Emissions Trading Scheme **(ETS) will contribute with a decrease of emissions in 2030 of 61%** compared to 2005, while **non-ETS sectors** (residential, transport, agriculture, waste, fluorinated gases and industry not subject to emissions trading) **will contribute with a mitigation of 39% in 2030** compared to the levels in 2005.

The sectors of the economy that, in absolute numbers, will reduce their emissions the most in this period (2020 – 2030) are those of **electricity generation** (36 MtCO2-eq) and **mobility and transport** (27 MtCO2-eq).

[225] 2017 Update of the long-term strategy for energy renovation in the building sector in Spain (page 17)

[226] Energy inventory of central government buildings in Spain and alternative approach (2013)

[227] National Energy and Climate Plan

[228] Central Intelligence Agency, the world fact book

[229] EUROSTAT

[230] Odyssee database, technical final energy savings, which excludes savings achieved thanks to economic or behavioural factors

[231] Information reported in this section is based on the updated NECP (if not differently specified)

Renewables (RES) are expected to play an important role in the Spanish strategy (59GW of additional capacity is expected to be installed in the planning period), in fact by 2030 the share of RES in the electricity system will reach 74% (in 2017 it was 46%) with a major contribution of **wind energy and solar photovoltaic (PV)**.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• the sector will contribute to **18% of 2021–2030 Spanish Final Energy Consumption savings** • In 2021–2030 the **EE improvement of 1,2mln dwellings** is expected	Existing measures (list of): • One of the most important measure for EE in residential buildings is the so called **PARER programme** (started in 2014 and supported also with resources of the POPE). The programme combines grant and repayable assistance and it is managed by the national energy agency (IDAE); • Another important programme is the **2013 – 2016 *national plan to promote rental housing, building renovation and urban regeneration and renewal***, that allocated circa EUR 280mln over the 2014 – 2016 period for renovations[232]; • With respect to **revolving resources**, the national promotional bank (**ICO**) has a dedicated credit line for EE interventions (*ICO Financing Facility for renovation)* that provided circa EUR 128mln in the 2014-2016 period[233]. New planned measures/priority objectives (NECP): • Measures are expected to be implemented to **support the use of RES in buildings** (e.g. development of local energy communities, installation of RES based heating systems in buildings) also with the use of a combination of subsi1235813dised loans and grants (no information is reported about neither the potential amount nor the source); • Support to **EE investments to renovate residential buildings** is envisaged, with a focus on measures improving the thermal envelope of buildings, with the aim of renovating 1.2mln dwellings in the planning period. Several measures are expected to be used (e.g. tax reform, legislative reform to simplify financing to home owners associations, public support including the continuation of the PARER scheme). It is envisaged to create a dedicated public budget of EUR 5.5bn (mainly from ESIF) to support investment of EUR 22.4bn; • Measures to **renovate residential equipment** are also envisaged (circa 6.6mln new home appliances are sold each year) with the aim of increasing their energy efficiency). Public support to support the purchase of appliances is not envisaged.
Public Sector	• **Every year** (during the 2021 – 2030 period) **300,000 sqm** of floor area of public buildings of the General State Administration are expected to be **renovated** (this renovation rate is higher than what required by the ECPB directive); • **Regions and Local Authorities** will also be obliged to renovate part of their buildings (**3% of their buildings surface per year).**	Existing measures: • OP backed grants for EE in public buildings have been implemented and are in place. They are channelled through POPE at national level and through regional OPs at Autonomous Community level. New planned measures/priorities (NECP): • Support to **EE investments to renovate buildings used for services (private and public**) is envisaged. For public buildings, this will be done combining (i) an obligation for Autonomous Communities and local administration to renovate 3% of the floor area of public buildings every year; and (ii) and incentive scheme that could be similar to the afore-described PARER programme. Public support schemes (e.g. grants and dedicated financing) are envisaged, with a dedicated public budget of 2.2bn (mainly from ESIF) to support investment of EUR 3.7bn; • EE measures are envisaged for **cooling equipment and large air-conditioning facilities** in the **services sector** (e.g. airports, hospitals, shopping centres, offices, grocery stores, shops and retail areas, etc.) and **public infrastructure** (e.g. street lighting systems, water treatment facilities, etc.). Public support schemes (e.g. grants and dedicated financing) are envisaged, with a dedicated public budget of 3.9bn (source not defined) to support investment of EUR 6.3bn.

[232] 2017 Update of the long-term strategy for energy renovation in the building sector in Spain (page 23)

[233] 2017 Update of the long-term strategy for energy renovation in the building sector in Spain (page 27)

Industry	• During **2021–2030** industry is expected to generate **10.3Mtoe** of **energy savings** (28% of cumulative savings of the overall program)	Existing measures: • Several measures supporting EE in industry have been developed and/or are in place in Spain, also with the support of ESIF resources. These channelled through POPE at national level and through regional OPs at Autonomous Community level; • Among the various measures, the **National Energy Efficiency Fund** (NEEF) managed by IDAE plays a crucial role. New planned measures/priorities (NECP): • Measures are envisaged to facilitate the use of **final energy saving technologies**, mainly in SMEs and large companies in the industrial sector (especially non-ETS). These will include public support programmes (grants and soft loans) and will be funded wither though the NEEF or from other sources (including ESIF). Overall investments have been quantified at circa EUR 7.4bn with a public support of EUR 1.6bn.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Spain are briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments (besides externalities and asymmetric information) are related to: - limited financial resources to devote to EE initiatives (in particular for poor households). The COVID crisis could have a further negative impact as it could reduce further households' disposable income/ financial resources; - limited financial returns of EE interventions (in particular for deep renovations). These barriers are considered to be relevant in Spain, considering moreover (i) that a relevant part of the country benefits from **mild weather** conditions with implications on the return of EE investments; and (ii) that the average **consumption per dwelling in Spain is one of the lowest in Europe** • Due to the uncertainty about future economic conditions, generated by the COVID crisis, households may decide to postpone long-term investments, such as EE renovations; • Based on (pre-crisis) discussions with local banks, it is reported that credit institutions are liquid and lending activities are well developed (including to households). This context may change due to the COVID crisis, and banks may become more selective in their lending activities to households; • There are areas where financing gaps have been reported, in particular banks report not to lend to Home Owner Associations (comunidad de vecinos) due to the not clear juridical status of these entities (this is a major issue as the large majority of dwellings in Spain are located in multi-apartment buildings).	• Typical non-financial barriers preventing EE investments are related to: - limited awareness about benefits of EE interventions; - Difficulties, especially in large multi apartment buildings, to agree on renovation activities. These barriers have been confirmed during meetings with national stakeholders and the NECP seems to try to address these issues (e.g. in the 2021 – 2030 local government offices will be created to increase awareness of the EE benefits and to support the EE projects preparation and deployment, with particular respect to multi-apartment buildings).	• TA programmes, to promote and to quantify EE benefits, to increase the likelihood of EE initiatives; • Financial support in order to reduce the pay-back period could be useful; • Support to the development of the ESCO model.

Public Sector	**EE investments in the public sector** can be performed either via 'traditional public procurement' or with 'alternative solutions' including for instance Public Private Partnerships (PPP) or Energy Performance Contracting (EPC) • Traditional public procurement is the most common solution and banks are reported to be keen to finance public entities at competitive conditions. Barriers to this model are represented by budget constraints of national and local entities[234]. Debt capacity could become an even more relevant issue, as the Spanish debt to GDP ratio may sharply increase to support the economy during the COVID triggered recession; • PPP or EPC type transactions are alternative ways to develop EE on public buildings and infrastructures, however banks are reported to be (in general) reluctant to co-finance these type of transactions (typically with limited or no recourse) in particular when implemented by small ESCOs.	Typical non-financial barriers preventing EE investments in the public sector are related to: • Difficulties in structuring sound EE projects (e.g. identification of the baseline, definition of EE interventions, etc.). This could be an issues in particular for small municipalities with limited technical capacities; • Difficulties with the procurement regulation, with the contractual requirements and with the monitoring of EE intervention. These issues are higher with 'innovative' implementation solutions (e.g. EPC).	
Industry	• Typical barriers preventing EE investments include: - long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities. The COVID triggered economic recession will have a severe impact on enterprises that may have more difficulties to access the credit sector (due to the less performing economic and financial ratios). Due to future uncertainty, enterprises may moreover reduce further their investment plans and they could postponing non-core investments.	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	

ESIF resources and existing financial instruments

Spain, through 64 national programmes, benefits from ESIF funding of **EUR 39.8bn** (circa EUR 856 per person) of which, **EE related support** is estimated in **EUR 495.4m**[235].

In the 2014 – 2020 period, Spain contributed **EUR 1.1bn**[236] **of its ESIF** (EUR 953.5mln from ERDF and EUR 127mln from EAFRD) **to financial instruments**, however **a very limited number of EE related financial instruments** has been developed.

There are in particular two financial instruments that could be of interest:

- **EE financial instrument operating in the Canary Islands,**
  The financial instrument started its activities in 2019 and it is managed by the regional agency SODECAN. The amount allocated to the financial instrument is EUR 6.2m of which ERDF covered EUR 5.3m. The financial instrument provides unsecured loans to enterprises with up to 15 years tenor to cover up to 85% of the investment costs.

[234] based on the EIB analysis of municipal investments, the main obstacles for the implementation of the infrastructure investment activities for Spanish municipalities are a narrow 'budget'

[235] Data provided by DG Regio based on an analysis of fields of intervention

[236] www.fi-compass.eu/financial-instruments/Spain

- **Urban development and EE financial instrument operating in Andalusia**
  During the 2007–2013 programming period, the Andalusia region developed a JESSICA financial instrument with an EUR 79.4 m initial endowment (funded with OP resources) targeting urban development projects and providing different type of financing: loans, with equity and quasi equity.
  The fund was set-up and deployed with the support of the EIB, that acted as Holding Fund and selected financial intermediaries responsible for the management of the urban development fund.
  The Urban Development Fund was managed by a professional private equity fund manager (GED Capital) that developed a strategy based on a combination of financial products (e.g. equity, quasi equity, loans, etc.). Several investments were made in PPP vehicles (e.g. concessionaires) created to build, operate and finance the regeneration of urban areas/buildings.
  Considering the results of the urban development fund, in the second half of 2018, the Andalusia Region entrusted the EIB as manager of a EUR 250 million Fund of Funds (2014–2020 OP) to invest in Sustainable Urban Development and in EE projects (circa EUR 100m are expected to be invested in this sector) and in the second half of 2019 the fund manager was selected and started operating.

During the **2007–2013** programming period a JESSICA instrument has been implemented (**JESSICA FIDAE**) **targeting EE interventions**. The Fund had an endowment of circa EUR 123mln to finance sustainable urban development projects that improve EE and/or use renewable energies.

During the current programming period, the **PF4EE** centralised instrument has been operating in Spain, targeting EE in the hotel sector.

During 2017–2018, following the delivery of the ex-ante assessment (recommending the setup of national financial instrument for EE), discussions occurred with IDAE regarding the setup of a Smart Finance for Smart Buildings (SFSB) type financial instrument, however a decision not to implement the financial instrument was finally taken. This was due, among others, to:

- The regionalised allocation of the smart growth OP, that would have imposed to concentrate financial instrument investments in southern Spanish regions, where absorption could have been critical;
- The perception of difficulties connected with the combination of grant and financial instrument resources (that was found to be needed in order to properly support EE investments).

Investment needs

The total investments to achieve the NECP targets will amount to **EUR 241.4bn between 2021 and 2030,** distributed as follows:

- Renewables: 38% (EUR 91.76bn);
- **Saving and efficiency: 35% (EUR 86.5bn)**;
- Networks and electrification: 24% (EUR 58.57bn);
- Other measures: 3% (EUR 7.53bn).

Of the total investment (EUR 241.4bn):

- **EUR 196bn can be considered as additional** to the baseline (scenario with actual measures only);
- 80% will come from the **private sector**, mainly linked to the deployment of renewables, distribution and transmission networks, and a large part of the saving and efficiency measures;
- 20% will come from the **public sector**, mainly linked to energy saving and EE measures, electrification of the economy and in actions associated with promoting sustainable mobility and modal shift;
- **5% circa of public sector investments will come from European funds**.

Focusing on EE, the NECP reports that approximately **EUR 30 billion of public funds** (national and European) in the form of direct public aid and public funding [will be needed] for the financing of EE projects [over 2021 – 2030].

With respect to **specific EE investment per sector**:

- Investment needed to support **EE in industry** (e.g. more efficient production processes, energy management, etc.) over the 2021–2030 will be **EUR 7.4bn** out of which **EUR 1.6bn would be provided with public suppor**t (funded by the National Energy Efficiency Fund, State budget and/or EU Funds) in the form of grants and soft loans;
- Investment needed to renovated **residential buildings** over the 2021–2030 will be **EUR 22.4bn out of which EUR 5.5bn would be provided with public support**, mainly funded with ESIF, in the form of grants and soft loans;
- Investment needed to renovate **services buildings (both public and private)** over the 2021–2030 will be **EUR 3.7bn, with a public support of EUR 2.2bn**, mainly funded with ESIF.

Finland

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final versions of the National Energy and Climate Plan of Finland;*
- *EC assessment of the draft National Energy and Climate Plan of Finland;*
- *National Energy and Climate Strategy for 2030;*
- *Finland's National Energy Efficiency Action Plan; 2017.*

Context overview

As of the beginning of 2019 Finland had a population of about **5.5mln inhabitants** (1.23% of the EU27) which has **increased** over time (+4% in the last 10 years)[237] and the positive trend is expected to continue: in 2030 population is expected to increase to 5.77 million[238].

Finland's **GDP** per capita in 2018 was about **EUR 36,890** (133.6% of the EU27 average) and it reported a 1.2% decrease in the last 10 years.[239]

Final energy consumption in Finland is 25.8Mtoe (2.6% of the EU27) and it has **increased (+2.46%) since 2005,** while at the EU27 level it decreased of 4.9%[240].

- **Consumption per capita** (4.7toe/person) is **more than 2.1 times higher** than the EU average (2.2 toe/person) and it decreased by 3.26% in the last 10 years (while at the EU27 level it decreased by 6.1%)[241];
- **Energy productivity** (GDP over the gross available energy) is 5.79 Euro per Kg of oil equivalent and this index increased by 3.27% in the last 5 years[242];
- **Sectors** contributing to final consumption are: industry (45% of total), followed by transport (20%) and households (20% of total).

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[243] is 2,836,000 (1.5% of EU27), 85.2% built before the year 2000;	• Households are responsible for 5.69Mtoe (2.32% of EU27)[246]; • Consumption per dwelling 1.85toe (33.1% higher than EU average)[247], and	• During 2000-2016, energy savings on residential buildings are estimated in 0.49Mtoe, or 11.2% of 2000 consumption[252]

[237] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[238] National Energy and Climate Plan
[239] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[240] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[241] EUROSTAT; Ratio between: Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[242] EUROSTAT; Energy productivity; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[243] Odyssee database, stock of dwellings (permanently occupied) year 2016
[246] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[247] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[252] Odyssee database, technical final energy savings

	• Finland has 290 million sqm of residential buildings, out of which 10% are not permanently occupied, and • Private households own 65% of all buildings[244]; • 90% of apartment buildings and about 10% of single-family houses use district heating[245].	• Residential buildings account for 75 percent of total energy consumption of all buildings[248]; • Total energy consumption is driven upwards particularly by continuously increasing number of dwellings and larger homes[249]; • Household energy use is dominated by space heating (64%)[250]; • Heat loss through the building envelope is relatively low[251].	• The most cost-optimal measures in apartment buildings relate to the ventilation (equipped with heat recovery) and windows[253].
Industry	• Industry is the second largest sector of economy in Finland and is very energy intensive; • Industry in its peak capacity can consume almost 50% of the total energy demand in Finland, and • 30% of industrial buildings use district heating[254].	• Consumption of industry is 11.1 Mtoe (4.6% of EU27) and it has increased (+8.4%) in the last 5 years however, it has decreased (-1%) in the last 10 years[255]; • Energy intensity level in industry has been consistently higher than the EU average and is one of the highest in the EU; • The energy-intensive pulp and paper, steel and chemical industries are the largest energy consumers (55%, 11% and 9%, respectively)[256].	• During 2000-2016, energy savings undertaken in industry were worth 1.42Mtoe or 11.5% of 2000 consumption[257]; • The most cost-effective measures in commercial buildings relate to ventilation and lighting[258].
Public Sector	• Municipalities and the State own less than 10% of all buildings; • Central government building stock is 884,000 sqm, and • The annual volume of new development by Senate Properties currently stands at 20,000 sqm[259]; • 60% of other buildings (except those two mentioned above) use district heating[260].	• Consumption in services (including public administration) is 3.08Mtoe (2.3% of EU27) increasing over time (5.87% last 5 years)[261]; • The total energy consumption of Senate Properties, which manages the Finnish State's building stock, decreased by 19% during the period 2012-2015[262].	• The most effective measures for increasing EE include improving heat recovery in ventilation systems, replacing windows, and improving the electrical efficiency of lighting and ventilation[263].

[244] Finland's National Energy Efficiency Action Plan, 2017
[245] National Energy and Climate Plan
[248] Finland's National Energy Efficiency Action Plan, 2017
[249] Odyssee database, Country Profile
[250] Odyssee database, Country Profile
[251] Finland's National Energy Efficiency Action Plan, 2017
[253] Finland's National Energy Efficiency Action Plan, 2017
[254] National Energy and Climate Plan
[255] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[256] Odyssee database, Country Profile
[257] Odyssee database, technical final energy savings
[258] Finland's National Energy Efficiency Action Plan, 2017
[259] Finland's National Energy Efficiency Action Plan, 2017
[260] National Energy and Climate Plan
[261] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[262] Finland's National energy Efficiency Action Plan, 2017
[263] Finland's National Energy Efficiency Action Plan, 2017

EE targets, measures in place/proposed

Finland's final National Energy and Climate Plan is based on two main Government reports (i.e. the 'National Energy and Climate Strategy for 2030' and the 'Medium-term Climate Change Policy Plan for 2030') with a focus on safeguarding the security of energy supply, increasing the share of renewable energy, and securing the competitiveness of society. The strategic theme on carbon neutrality includes the following objectives:

- Finland will achieve carbon neutrality by 2035;
- Finland aims to be the world's first fossil-free welfare society; and
- Finland will strengthen carbon sinks and stocks in the short and long term.[264]

EXISTING POLICIES

Finland started active EE policies and measures already after the 1970s energy crisis and launched its first comprehensive Energy Efficiency Action Plan in 1993. Since then Finland has number of existing policy measures for residential and services as well as industry sectors. These include: EE agreements, energy advice for consumers, promotion of the deployment of heat pumps in detached and terraced houses, energy audit activities and promotion of investments in heating plants. This long history of EE policies and measures means that there are no silver bullets or low-hanging fruit to improve EE.[265]

As regards policy measures, targets have been set for EE agreements. Finland has a longstanding tradition of EE agreements to steer companies and communities to improve their EE and it covers business (including industry), real estate and municipal sectors.[266] However, Finland has set separate sector-specific EE targets only in the field of transport.

NEW POLICIES (2020-2030)

In general, as the final NECP is based on already completed previous energy and climate strategies mentioned above, it does not offer any further measures beyond these. However, during the public consultation, an EE related public statement highlighted that renovations that improve EE of buildings should be subsidised significantly more.[267]

According to the preliminary assessment of the EC, the initial proposed contribution towards the 2030 collective EU EE targets was low and unambitious considering the collective effort needed. However, in the final NECP Finland has revised the contribution and compared to 2017 levels envisages an increase in primary energy consumption (due to start-up of two nuclear power plant units) but a slight decrease in final energy consumption for 2030 (reported in the following table):

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy consumption	31.7	35.9	34.8
Final energy consumption	25.2	26.7	24.9

[264] National Energy and Climate Plan
[265] National Energy and Climate Plan
[266] National Energy and Climate Plan
[267] National Energy and Climate Plan

This is possible due to improved energy technology and EE actions taken that help to disconnect growth of the national economy from the amount of energy consumption i.e. final energy consumption per GDP would decrease from 1.4 GWh/million euro in 2021 to 1.1 GWh/million euro in 2030.[268]

The Energy and Climate Roadmap 2050 states that the measures Finland must undertake to achieve an 80-95% reduction in greenhouse gas emissions by 2050, are related to **renewable energy, energy efficiency and clean-tech solutions**.[269]

Additionally, **Finland is in the process of establishing a new long-term renovation strategy** with the aim **to decarbonise the current building stock by 2050**. The strategy will have an overview of the building stock in 2020 and sets indicative targets for the years 2030, 2040 and 2050. The initial target levels for heating energy use of buildings indicate significant energy savings when compared to the baseline year 2020 (16%, 30% and 42% respectively). The strategy is estimated to be published in March 2020.[270]

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• 19,248 GWh/a of buildings sector energy savings in 2020; • Building stock volume is expected to increase.	Existing measures: • Promoting heat pumps for detached and terraced houses; • Energy efficiency agreement for oil-heated detached houses. New planned measures/priority objectives: • Energy performance of buildings – Finland will adopt an energy subsidy scheme designed especially for housing companies. No timing, budget nor source specified in the NECP; • Finland will adopt a separate action plan to encourage properties using oil heating to switch to other forms of heating during 2020s. No timing, budget nor source specified in the NECP.
Industry	• 1,188 GWh/a of industry sector energy savings in 2020 (ESD sector only); • Industrial production is expected to grow particularly in the energy intensive pulp and paper sector.	Existing measures: • Energy efficiency agreements for businesses; • Grants for energy audit activities are provided for voluntary audits, and normally cover 40-50% of the costs; • Grants for energy saving investments are only available to businesses that have signed an energy efficiency agreement, and normally cover 20% of the investment costs, and • Grants for investments in new technology are available to all businesses and non-governmental organisations, and normally cover 20-35% of the investment costs[271]. New planned measures/priorities: • Finland will adopt a separate action plan to encourage properties using oil heating to switch to other forms of heating during 2020s. No timing, budget nor source specified in the NECP.
Public Sector	• 1,038 MWh/a of public sector energy savings in 2021 and 789 MWh/a in 2030[272]	Existing measures: • Energy efficiency agreements for local governments (including investment grant up to 20% of the costs, 25% in case of involving ESCOs);

[268] National Energy and Climate Plan
[269] National Energy and Climate Strategy for 2030
[270] National Energy and Climate Plan
[271] Finland's National Energy Efficiency Action Plan, 2017
[272] National Energy and Climate Plan

	• State buildings are renovated at a rate of 160,000 sqm per year up to 2020[273]; • Oil heating will no longer be used in properties owned by central and local governments after 2024[274].	• Subsidised local government energy audits (40-50% of eligible costs, up to 60% in case of renewable energy audits). New planned measures/priorities: • Finland will adopt a separate action plan to encourage properties using oil heating to switch to other forms of heating during 2020s. No timing, budget nor source specified in the NECP.

Market failures, main issues and barriers to investment

A limited number of specific issues preventing EE activities in Finland is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• Obtaining financing for EE projects is generally not a problem in Finland although the prerequisites for granting financing are today examined more closely[275].		• More analysis are needed to understand the possibilities for the EE financial instrument.
Residential Sector	• Typically apartment buildings use their own resources (savings, internal financing, reserves, funding) or market-based loans; • Access to market-based loans is affected by collateral e.g. in areas with low property prices, the need for a loan may be too high compared to the market value of the residential property[276].	• Households tend to have varied level of awareness of EE and have difficulties to adequately assess it; • Difficulties to agree with the EE investments in apartment buildings; • In areas suffering from depopulation, some buildings will not be renovated as their useful life is expected to be short or those who stay cannot afford it (price per occupied dwelling is too high).	• Financial instruments could provide long term soft loans or guarantees for those who cannot provide sufficient collateral to obtain market-based loans or for those who consider monthly instalments too high.
Industry	• Obtaining financing for EE projects is generally not a problem in Finland (the COVID driven economic recession may have a negative impact on this).	• Property management costs (including energy) are a minor cost item and not a priority.	• Proper ex-ante assessment is needed to understand the possibilities for the EE financial instrument.
Public Sector	• Government budgetary problems are directly reflected in opportunities to invest.	• Due to past experience, EE improvements still have a bad reputation as a cause of indoor air-quality problems[277].	• Financial instrument targeting ESCOs, to avoid debt barriers and budgetary problems existing in public sector.

[273] Finland's National Energy Efficiency Action Plan, 2017
[274] National Energy and Climate Plan
[275] National Energy and Climate Plan
[276] Finland's National Energy Efficiency Action Plan, 2017
[277] Finland's National energy Efficiency Action Plan, 2017

ESIF resources and existing financial instruments

Finland is a relatively small beneficiary of EU support (ESIF support being EUR 3.8 billion, total funding of EUR 8.4 billion: on average of EUR 690 per person from the EU budget over the period 2014-2020). For **low carbon economy (TO4)**, circa EUR 214.5mln has been allocated (EUR 186.5mln from ERDF; EUR 27.6mln from EAFRD and EUR 0.4mln from EMFF).

Finnish Government policy states that 25% of Finland's ERDF financing will be allocated to measures that promote the transition to a low-carbon society under the 2014-2020 programming period.[278] **There are currently no financial instruments targeting EE in place**.

Finland is implementing two financial instruments, one being **SME Initiative** (total budget EUR 75mln, of which ERDF EUR 20mln) **managed by the European Investment Fund (EIF)** and the other a small venture capital instrument in Åland (EUR 1.5mln from ERDF).

Investment needs

The final NECP includes incremental investment needs and nothing specific has been provided for EE measures. Based on the draft NECP the EC estimated that **the quantified investment needs for all sectors and dimensions correspond to 1.5-2% of GDP per year**, notably in the electricity network.[279]

According to the Finland's National Energy Efficiency Action Plan it is estimated that the **renovation needs in residential buildings** in Finland until 2025 is almost **EUR 1 billion per year**.[280] The final NECP does not provide any additional information related to that.

[278] Finland's National energy Efficiency Action Plan, 2017
[279] The European Commission assessment of the draft National Energy and Climate Plan of Finland
[280] Finland's National Energy Efficiency Action Plan, 2017

France

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Draft version of the National Energy and Climate Plan of France;*
- *EC assessment of the draft National Energy and Climate Plan of France;*
- *Final version of the National Energy and Climate Plan of France;*
- *Odysee-mure database;*
- *EU Energy Poverty Observatory; Member State Report France;*
- *Climate-KIC; Building Market Brief - France. 2018;*
- *National Energy Efficiency Action Plan. 2017 update;*
- *National Energy Efficiency Action Plan. 2019 update;*
- *JRC; Science for Policy Report, Accelerating energy renovation investments in buildings. 2019;*
- *JRC; Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies. 2016;*
- *EC; Commission Staff Working Document Country Report France. 2020;*
- *European Court of Auditors; Allocation of Cohesion policy funding to Member States for 2021-2027. 2019;*
- *EIB; État des lieux des besoins d'investissement et de financement non-couverts en France et propositions d'instruments financiers par le Groupe BEI. 2017;*
- *Agence Nationale de la Cohésion des Territoires; Etat des lieux de la programmation FEDER 2014-2020 en metropole. 2019;*
- *Agence Nationale de la Cohésion des Territoires; analyse du FEDER 2014-2020 pour mieux préparer 2021-2027 en france metropolitaire. Transition Énergétique. 2019;*
- *European Investment Advisory Hub. EIB. PwC. Financing Energy Efficiency improvement in residential housing in France; Market analysis. 2018.*

Context overview

France has about **67m inhabitants** (15% of the EU27) increasing over time (4.6% in the 2008–2018 period)[281] and by 2030 the French population is expected to reach 70.2m inhabitants.

Real GDP per capita in 2018 was **EUR 32,830** (19% higher than the EU27 average) and has increased by 4.9% in the last 10 years[282]. Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, France will suffer a sharp recession in 2020 with the gross domestic product (GDP) expected to contract by 8.25%, before rebounding and grow by 7.5% in 2021.

Final energy consumption (FEC) in 2018 was 146.6Mtoe (14.8% of the EU28) and it has **decreased by 8.5% since 2005,** while at the EU27 level it decreased by 4.9%[283]. **Consumption per capita** (2.2toe/person) is equal to the EU average (2.2 toe/person) and it has decreased by 14.1% compared with 2005 (while at the EU27 level it decreased by 7.4%)[284]. **Energy productivity** (GDP over the gross available energy) in 2018 was 8.6 Euro per Kg of

[281] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[282] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[283] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[284] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

oil equivalent (6% higher than the EU average), showing a moderate reliance on energy to generate GDP (this index increased by 12% in the last 5 years)[285]. **Sectors** contributing to FEC are: transport (31% of the total), households (27%), industry (18.6%) and services (16%)[286]. French is very dependent on **nuclear energy,** which represents circa 44% of primary energy consumption, followed by oil (25%) and natural gas (16%)[287].

	Overview	Consumption	EE
Residential Sector	• Based on the 2020 EC Country Report for France, the residential sector counts 30m primary residences: 8m million shared properties, 5m social housings and 17m individual houses. Some 7m to 8m homes fall into the energy F and G classes ('thermal sieves'), of which 1.5m are inhabited by households in situations of energy poverty; • Based on the 2018 report of 'Building Market Brief. France. Climate-KIC', 68% of residential floor area is occupied by single-dwelling buildings and 32% by multi-dwelling buildings. 79% of the residential dwellings are privately owned (58% of them are occupied by the owner).	• In 2018, households' energy consumption was 39.1Mtoe (15.9% of EU27) and it decreased by 11.6% in the last 10 years[288]; • Households' energy consumption is mainly related to space heating (64.7% of total consumption).	• During the 2000 – 2016 period, the residential sector generated energy savings of 14.9Mtoe (equal to 36% of consumption recorded in year 2000)[289]; • The 2013 *Plan de rénovation énergétique de l'habitat* (PREH) set a target of 500,000 major renovations per year by 2017 (in 2019, the National Agency for Housing (ANAH) contributed to the renovation of 155,765 housing units).
Public Sector	• The stock of public buildings occupied by State services amounts to approximately 22.2m sqm[290].	• In 2017, energy consumption in services (including public administration) was 23.8Mtoe, increasing over time (+11% last 10 years VS +3% in EU28)[291]; • During the 2014–2017 period, public buildings occupied by State services generated energy savings of circa 7,370 GWh compared with 2013[292].	• France has a target to renovate 7.6m sqm of buildings of the central administration, during the 2016–2020 period[293]; • The public investment foreseen for EE on public buildings in the 2015–2020 period is about EUR 97.2m.
Industry	• Industry accounts for 19.5% of real GDP (2017) and it employs circa 20% of the overall labour force[294].	• In 2018, the final energy consumption in the industry sector was circa 27.3Mtoe (11.3% of EU27) with a decrease by 14% in the last 10 years[295].	• During the 2000–2016 period, energy savings undertaken in industry were worth 4.7Mtoe or circa 13% of energy consumption of the sector in year 2000[296].

[285] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[286] EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[287] National Energy and Climate Plan
[288] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[289] Odyssee database, technical savings
[290] National Energy and Climate Plan
[291] EUROSTAT
[292] National Energy Efficiency Action Plan, 2019 update
[293] Information reported in this section (EE/Public sector) is based on the NECP
[294] Central Intelligence Agency, the world fact book
[295] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[296] Odyssee Mure, technical energy savings

EE targets, measures in place/proposed [297]

The National Energy and Climate Plan (NECP) of France builds on the Multiannual Energy Plan (*Programmation Pluriannuelle de l'Energie*) adopted in 2016 and updated in 2019 and the National Low-Carbon Strategy (*Stratégie nationale bas-carbone*) adopted in 2015 and updated in 2019. The NECP foresees France to become carbon neutral by 2050 and identifies measures to reach that target. The following table summarises energy savings expected in the plan.

NECP EE targets (Mtoe)	Target 2020	Target 2030
Primary Energy Consumption (PEC)	219.9	202.2
final energy consumption (FEC)	131.4	120.9

Among the various measures in place and planned, one of the most important is related to the **energy saving certificates** (*Certificat d'Economie d'Energie or CEE*) that are provided by the competent Ministry to entities performing EE initiatives. Each certificate (CEE) corresponds to a certain amount of saved final energy[298] and under this policy measure, France intends to support the amount of extra energy savings (compared with actual measures) required by Art.7 of the EC Directive 2012/27/EU (Energy Efficiency Directive).

In the following table, information regarding the main measures are presented.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• France has the 2050 target to reach 100% low energy buildings (*bâtiments basse consommation*); • The French Multiannual Energy Programme, plans circa. 300,000 EE renovations per annum during 2015 - 2030 and circa. 700,000 during 2030 - 2050[299].	Existing measures (list of): • Several national **measures to support EE investments in residential buildings** are in place, mainly connected with the housing energy renovation plan (*Plan de rénovation énergétique de l'habitat*) and the energy renovation plan for buildings (*Plan de renovation énergétique du bâtiment*). These include: – a one-stop-shop information platform where available financial support schemes are reported and where support to perform energy audits can be provided[300]; – A tax credit of up to 30% on EE related expenses (*Crédit d'Impôt Transition Energétique* – CITE); – A zero percent interest rate loan (*éco-prêt à taux zéro*) for individual owner-occupiers or landlords in order to finance major EE renovations. The loan amount is up to EUR 30,000 and it is managed by *Caisse des Dépôts et Consignations* (CDC, the French Promotional Bank). Between 2012 and 2017 it provided loans for EUR 2.8bn[301]; – A zero percent interest rate loan (*éco-prêt logement social*) for social landlords (*e.g.* social housing associations) to finance EE renovations. The loan instrument is also managed by CDC and has the target of supporting the renovation of 70,000 social housing units/year[302]; – Reduced VAT rate (5% instead of 10%) and exemption from the stamp duty (*taxe foncière*) on EE renovations. • With respect to **energy poverty**, the National Housing Agency (*Agence Nationale de l'Habitat – ANAH)* helps owners/occupiers who fall under a resources ceiling to carry out housing renovation works. In this respect, the *Habiter mieux* ('living better')

[297] Information reported in this section is based on the NECP (if not differently specified)
[298] 1 CEE = 1 kWh of cumulative energy savings (kWh cumac). For example, the number of kWh cumac saved following the installation of an energy efficient appliance corresponds to the cumulative total of the energy savings made each year during the appliance's life cycle (National Energy Efficiency Action Plan, 2017 update)
[299] National Energy and Climate Plan
[300] www.faire.fr
[301] National Energy Efficiency Action Plan, 2017 update
[302] National Energy Efficiency Action Plan, 2017 update

		programme, managed by ANAH and drawing upon national resources, provided EUR 1.35bn over the 2010-2017 period; • Another well-established **revolving mechanism** to support EE renovation in residential buildings (individual and multi-apartments) in France is direct third party financing, implemented at regional or metropole level *via* ***Sociétés de Tiers-Financement*** (*e.g.* SPEE in Picardie Region, SEM in Ile-de-France, AREC in Occitanie, ARTE in Nouvelle-Aquitaine, and Bordeaux Métropole Energie). *Sociétés de Tiers-Financement* are supported by EIB (and EFSI) thanks to a specific EIB programme that followed the law enabling their creation. New planned measures/priority objectives (NECP): • Existing measures are expected to be continued; • Some existing measures are expected to be reinforced/improved. Although limited details were provided in the NECP, examples include: the tax credit system to be simplified since 2020, the scope of the *éco-prêt* product to be enlarged.
Public Sector	• France expects to generate savings of 7,200 GWh of primary energy during the 2021–2030 period in the sector	Existing measures: • The energy renovation plan for buildings (*Plan de renovation énergétique du bâtiment*) envisages a EUR 1.8bn investment to improve the energy performance of public buildings, including administrative cities. Local authorities will be made available EUR 3bn of which (i) EUR 2.5bn as loans from CDC, for the renovation of their parks, (schools, crèches, hospitals,...) and (ii) EUR 500m via the *dotation de soutien à l'investissement local*; • Besides national programmes, there are some regional ESIF backed grant schemes supporting EE in the public sector. New planned measures/priorities (NECP): • Existing measures are expected to be continued in the post 2020 period; • A national task force will be created to accelerate the EE renovations of public buildings (mainly in schools and other educational buildings).
Industry	• The long term plan sees a strong reduction of GHG emissions: from 147MtCO2 eq in 1900 to 54MtCOs eq in 2030; • In the tertiary sector during the 2021–2030 period 15m sqm of the building stock are planned to be renovated.	Existing measures: • At the national level there are many measures supporting EE in industry, examples are: – Energy saving certificates (CEE), as industry accounts for 20% of certificates issued between 1/1/2015 and 31/1/2017; – PRO-SMEn, a programme that provides financial subsidies (up to EUR 40,000) to businesses to set up an energy management system; – ADEME's (*Agence de l'Environnement et de la Maîtrise de l'Energie*) 'Aides à la décision' (Decision aid) and other schemes managed with the Chambers of Commerce subsidises the preparation of studies on energy efficiency in industry (e.g. audits). • The main **revolving measures** are managed by the national promotional bank for SMEs and mid-caps Bpifrance[303]: – The *Prêt Eco-Energie* finances (without recourse and at preferential rate) small EE interventions (EUR 10k – 100k) in SMEs. By the end of 2019, EUR 100m are expected to be lent; – the *Prêt Vert* product finances (without recourse) EE interventions in industry (loan maximum amount is EUR 5m). By the end of 2019, EUR 500m are expected to be lent; – the PF4EE financial instrument developed by the EIB and co-funded by the LIFE programme is active in France since 2016 and it is managed by the Crédit Coopératif.

[303] Odyssee Mure: FRA15 Green & eco-energy loans for SME / 'prêt écoénergie' & 'prêt vert' (2018)

		New planned measures/priorities (NECP): • Existing measures are expected to be continued in the post 2020 period (e.g. the Prêt Éco-Énergie distributed by Bpifrance will be prolonged to 2025); • New supporting measures for de-carbonation and EE in industry will be developed in the context of the '2025 Productive Pact' (*Pacte productif 2025*).

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in France are briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments (besides externalities and asymmetric information) are related to: - Limited financial resources to devote to EE initiatives (in particular low-income households who are not necessarily the owner of their apartment and may prioritise other spending). The COVID crisis could have a further negative impact as it could reduce further households' disposable income/ financial resources; - Limited financial returns of EE interventions (in particular for deep renovations). Financial returns could be further lowered if current low energy prices will endure in the future; - Numerous financing schemes provided by different actors that may lack coordination and communication, but that often need to coordinate to finalise the financing plan for social housing (*e.g.* social housing); - Focus on of the supporting schemes on low-income households while the rest of the population needs to discuss with banks. • Due to the uncertainty about future economic conditions, generated by the COVID crisis, households may decide to postpone long-term investments, such as EE renovations.	• Based on the 2020 EC Country Report for France, main pitfalls identified for deployment of EE investments include: - The economic interest is not fully adopted by individuals (especially for deep renovations); - Households who would most benefit from substantial renovations are usually those with limited resources; - Available support schemes are scattered among various actors and hard to mobilise at once; - Solutions are heterogeneous, suppliers numerous, and reported abuses have affected the level of trust; - For rental property, asymmetric incentives between the landlords (who finance the investment) and the tenant (who stands to gain from the investment).	• Leverage existing initiatives from the two NPBs (CDC for residential and public sectors, Bpifrance for industry) and the local STFs; • Coordinate the financial instruments with the existing grant schemes (from ANAH or other entities); • TA programmes, to promote and quantify EE benefits (ex-ante audit), as well as to properly structure EE interventions could increase the likelihood of EE initiatives being developed (especially in residential and public sectors); • Payment by results schemes (or EPC-type schemes) could help EE interventions in the public sector; • Leverage the EU and national policy impetus for Circular Economy to foster related financial instruments during the 2021-2027 programming period.
Public Sector	EE investments in the public sector can be performed either via 'traditional public procurement' or with 'alternative solutions' including for instance Public Private Partnerships (PPP) or Energy Performance Contracting (EPC): • Traditional public procurement is the most common solution and banks are reported to	• Difficulties (lack of skills and financial resources) to manage: - Preparatory activities especially in smaller municipalities (e.g. baseline, project structuring, contractual framework, etc.);	

	be keen to finance public entities at competitive conditions. Barriers to this model are represented by regulatory constraints of public entities (e.g. Universities that cannot have debt and so depend on the Ministry of Higher Education to renovate). Public debt capacity could become a relevant issue, as the French debt to GDP ratio is expected to sharply increase to support the economic during the COVID triggered recession; • PPP or EPC type transactions are alternative ways to develop EE on public buildings however complexities related to this solution make it difficult to be applied.	- Procurement process and monitoring activities (especially in smaller municipalities). • EE renovation in public sector often require coordination between various levels of administrations (national, regional, local, specific entities in charge of managing public assets) and various competences (the skills being not necessarily in the paying authority); • EE renovation in public sector requires long-term planning and consensus (that may evolve with elections).	
Industry	• Barriers to EE investments include: - Long pay-back period of several EE interventions; - Difficulties to obtain financing based on cash flows generated by EE activities; - Limited financial instruments (with appropriate features) focusing on EE interventions while banks not adapting their current offer to EE interventions. • EE interventions often not perceived as a priority when seeking financing; • The COVID triggered economic recession will have negative impacts on enterprises that could have more difficulties to access the credit sector (due to the less performing economic and financial ratios). Due to future uncertainty, enterprises may moreover reduce further their investment plans and they could postpone non-core investments.	• Typical non-financial barriers preventing EE investments: - Limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE); - Difficulties to include EE interventions into wider development projects / investments (which are more core business); - EE interventions among companies may require coordination between the public sector (to generate incentive) and Chambers of Commerce – or other representative private actors (to diffuse this incentive among companies).	

ESIF resources and existing financial instruments

For the 2014–2020 period, France benefits from ESIF funding of EUR 26.7bn (circa EUR 406 per person)[304] of which, **EE related support** is estimated in **EUR 1.1bn**[305].

In the 2014-2020 period, France contributed EUR 430m[306] of its ESIF (EUR 403m ERDF; EUR 27m EAFRD) to **financial instruments**, however only one financial instrument has been implemented drawing resources from TO4 (the CAP3RI Fund presented below).

***Le fond d'investissement capital risque de la Région Hauts-de-France* (CAP3RI).**

The **CAP3RI financial instrument** was launched in 2015 with an OP endowment of EUR 15m from ESIF, under the priorities of intervention 4b (EE and renewables in enterprises) and 4a (production and distribution of renewable

[304] https://cohesiondata.ec.europa.eu
[305] Data provided by DG Regio based on an analysis of fields of intervention
[306] www.fi-compass.eu/financial-instruments/France

energies). As of 31/12/2018, the ESIF amount paid to the financial instrument was EUR 9.4m, while the ESIF amount committed to final recipients was EUR 7.1m.

The financial instrument provides both equity and quasi equity financing to enterprises and it leveraged important resources from the EIB (EUR 20m loan guaranteed by the European Fund for Strategic Investments, EFSI) and private investors (EUR 5m from *Crédit Agricole* and EUR 3m from Groupama).

The instrument also has EUR 2.5m (within the EUR 15m ESIF endowment) to provide technical support to the SMEs (often to perform ex-ante analysis of the projects). The instrument and the technical support are provided in one single operation and both managed by the financial intermediary, *Nord Capital Partenaires*.

The ambition of the CAP3RI fund is to generate a total investment portfolio of EUR 200m (*i.e.* 16x the ERDF contributed by the managing authority to the fund). This significant leverage effect is notably achieved, at Fund level, thanks to EIB financing in the form of a participatory loan and, at the level of individual projects, by systematically seeking co-financing up to minimum 50% of the cost of each project.

It is to be mentioned that (i) since the merge of Nord-Pas de Calais and Picardie within the Hauts-de-France region, the instrument is financing also projects in Picardie (thanks to the EIB and private financing) and (ii) other French regions are currently considering developing instruments to support similar projects (*i.e.* circular economy, renewable energy sources and soft/smart mobility), potentially with the support of ERDF funding during the next programming period.

Investment needs

As reported in the NECP, **in 2018 climate investments reached EUR 45.7bn** (with a 17% increase over the last three years) investments are related to: EE (EUR 19.5bn); transport and net infrastructure (EUR 11.4bn); renewable energies (EUR 7.5bn); nuclear power plants (EUR 4.9bn); forestry and non-energetic industrial processes (EUR 2.3bn).

With respect to the financing entity: households' investment was circa 37% of the total (EUR 17bn) and it was mainly related to residential buildings and environmental friendly vehicles; enterprises invested EUR 13.6bn in all sectors; public sector invested circa EUR 15.1bn in various sector (e.g. transport infrastructure, buildings, etc.).

To support the French climate strategy, the NECP reports that **an investment between EUR 45bn to EUR 85bn per year** will be needed during the 2019 – 2032 period, with the split reported in the following table.

	2019 – 2023	2024 – 2028	2029 – 2033	2034 - 2050
Buildings	14	18	22	28
Transport	21	36	52	85
Energy and networks	11	10	11	13
Total	**46**	**64**	**85**	**126**

Out of the estimates annual investments of about EUR 45-85 billion, **circa EUR 25bn to EUR 40bn** (which corresponds to 1.1–1.7 % of GDP in 2018) would represent the **additional investment needed compared to existing measures**[307].

[307] EC assessment of the draft National Energy and Climate Plan of France

Greece

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *JRC Science for Policy Report 'Accelerating energy renovation investments in buildings' 2019*
- *National Energy and Climate Plan of Greece;*
- *EC assessment of the draft National Energy and Climate Plan of Greece;*
- *Improving Energy Efficiency in buildings as a tool for economic growth in Greece, Foundation for economic and industrial research 2018;*
- *Episcope, Opportunities and outlook on the energy efficiency improvements for the Greek building stock, 2016;*
- *Ex-ante assessment for the use of financial instruments in Greece 2014-2020 Grant Thornton 2014;*
- *A meeting with the Minister of Energy Mr Hatzidakis and Interviews were conducted with officials of the Ministry of Energy on November 12th 2019 in Athens, Greece.*

Context overview

Greece has **10.741.165 inhabitants** (2.10% of the EU27)[308]. The population of the country has decreased in the last 10 years (2018 – 2008) by 2.89%, however it is important to mention that in the case of Greece and the context of the economic crisis, the statistics of demographics do not necessarily portray the reality on the ground. Due to the strong economic slowdown and very high unemployment rates (19.3% in 2018 and close to 40% for people under the age of 25)[309] people are seeking better living conditions temporarily or more permanently without necessarily changing their tax residency. This is referred to as the brain drain and should be an important component of the projections and future analyses regarding the economic prospects of the country.

The country underwent a considerable economic slowdown during the crisis period. The banking system of the country was heavily exposed to Greek government capital bonds which lead to a near collapse of the banking system. The banks underwent a radical restructuring with most foreign branches leaving the country and remaining banks merging into 4 so called 'systemic' banks. In practise, the country was left without an active banking system since commercial banks were not able to address their portfolios of non-performing loans (due to a restriction on collateralized real estate auctions), and their liquidity was constantly under threat from a run on bank savings by the general public (due to political uncertainties). As a result of the later, controls were imposed on banking system to avoid a collapse in 2015 which was lifted in the summer of 2019. As a result of these conditions, GDP per capita reduced in the last 10 years (2018 – 2008) by 21.2%[310]. Through an intensive reform programme, the country was able to slowly recover and report an increase in GDP per capita in the last 5 years (2008 – 2003) of 5.83% but still far from reaching pre crisis levels. The recent COVID outbreak and the counter measures taken to limit its spread will result in a severe economic recession in 2020. Based on the EC spring economic forecast, Greece GDP will drop by 9.7% in 2020, before rebounding in 2021 (+7.9%).

Final energy consumption in Greece in 2018 was 15.95Mtoe (1.6% of EU27 consumption) and seems to have been influenced by the economic crisis. More specifically, consumption fell steadily in the last 10 years by close

[308] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020 (data refers to 2018)
[309] EUROSTAT
[310] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

to 25.5%, while a slight increase in being recorded after 2015. It is important to note that still 29% of Greek households are unable to ensure thermal comfort conditions and 40% of them are delaying payments of their energy bills[311].

- **Consumption per capita** (1.48toe/person in 2018) is 33% lower than the EU27 average (2.2 toe/person) and in the last 10 years, it has decreased much more sharply (23%) than the EU average (-6%)[312];
- **Energy productivity** (GDP over the gross available energy) in 2018 is 7.38 Euro per Kg of oil equivalent (close to the EU average), showing a moderate reliance on energy to generate GDP. This can be explained by the fact that Greece is not an industrial country, with the economy being more dependent on the service sector and more specifically on tourism and shipping. It is however important to note that the country is heavily dependent on oil and natural gas imports from third countries;
- **Sectors** contributing to final consumption are: transport (5.815 toe), households (4.413 toe), industry (3.096 toe) and services (2.192 toe)[313].

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[314] is 4.4m (representing 2% of EU27), circa 80% were built before 2000[315]. According to the Greek statistical agency the total dwellings (including empty) are 6.3m; • 22.6% were built in the period from 1971 to 1980[316] with the national insulation requirements being defined in 1979; • In the last 10 years, the number of dwellings remained the same due to the almost complete inactivity in the construction sector and almost complete lack of bank housing mortgages; • Amongst residential dwellings, 2.5m are single houses, 1m are 2-apartment houses and about 2.8m are multi-apartment buildings[317]; • An important fact is that 1.3m houses are summer or secondary houses and 3m dwellings are occupied by owners.	• Households[318] in 2018 are responsible for 3.91Mtoe (1.6% of EU27) or 25% of the national consumption; • Consumption per dwelling is 1.08 toe (22% lower than EU average)[319]; • During the period of the crisis, and especially between 2008-2014, consumption in households reduced by close to 30%; • The predominant energy class is 'H' which is for lower energy efficient buildings. The situation in apartment buildings is better than in houses[320]; • 45.6% of houses do not have any insulation; • A characteristic of energy use in households is the extensive use of kerosene central heating systems. More than 60% of houses use kerosene while 15% use wood. The use of gas remains low at 7.6%;	• During the period of the crisis, and especially 2008-2014, consumption per dwelling reduced from 1.23 to 1.0 toe; • At the same time the number of dwellings actually slightly decreased due to the almost complete inactivity in the construction sector and the rise in emigration; • The EE potential of the residential sector remains untapped since a high percentage of houses remain without insulation; • The crisis affected the ability of households to undertake improvement works, while until 2015 only 650.000 energy audits (85% in residential buildings) were conducted[321].

311311 Greece NECP
312 Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
313 EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
314 Hellenic Statistical Office (ELSTAT)
315 Odysee-mure database
316 Improving Energy Efficiency in buildings as a tool for economic growth in Greece, Foundation for economic research 2018
317 Hellenic statistical agency
318 EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
319 Odyssee-Mure, Database
320 Episcope, Opportunities and outlook on the energy efficiency improvements for the Greek building stock, 2016
321 Episcope, Opportunities and outlook on the energy efficiency improvements for the Greek building stock, 2016

		• A positive characteristic is the extended use of solar panels for the heating of water (38% of houses).	
Industry	• The building stock in Greece includes more than 43.000 hotel buildings with 10.000 buildings being built before 1980; • In the remaining service sector there are 206.000 buildings hosting shops and offices. From these buildings, 108.000 were built before 1980; • Regarding industrial buildings, these amount to almost 34.000 buildings with 14.000 built before 1980[322].	• Industry and services are responsible for approximately 4.8Mtoe of energy consumption; • Consumption reduced from 4200 to 3000 toe between 2008 and 2016; • The economic slowdown reduced the contribution of industry in the overall energy consumption in the country.	• The EE potential in hotels and the service sector in general is very high with 130.000 buildings requiring improvements and upgrades to achieve EE gains.
Public Sector	• In the public sphere, almost 22.000 buildings are schools with more than half being built before 1980; • Close to 2000 buildings host hospitals with 500 built before 1980[323].	• The NECP identifies 28 central government buildings with a surface of 177.000 sq.m. that require improvements.	• Same as the industry and service sector, a large percentage of buildings require improvements.

EE targets, measures in place/proposed

Greece is implementing a number of policies up to 2020 and planning additional measures to reach the 2030 targets. These measures are complemented by a set of financing schemes including grant schemes and financial instruments. The final version of the NECP presented more ambitious targets as compared to the draft version, with a much stronger emphasis put on the use of financial instruments and the promotion of a number of legislative changes to facilitate the upgrade of the national building stock.

EXISTING POLICIES

The country is implementing a number of horizontal measures to achieve EE gains in all sectors. These include legislative measures and financing schemes. Some examples include the framework for the energy efficiency requirements and audit requirements and audit certificates in all buildings, as well as the energy efficiency obligation scheme to energy providers.

Other examples also include the obligatory efficiency upgrade of social housing, but also upgrades in residential and public buildings. In the residential sector, the main financing scheme which has gained visibility and has been deemed successful is called 'exikonomo katikon' (which translates into 'saving at home') which has been targeting more than 70.000 dwellings with grant financing of up to 70%. A new phase of the programme is currently underway. Moreover, concerning industry, other grant schemes have mostly targeted small touristic hotels with eligible costs targeting energy efficiency improvements. In the current programming period, a new grant scheme is being designed for SMEs and will be launched in 2020. Regarding public buildings, the grant scheme 'energy savings for local governments' is currently supporting the energy efficiency improvements in

[322] Ex-ante assessment for the use of financial instruments in Greece 2014-2020 Grant Thornton 2014
[323] Ex-ante assessment for the use of financial instruments in Greece 2014-2020 Grant Thornton 2014

buildings of 59 municipalities with a budget of EUR 23.3. The specific programme has a total budget of EUR 83.4m and further proposals are being evaluated.

NEW POLICIES (2020–2030)

Under the **existing and future policy measures**, the objective for Greece is to achieve energy savings of at least 38% by 2030. An ambitious target has been defined to refurbish 600.000 buildings by 2030. For public buildings, a new programme entitled 'Electra' is being designed. This programme will promoted legislative changes and financing schemes based on financial instrument to support the upgrade of buildings owned by the state and state owned companies. In the remaining sectors, a new state owned promotional entity will be created namely the National Fund for Energy Efficiency. This fund will also promote the use of financial instruments in EE projects.

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy consumption	23.1	24.7	20.55
Final energy consumption	16.8	18.4	16.5

According to the NECP, the country will continue to implement horizontal measures in the market to promote EE across the board. Such measures will include strict requirements for near zero emissions in all new buildings, continuation and improvement of the obligation schemes, and continuous effort to provide motives for renovations in all sectors through financing schemes. In addition to the more extensive use of financial instruments, interviewed officials of the Ministry of Energy stated that the full grant coverage for investments in public buildings will cease and the target is to promote the use of PPPs, Energy Performance Contracting (EPC) and the ESCO model.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• 79% of buildings correspond to residential use[324]; • Residential buildings have a vast potential to improve EE; • The residential buildings in the form of single houses are poorly insulated and predominantly use kerosene, electricity and wood for heating purposes.	Existing measures: • Legislation has been promoted through the national energy efficiency plan for promoting the rational use of energy in the residential sector; • These laws aimed at transposing EU Directives laws into the national regulatory framework; • Measures are implemented to encourage the use of natural gas in the residential sector; • Measures to promote the use of renewable energy in residential buildings; • Special law introduced setting minimum energy performance requirements for buildings; • All new buildings must be at least category B; • Main financing tool through grants has been the 'savings at home' ESIF programme with more than EUR 500m in the 2007 - 2013 programming period and EUR 300m in the current programming period. New planned measures/priority objectives (NECP): • New measures will be put in place to set minimum requirements for new buildings with mandatory elements such as solar panels and efficient heating systems; • Supporting households through financing schemes for EE improvements will remain the first priority in the period 2020-2030;

[324] Ex-ante assessment for the use of financial instruments in Greece 2014-2020 Grant Thornton 2014

		• A shift from grants to financial instruments for the residential sector remains a strong commitment of the state authorities.
Industry	• There are 300.000 buildings in the country used for industry and services[325]; • 206.000 refer to office buildings while 33.000 are hosting factories and 43.000 hotels.	Existing measures: • Energy audits framework in place for SMEs; • Financial motives in the form of grants are included in the so called 'development law' which is the main financing grant scheme for industry in Greece; • Legislation launched to promote EPC and energy services; • Special law introduced setting minimum energy performance requirements for buildings; • All new buildings must be at least category B; • New grant programme for SMEs with ESIF is currently planned (not dedicated to EE specifically but generic investment projects). New planned measures/priorities (NECP): • The framework for mandatory energy audits for large companies will be reinforced; • New grant programme for SMEs with ESIF is currently planned (for the current period); • A shift from grants to financial instruments for the SME sector and the private sector in general remains a strong commitment of the state authorities building on the experience of the existing infrastructure FoFs; • The new National Fund for EE is expected to play a crucial role in the promotion of financial instruments for EE projects; • The new Fund will finance projects through loans or guarantees.
Public Sector	• There are 24.000 public buildings hosting schools and hospitals and 48.000 churches; • The NECP also refers to 177.000 sq. meters of space being used by the parliament and ministries.	Existing measures: • New law obliging mayors and governors of regions to have energy efficiency plans for buildings under their responsibility; • 'energy officer' role is introduced in all public buildings; • Targeted grant programmes for public buildings were implemented with budgets exceeding EUR 270m in the current programming period; • Financial instruments through the infrastructure FoFs also target public buildings; • EPC framework also relevant for public buildings. New planned measures/priorities (NECP): • Green procurement will be introduced in the public sector to set the example; • Use of financial instruments for the renovation of public buildings. The officials of the Ministry mentioned that the full grant programmes for public buildings will cease to exist and will be substituted with financial instruments; • A new programme called 'Electra' will be implemented promoting legislative changes and financing schemes for the refurbishment of public buildings; • Stricter requirements for public buildings will be introduced. For example, from 2024 all buildings used by the state will need to be at least of energy class B. Also, from 2021, all building newly leased or bought by the state will need to be of energy class A.

[325] Ex-ante assessment for the use of financial instruments in Greece 2014-2020 Grant Thornton 2014

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Greece is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The financial crisis affected all stakeholders and there is still a lack of liquidity in the market; • The banking sector is recovering but still financing is in a stale condition in the market. The new COVID triggered recession could have negative impacts in this respect.	• Limited ESCO market.	• Lack of past experience in implementing a dedicated financial instrument for EE.
Residential Sector	• Households are still recovering from the crisis and trying to cope with additional taxation on their properties, moreover the new economic crisis triggered by the COVID outbreak, could deteriorate further households economic conditions.	• In apartment buildings, asymmetry of needs and priorities between owners renting out their apartments and owners living in their apartments; • Low awareness of EE benefits in rural areas; • High dependency on electricity and kerosene fuelled central heating systems with high cost; • Low use of natural gas.	• There is no experience in the sector with dedicated financial instruments due to availability of generous grant programmes; • The dedicated grant programme 'exikonomo katikon' for EE gave the possibility to choose between a traditional grant and a loan component. The direct competition between the grant and loan components naturally gave the benefit to the grant.
Industry	• Predominance of SMEs in the market which by default have limited access to finance; • During the crisis, the priorities of SMEs were shifted towards survival and paying their increasing taxation and labour cost.	• Very high dependency of hotels in electricity to generate cooling systems.	• High dependency and appetite for grants; • No experience with dedicated financial instrument for public buildings.
Public Sector	• Limited public resources during the crisis years; • Municipalities are over-indebted and unable to receive new loans (in case there was a debt financial instrument); • The new government deficit that will be generated to face the COVID crisis will deteriorate further the government debt capacity.	• Political priorities during the crisis years were focused on fiscal recovery; • High dependency of financing for the renovation of public buildings has been on grants. Especially buildings owned by municipalities and regions have been financed with 100% grants from the ESIF regional OPs.	• High dependency and appetite for grants; • No experience with dedicated financial instrument for public buildings; • The currently implemented FoF for infrastructure is also covering EE improvements for public buildings and will be a test for the market and for future financial instruments.

ESIF resources and existing financial instruments

Greece has been allocated **EUR 21.14 bn** in ESIF in the current programming period 2014-2020. The ESIF funds are implemented through 7 sectoral and 13 regional programmes. Under these programmes, EUR 2.8 bn are allocated to Thematic Objective (TO) 3 (enhancing the competitiveness of SMEs), EUR 2.2 bn to TO4 (supporting shift to low-carbon economy), and EUR 1.3 bn to TO 5 (promoting climate change adaption).

In the beginning of the programming period an ex-ante assessment was conducted also covering energy efficiency, and which identified market failures and financing gaps in the sector. In order to address these gaps, the creation of an Infrastructure FoF was decided. This FoF is managed by the EIB under the monitoring of the Greek PPP unit in the ministry of finance. The allocation to the FoF from ESIF is EUR 200m, while additional funds were also allocated from an EIB loan (EUR 200m) and from JESSICA reflows (EUR 50m). The focus of this instrument is to provide loan financing through intermediaries to projects targeting the increase of energy efficiency in private (non-residential) buildings.

In addition, the newly created Hellenic Development Bank (a restructuring of the former Hellenic Entrepreneurship Fund-ETEAN) is also operating as a FoF managing ESIF in the form of financial instruments for SMEs. The institution is providing debt financing through intermediaries targeting SMEs. Although a dedicated EE instrument is not implemented, the generic instruments can also finance EE projects. The main instrument is called TEPIX and is implemented in the form of a risk sharing loan with partner banks for the financing of SME projects (up to EUR 1.5m -total budget of the programme EUR 366m from ESIF). The NECP also mentions the creation of a National Fund for Energy Efficiency that will promote the use of financial instruments for EE, but it is not clear whether this will be a separate institution or a component of the Development Bank.

For the residential sector, it is important to note that the Hellenic Development Bank has also been entrusted by the state to implement the grant programme dedicated to EE improvement for residential buildings 'Exikonomo katikon' (or 'Savings at home'). The programme provides an option to potential beneficiaries to apply for a loan and/or a grant. In early 2020, the programme had proved very successful in particular for the grant component (payments registered: 67%, or EUR 268m), but also for the loan component (loans: 80%, or EUR 39m from the Fund).

Investment needs

The NECP for Greece presents a breakdown of estimated investment needs for the period 2020-2030 by investment area. There are 11 investment areas defined as follows:

- Renewable energy EUR 9.0bn
- Electrical system infrastructure EUR 5.5bn
- New conventional electricity generation plants EUR 1.3bn
- Development of electricity distribution network EUR 3.5bn
- Cross border natural gas pipelines EUR 2.2bn
- Natural gas network and storage EUR 2.0bn
- Research and innovation EUR 800m
- Energy Efficiency EUR 11.0bn
- Investments in the refinery sector EUR 1.5bn
- Climate change-floods-forests EUR 2.0bn
- Circular economy EUR 5bn

Total estimated investment needs are estimated at EUR 43.8bn.

Croatia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final version of the National Energy and Climate Plan of Croatia;*
- *EC assessment of the draft National Energy and Climate Plan of Croatia;*
- *Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock of the Republic of Croatia. September 2017;*
- *Assessing the potential future use of financial instruments in Croatia. A study in support of the ex-ante assessment for the deployment of EU resources during the 2014-2020. European Investment Bank. PwC. Final Report September 2015;*
- *Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock of the Republic of Croatia. September 2017;*
- *National Energy Efficiency Action Plan. 2017;*
- *Creation of an investment platform for smart cities and islands in Croatia. European Advisory Investment Hub. EY. 2019.*

Context overview

As of January 2019 Croatia has 4,076,246 **inhabitants** (0.9% of the EU27) decreasing over time (-4.8% in the last 10 years)[326]. The development of Croatian regions and populations are uneven, with growing pressure on larger cities[327]. **Real GDP** per capita in 2018 was **EUR 11,990** (43% of the EU27 average) and it increased by 4.5% in the last 10 years (2008 – 2018)[328].

Final energy consumption (FEC) in 2018 was 6.9Mtoe (0.7% of the EU27) and it has **decreased by 5.4% since 2005,** while at the EU27 level it decreased by 4.9%[329]. **Consumption per capita** in 2018 (1.7toe/person) was 25% lower than the EU average (2.2 toe/person) and it decreased by 3% in the last 10 years (while at the EU27 level it decreased by 6%)[330]. **Energy productivity** (GDP over the gross available energy) in 2018 was 5.6 Euro per Kg of oil equivalent (69% of the EU average), showing a strong reliance on energy to generate GDP (this index increased by 10% in the last 5 years)[331]. **Sectors** contributing to FEC are: households (34% of total), transport (31%), industry (17%) and services (12%)[332]. The **building sector** (residential and non-residential buildings) accounts for 42.3% of national FEC: most buildings in Croatia are rated as E or F energy classes, but many are G-rated (which represents the worst option)[333].

[326] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[327] National Energy and Climate Plan
[328] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[329] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[330] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[331] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[332] EUROSTAT
[333] Croatian National Energy Efficiency Portal (www.enu.hr)

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 762,397 buildings (total floor area 142 mln sqm)[334]: ○ 290,689 are multi-residential buildings (floor area 55mln sqm; 71% of it was built prior to 1987); ○ 471,708 are family houses (floor area 87mln sqm; 74% of it built prior to 1987).	• In 2018, households' energy consumption was 2.3Mtoe (0.9% of EU27)[335]; • Consumption per dwelling is 1.6toe (17% higher than EU average)[336].	• During the 2014 – 2016 period, 2,1mln sqm[337] (total floor area) of residential and non-residential buildings were renovated: ○ EE investments undertaken in the residential sector was estimated in HRK 1bn (circa EUR 138mln); ○ EE investments undertaken in the public buildings was estimated in HRK 344mln (circa EUR 44mln)[338]. • As of 2017, the area of the national building stock that is still subject to EE renovation was 190,3mln sqm[339].
Public Sector	• There are 80,196 public buildings in Croatia, with a total floor area of 13,801,902 sqm; • 61% of the total floor area was built prior to 1987[340].	• Consumption in services (including public administration) in 2018 was 0.8Mtoe (0.6% of EU27) increasing over time (14.3% in the last 5 years VS +0.3% in EU27).	
Industry	• Industry accounts for 26% of real GDP (2017)[341]; • The industry production index increased by only 2% between 2010 and 2017[342].	• In 2018, industry consumed 1.2Mtoe (0.5% of EU27) with a decrease by 29% in the last 10 years[343].	• During 2000-2016, energy savings achieved in industry were worth 0.5Mtoe or 37% of 2000 consumption; • Most of these savings were achieved in the beginning of 2000s (55% of 2000-16 savings were made before 2006)[344].

EE targets, measures in place/proposed

Several policy measures are in place, relying both on **EU** (ERDF) and national **resources** (e.g. Croatian Environmental Protection and Energy Efficiency Fund or 'EPEEF'). Existing measures cover all sectors and they include subsidies, energy taxes and revolving instruments.

For the **2020 - 2030 period**, the draft National Energy and Climate Plan (NECP) envisages the continuation of some existing measures and the implementation of new measures, to reach the targets reported in the following table.

	EE targets (Mtoe)	2017 data	Target 2020	Target 2030
NECP overall targets	Primary energy consumption	8.3	10.7	8.23
	Final energy consumption	6.9	7.0	6.58

[334] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[335] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[336] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[337] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[338] The conversion rate used is 7.6HRK per 1EUR
[339] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[340] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[341] Central Intelligence Agency, the world fact book
[342] EUROSTAT
[343] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[344] Odyssee database, technical final energy savings

In the following table more details of current and planned measures are reported, based on the NECP.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• After 2020 all new buildings to be nZEB[345] In 2021–2030 is expected: • 6,000 new buildings to be constructed; • 10.9mln sqm of new buildings and 8.6m sqm of renovated buildings; • 30.000 new and renovated housing units per year (1.6% annual renovation rate); • A programme to address energy poverty to be developed.	Existing measures (list of): • **EPEEF** is funding and providing **grants** for EE renovations in multi-apartment buildings (EUR 73m for 586 buildings – the measure started in 2014 and projects are expected to be completed by 2019) and single family houses (EUR 30m – the measure started in 2019 and projects are expected to be completed by 2023); • The Ministry for Construction is providing **OP backed grants** (EUR 100m) for EE in residential buildings (multi apartment buildings and family houses)[346]; • Various **revolving solutions** are active, such as the Green for Growth fund (providing dedicated resources through financial intermediaries), RENOVA + (EUR 60m credit line facility, provided by EBRD, for EE in the residential sector). New planned measures/priority objectives (draft NECP): • **EE in Multi apartment buildings**: the existing ESIF scheme (managed by MPCC) is expected to be continued in the 2021–2030 period. Procedures are expected to be simplified especially regarding the procurement process; a dedicated fund will be created to support energy poor households (to avoid the risk of blocking the multi-apartment building renovation approval process) and a technical assistance facility will be provided. Under the program 520,000 sqm are expected to be renovated every year, with an investment of circa **EUR 110m annually** (EUR 1.1bn during the 2021-2030 period). The support programme is expected to be a **grant** covering up to 60% of investment costs; • **EE in single family houses**: it will be a continuation of the EPEEF program, therefore resources should come from national resources (revenues from sales of GHG emission allowances). The programme is expected to renovate circa 350,000sqm annually, with an investment of circa **EUR 68m annually** (EUR 682m during the 2021–2030 period). The support programme is expected to be a **grant** covering up to 60% of investment costs.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • As done in the 2014–2020 period, also in the post 2020 period Croatia will follow an alternative approach (to reach the same targets).	Existing measures: • OP backed **grants combined with soft loans** (EUR 211m) for EE in public buildings; • The Croatian Government Real Estate Agency (APN) managed an **ESCO based programme for EE on public buildings**, with the support of EPEEF that was proving grants covering up to 40% of investment needs; • **Revolving schemes** are in place, such as the Western Balkans Sustainable Energy Financing Facility (WBSEFF); and **financial instruments** managed by HBOR to support EE in public buildings (financial instrument combined with grant) and for public lighting. New planned measures/priorities (draft NECP): • **EE in public buildings**: the support programme is expected to build upon the ESIF backed renovation programme of the current programming period, however the involvement of private capital and ESCOs will be sought (in particular in energy intensive buildings, such as hospitals, penitentiaries, elderly homes, etc.). The programme is expected to renovate circa 350,000sqm annually, with an investment of circa **EUR 113m annually** (EUR 1.1bn during 2021–2030); • **EE for heritage buildings**: the programme will support buildings with the status of cultural properties. The investment foreseen during the 2021–2030 period under this programme is of circa **EUR 1.7bn** for EE renovations and EUR 660m for maintenance costs;

[345] This is a requirement coming from the Energy Performance in Buildings Directive (EPBD)
[346] Croatian Ministry of Construction and Physical Planning

		• **EE of public lighting**: the programme is expected to build upon the ESIF financial instrument implemented by HBOR in the current programming period. Moreover it is expected to also support initiatives deployed via Energy Performing Contracts (EPC) or Public Private Partnerships (PPP). The investment foreseen during the 2021 – 2030 period under this program is of circa **EUR 374m**.
Industry	• In 2021-2030, ETS (Emission Trading System) remains the main policy instrument for reducing industrial sector emissions; • In addition, it is expected that the EE obligation scheme will be extended to smaller energy suppliers.	Existing measures: • OP **grants and soft loans** (EUR 40m) for EE and RES in commercial sector/tourism; • OP **grants and soft loans** (EUR 60m) for EE and renewables in industry; • Dedicated fiscal measures (e.g. emission tax); • Various **revolving solutions** are in place, such as the Green for Growth fund, RENOVA + (EUR 60m credit line facility, provided by EBRD, for EE in the residential sector), the Western Balkans Sustainable Energy Financing Facility (WBSEFF); and the recently established financial instrument, managed by HBOR providing loans to EE projects developed by the business sector. New planned measures/priorities (draft NECP): • As presented above, the **EE obligation scheme** is expected to be the most relevant programme to achieve energy savings on energy suppliers (the amount of energy savings obligation has not been reported in the NECP); • Based on the NECP *new financial incentives from public sources* [to industry] *are not foreseen.*

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Croatia are briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	Based on Croatian policy documents[347]: • the main barriers to EE renovations in buildings are financial in nature (e.g. long payback period, insufficient financial incentives, and a lack of successful financial models, etc.); • the **socially-determined price of energy**-generating products in Croatia is de-stimulating the implementation of EE measures (reducing financial return of EE and increasing the payback period); • Based on (pre-crisis) discussions with local banks, it is reported that **credit institutions are liquid** and lending activities (including to households) are well developed. This context may change due to the COVID crisis, and banks may become more selective in their lending activities to households. There are areas where **financing gaps** have been reported by local banks, in particular: – **Lending to multi-apartment buildings**, as banks are reported to be reluctant (in general) to lend to **home-owner-associations** when less than 100% of owners agree on the EE renovation	Based on Croatian policy documents[348]: • lack of information and motivation on the part of investors, the public and stakeholders (insufficient awareness of the positive effects for individuals and the society as a whole); • Complex ownership relations of multi-residential buildings (EE renovation investment decisions require a 51% majority); • Demographic and migration trends, as well as changes in housing culture and living habits are also an important barrier to successful	• TA programmes, to promote and to quantify EE benefits, to increase the likelihood of EE initiatives; • Financial support (e.g. grant/financial instrument combination) in order to reduce the pay-back period could be useful; • Support to the ESCO model via financial instrument could help.

[347] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[348] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017

	(while according to the national regulation it is sufficient the approval of the majority of owners to undertake these works); – Financing EE initiatives with **innovative schemes** (such as the **ESCO model**) due the reluctance of banks to lend via limited/no recourse solutions and to the lack of equity.	implementation EE renovations; • the crises started in 2009 caused the shutdown or bankruptcy of a large number of construction companies thus further strengthened the existing barrier of inadequate capacity, knowledge, abilities, and skills to perform EE renovations.	
Public Sector	▪ Public Authorities tend to relay on grants to finance EE investments and, although regulatory limits to borrowing capacity of public entities don't apply for EE investments, local authorities (in particular the small ones) have difficulties borrowing to provide co-financing (due to limited fiscal capacity) [349]; ▪ Based on discussions with local banks, it is reported that **credit institutions are eager to lend to Public Authorities** as these are perceived to be low risk. Competition in municipal lending is reported to be fierce, leading to low rates offered to public entities. **Financing gaps** are reported to be linked to **innovative schemes** (such as the **ESCO model**) due the reluctance of banks to lend via limited/no recourse solutions and to the lack of equity; ▪ Most of buildings require deep, capital intensive renovations. This requires considerable investments, characterised by long-term return and low profitability, which makes them unattractive to potential funders[350]; ▪ Debt capacity of Public entities could become an even more relevant issue, as the Croat debt to GDP ratio is expected to sharply increase to support the economy during the COVID triggered recession.	Based on Croatian policy documents[351]: • A typical obstacle to the process of energy renovation of public buildings is the public procurement process (based on the most financially favourable selection criteria), which is always time consuming, and in many cases unsatisfactory results; • lack of awareness of alternative procurement solutions (e.g. EPC).	
Industry	• A combination of low profitability, low attractiveness of bank loans, and limited own resources have resulted in companies being largely unwilling to implement EE improvements in their production processes[352]; • As EE investments are not the core budgeting priority for many companies, there are no	Based on the ex-ante assessment, inefficient production processes account for a large part of energy consumption however: • Projects in this market segment are typically capital intensive, with limited positive impact on the core business of	

[349] Creation of an investment platform for smart cities and islands initiatives in Croatia. European Advisory Investment Hub. EY. 2019
[350] Assessing the potential future use of financial instruments in Croatia. A study in support of the ex-ante assessment for the deployment of EU resources during the 2014-2020. EIB. PwC. Final Report September 2015
[351] Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
[352] Assessing the potential future use of financial instruments in Croatia. A study in support of the ex-ante assessment for the deployment of EU resources during the 2014-2020. EIB. PwC. Final Report September 2015

	sufficiently-developed projects or long-term project portfolios[353]; • Due to the limited experience in EE investment, banks tend to consider them high risk and are either not willing to provide project finance or offer it at high interest rates, limited maturity of loans, and high collateral requirements. This hampers the ESCO market development, and makes it difficult to finance projects[354].	enterprises and limited economic benefits (energy savings) in the medium term.	

ESIF resources and existing financial instruments

Croatia, through 4 national programmes, benefits from **ESIF funding of EUR 10.7 billion** (circa EUR 2,529 per person, one of the highest in EU). For the **low carbon economy, EUR 875m** has been allocated (EUR 625m from ERDF; EUR 237m from EAFRD; EUR 11.8m from EMFF)[355].

Based on information provided by the Managing Authority (MA), OP resources allocated for **EE are EUR 531m**.

In the 2014 – 2020 period, Croatia contributed **EUR 410m**[356] **of its ESIF** (circa 4% of its budget) **to financial instruments** (ERDF).

Based on information provided by the MA, **EE related financial instruments** received an ESIF endowment of **EUR 80m**, equal to circa 16% of (ESIF backed) EE related support. Below a brief description of EE financial instruments is reported.

- **Financial instrument for EE in enterprises**

  The instrument is managed by HBOR, which received an ESIF contribution of EUR 35m and it takes the form of a risk sharing loan instrument, where ESIF will contribute to 50% of the portfolio (charging a zero percent interest rate) and commercial banks, who will deploy the instrument, will contribute the remaining 50%, charging an interest rate defined during the public procurement process.

  HBOR has recently closed the call for the selection of financial intermediaries and it plans to be ready with the financial product by the end of the second quarter 2020. Final recipients include enterprises (of all size and sector) performing EE projects generating at least 20% of energy savings compared with the 'pre-project' situation. Final recipients are also expected to benefit from technical assistance (provided under the ELENA scheme) from consultants that are currently being selected by HBOR. The consultants will support both the technical preparation of the projects and with the project submission to the financial intermediaries.

  Based on information provided by the MA, the financial instrument is expected that 70 companies will generate 69.5 GWh of energy savings, and 17.5 GWh of energy from renewable sources.

- **Financial instrument for EE in public buildings**[357]

  The financial instrument is managed by HBOR and it was launched in 2018 (first loan signed in Autumn 2018) it is developed in combination with a grant scheme funded under the SO 4c1 *'Reducing energy consumption in public sector buildings'* of the OP Competitiveness and Cohesion (managed by the Ministry of Construction and Physical Planning). Based on information provided by the MA, the grant contributes to 35% - 60% of the

[353] Assessing the potential future use of financial instruments in Croatia. A study in support of the ex-ante assessment for the deployment of EU resources during the 2014-2020. EIB. PwC. Final Report September 2015
[354] Assessing the potential future use of financial instruments in Croatia. A study in support of the ex-ante assessment for the deployment of EU resources during the 2014-2020. EIB. PwC. Final Report September 2015
[355] https://cohesiondata.ec.europa.eu
[356] www.fi-compass.eu/financial-instruments/Croatia
[357] Creation of an investment platform for smart cities and islands initiatives in Croatia. European Advisory Investment Hub. EY. 2019

investment, while the financial instrument to 35% - 65% (depending to the development index and climate conditions).

Public sector entities (e.g. cities, counties, schools, kindergartens, hospitals, etc.) can apply to a grant call (managed by the Ministry) demonstrating that at least 50% of energy for heating will be saved after the renovation. Before the official submission of the documentation, the applicant may require TA (mainly administrative support, but also informal advice on the specific EE intervention) from the Environmental Protection and EE Fund.

Projects which have approved grant decision can apply for the financial instrument to cover capital expenditure not covered by the grant. Financial instrument provides loans (without leverage) at favourable conditions such as low interest rates (0.1% to 0.5%) and longer tenors compared with commercial banks (14 years maximum). EE projects financed through this financial instrument are procured through traditional public procurement procedure, therefore final recipients are always public authorities that in Croatia are allowed to exceed their debt capacity threshold when developing EE projects (or projects supported by EU resources).

Based on the latest information provided by the MA (second half of 2019) the total allocation has been contracted. In terms of non-financing results, the financial instrument (that is operating in conjunction with a grant scheme), 22 GWh of energy savings (while the entire programme is expected to generate 62GWh).The financial instrument reported very good performances as in less than 1 year the allocated endowment was fully deployed, recently the MA has increased the allocation with an additional EUR 28mln, that is expected to be used to co-finance the pipeline of EE projects supported by the last grant call. As described before, final recipients of this financial instrument will also be able to benefit from technical assistance (provided under the ELENA scheme) for the projects preparation.

- **Financial instrument for EE in public lighting**[358]

  The financial instrument is managed by HBOR and it was launched in the beginning of 2018, while the first loan was signed in autumn 2018. Under this financial instrument, HBOR is managing EUR 20m of ESIF by mean of loans (without leverage) to public sector entities (e.g. municipalities) performing EE renovations in public lightings (as mentioned above, local authorities can exceed their debt capacity when borrowing for these type of projects).

  This financial instrument is not combined with grants, therefore it had a slower uptake compared to the financial instrument for EE in public buildings, nevertheless, as of last week, circa 61% of resources under management have been already allocated: signed loans represent 22% of resources under management; approved loans represent 19% of resources; projects under assessment represent another 13% of resources and the so called ‘strong pipeline’ accounts for the remaining 7%.

  According to HBOR expectations (communicated in January 2020), in the next twelve months, all resources are expected to be allocated and spent. In non-financial terms, the financial instrument is expected (as of 2023) to generate savings worth 15GWh. As already reported in the previous bullet points, also this financial instrument will benefit from the TA support provided under the ELENA facility.

[358] Creation of an investment platform for smart cities and islands initiatives in Croatia. European Advisory Investment Hub. EY. 2019

Investment needs

The NECP includes estimates for investment needs, summarised in the following table.

Investment needs (EUR bn)	2021 - 2030	2031 - 2050
Building sector (energy renovation)	1.70	3.63
Building sector (nZEB new construction)	4.97	13.57
Electricity generation	2.12	4.79
Transmission of electricity	1.03	1.29
Electricity distribution	1.30	2.60
Heating	0.08	0.16
Solar thermal systems	0.40	0.79
Natural gas transportation and distribution	1.39	0.36
Oil sector	1.69	1.29
Hydrocarbon prospecting	3.16	1.86
Infrastructure of alternative energy forms in transport	0.07	0.43
Production of advanced biofuels	0.48	0.09
Total	**18.39**	**30.87**

As reported in the table, **buildings related investments** are the single largest investment cost of the NECP (over the 2021 – 2050 period, buildings related investments account for **48% of total investments**).

The amount of investment that will be needed to support **nZEBs**, that will become the standard required for new buildings from 2021 (it is already the standard for public buildings), is particularly considerable.

Hungary

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan of Hungary;*
- *Final version of the National Energy and Climate Plan of Hungary;*
- *EC assessment of the draft National Energy and Climate Plan of Hungary;*
- *Hungary Ex-ante assessment Phase 1 (TO1, TO2, TO3, TO4, TO8). Szazadvév. 2016;*
- *National Energy Efficiency Action Plan. 2017;*
- *Energy Efficiency Trends and Policies in Hungary; Odyssee-Mure training programme. 2018. HEA Hungarian Energy Agency;*
- *National Energy Efficiency Action Plan. 2017;*
- *Creation of a multi-sectorial investment platform in Hungary. EY. December 2018;*
- *Eurostat national statistics;*
- *Odysee-mure, Hungary country profile;*
- *EU building stock observatory;*
- *EU contraction sector observatory;*
- *EU Energy Poverty Observatory Member State Report Hungary;*
- *JRC Science for Policy Report, Accelerating energy renovation investments in buildings 2019;*
- *JRC Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies, 2016;*
- *JRC Science for Policy Report, Energy Service Companies in the EU 2017;*
- *Commission staff working document. The EU Environmental Implementation Review 2019 Country Report Hungary 2019;*
- *Commission Staff Working Document Country Report Hungary 2020;*
- *Allocation of Cohesion policy funding to Member States for 2021-2027. European Court of Auditors. March 2019;*
- *EPBD Implementation in Hungary, Status in December 2016;*
- *European Social Policy Network, In-work Poverty in Hungary, 2019;*
- *European Commission Spring 2020 economic forecasts.*

An interview was conducted with Hungarian Development Bank MFB

Context overview

The country has a population of about 9.8m inhabitants (2.2% of the EU28) which has declined over time (-3% in the last 10 years) and this negative trend is expected to continue despite the positive economic performance in the country in recent years. It is expected that by 2030 the population will further decrease to 9.5m[359].

[359] EUROSTAT

Hungary underwent a challenging period related to the financial crisis in 2009, as most EU countries but managed to gradually recover and eventually achieve one of the strongest economic expansions in the EU in recent years[360] up until the current crisis generated by the COVID-19 pandemic.

The national GDP was increasing by 4% each year since 2014, even sustaining the overall EU slowdown of 2019 mainly due to the booming activity in the construction sector[361]. According to latest projections[362] related to measures undertaken to limit the spread of COVID-19 and the overall effects of the pandemic, the Hungarian economy is expected to contract significantly in 2020 and unemployment is expected to raise again. More specifically, the European Commission spring economic forecast for 2020, foresees a 7.0% contraction of the economy that will lead to an increase of unemployment to 7.0% (from 3.4% in 2019). In 2021 the economy is expected to rebound with a GDP growth of 6% (compared with 2020) but unemployment is expected to remain higher (6.1%) than the pre-crisis level.

The crisis could have a dual negative impact on EE investments, by both **reducing the demand** (e.g. households and enterprises may decide/be forced to postpone investments) **and the financial supply** (e.g. financial intermediaries may become more selective in their lending activity) **therefore increasing the importance of EE related supporting schemes.**

Final energy consumption in Hungary in 2018 was 18.5Mtoe (2% of the EU27) and it has slightly decreased (-1.1%) compared to 2005, while at the EU27 level it has decreased by 4.9%.

- Consumption per capita in 2018 (1.9toe/person) was 14% lower than the EU27 average (2.2 toe/person) however, it increased by 9% in the last 10 years (while at the EU28 level it decreased 6%);
- Energy productivity (GDP over the gross available energy) in 2018 was 4.6 Euro per Kg of oil equivalent (one of the lowest in EU), showing a strong reliance on energy to generate GDP (this index increased of 9% in the last 5 years);
- Sectors contributing to final consumption are: households (34% of total), transport (24%), industry (23%) and services (12%). The building sector represents the largest end-use in Hungary, accounting for 47% of national final energy consumption: the third highest among EU countries.

	Overview	Consumption	Energy Efficiency (EE)
Residential Sector	• The stock of dwellings[363] is 3.9 million (2% of EU27), circa 97% built before 2000; • 20% of residential buildings (750k) were built from pre-fabricated building blocks in 1960-90. As of 2018] 36% of panel buildings were refurbished][364];	• In 2017 Households' energy consumption was 6.3Mtoe (2% of EU28) [365]; • Consumption per dwelling is 1.7toe (19% higher than EU average)[366]; • The residential sector accounts for 78% of buildings' consumption (75% of heat	• 90% of the building stock needs renovation, more than 25% of the population live in houses with poor living conditions (damp walls, leaking roofs)[368]; • During 2000-2016, energy savings in the residential buildings were estimated at 0.9Mtoe, or 16% of 2000 consumption[369];

[360] Commission Staff Working Document Country Report Hungary 2020
[361] Commission Staff Working Document Country Report Hungary 2020
[362] European Commission Spring 2020 economic forecasts. May 2020
[363] Odyssee database, stock of dwellings (permanently occupied) year 2016
[364] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority
[365] EUROSTAT
[366] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[368] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority
[369] Odyssee database, technical final energy savings

	• A boom in the housing market was observed in recent years with a rise in prices.	energy demand), 10% more than the EU average[367]; • Household energy use is dominated by gas (46%) and wood (28%), then electricity (15%) and heat (8%).	• Savings occurred mainly in the beginning of 2000s (90% of 2000-16 EE were done before 2013).
Industry	• Industry represents circa 31% of GPD[370] and it employs circa 21% of labour force[371]; • The industry production index increased by 29% between 2010 and 2017[372].	• In 2017, industry's energy consumption was 4.3 Mtoe (2% of EU28)[373] and it increased sharply (+17%) in the last 5 years; • Sub-sectors contributing the most to consumption are chemical (26%), food and tobacco (14%), non-metallic minerals (13%).	• During 2000-2016 energy savings undertaken in industry were worth 1.5Mtoe or 41% of 2000 consumption[374]; • Most of aforementioned energy savings were achieved in the beginning of 2000s (2/3 of 2000-16 EE were done before 2006).
Public Sector	• Between 10,000 and 12,000 buildings are used by the service sector (including public administration) [375], limited information is the stock and condition of public buildings.	• In 2017, services' energy consumption (including public administration) was 2.1Mtoe (1% of EU28) decreasing over time (-8% last 5years VS +2% in EU28).	• Under Art. 5 of the Energy Efficiency Directive (EED), every year 3% of the useful floor area of Central government buildings bigger than 250m2 need to be renovated (this corresponds to nearly 14,500-15,000 sq.m. of floor area per year in HU)[376].

EE targets, measures in place/proposed

EE is declared to be a priority in Hungary (e.g. in the National Energy Strategy and the National Energy Efficiency Action Plans) with a focus on (i) reducing energy imports; (ii) improving energy security and (iii) promoting energy affordability (especially in the residential sector). The overall economic conditions have been favourable in the country, especially after 2014, in order to promote a renovation agenda for buildings. The prospects going forward, related to renovation of buildings will need to be reassessed after the effects of the current crisis are more accurately measured.

Most measures outlined in the National Energy and Climate Plan (NECP) were previously defined in the National Energy Strategy[377] which was set up in 2010 and updated in 2015 (for the period 2015-2020). The main parameters of this strategy related to buildings are the following:

- The application of cost-optimal requirements to be defined for all buildings receiving state support for renovation;
- Near Zero Emission (NZE) standards for all new public buildings after 2019 and for all buildings after 2021;
- Application of new energy performance labelling system and detailed definition of NZE requirements;
- Obligation for energy audits and energy performance certificates with every transaction (sale or rent of properties);
- Technical requirements for renovation of existing buildings moving closer to requirements for new buildings;
- Set of annual renovation targets for buildings in all sectors;

[367] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority
[370] Central Intelligence Agency, the world fact book (data refers to year 2017)
[371] About Hungary. Hungarian Investment Promotion Agency. 2017 (data refers to year 2016)
[372] EUROSTAT
[373] EUROSTAT
[374] Odyssee database, technical final energy savings
[375] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority
[376] National Energy Efficiency Action Plan. 2017
[377] EPBD Implementation in Hungary, Status in December 2016

- Implementation of awareness campaigns.

EXISTING POLICIES

The policies and measures already in place, are relying mainly on financing schemes from ESIF and national funds both in the form of grants and financial instruments. Under the **continued implementation of existing policy measures**, final energy consumption in 2030 is expected to still be 18% higher than in 2016. The increase is attributable to the **rise in industrial production** and higher fuel consumption resulting from increasing income, while household energy consumption is expected to decrease. Under **existing policy measures** (not including the potential impact of the new policies), by the year 2030:

- Consumptions in **households** is expected to be remain constant since the reduction of the population will be offset by the increase residential floor area requiring heating;
- Consumption in **services** is expected to increase by 15% related to 2016;
- Consumption in **industry** is expected to increase more than 48% compared to 2016.

In the EE context, it is important to mention the activities the Hungarian Central Bank is promoting in order to enable domestic banking, capital market, insurance and fund services and products to contribute more substantially to environmental sustainability (the so called green programme[378]).

In December 2019, the Hungarian Central Bank published the '**green retail lending**' pilot scheme, to support EE financing in residential buildings[379]. Under this scheme, banks would be eligible for lower capital requirements based on the volume of performing mortgage loans and personal loans registered at the end of the calendar year, distributed between 1 January 2020 and 31 December 2023 to private persons for the energy-related renovation of residential buildings or for the purchase or construction of homes with at least 'BB' energy performance rating, and to condominiums or housing associations for energy-related renovation. Together with other awareness raising measures that the Hungarian Central Bank will deploy in the coming years, the afore-described initiative is expected to increase the demand for more efficient buildings and EE renovations.

NEW POLICIES (2020 – 2030)

The NECP reports important new measures, for the 2020 and 2030 period, in particular the construction of two new nuclear power plants, allowing the phasing out of carbon power generation in Hungary and a strong push towards renewable energies (in particular solar energy). According to the final NECP, three main measures are being added to the existing ones for the next period:

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy cons	24.5	27.0	31.0
Final energy cons	18.5	19.0	21.0

- Introduction of tax relief measures for businesses that undertake measures to improve their energy efficiency;
- The introduction of an obligation scheme for energy providers and end users;
- An overall promotion of ESCOs and EPC contracting (although specific measures are not defined).

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• Based on the NECP, with the new measures, consumption in the household sector in 2030 will be 20% lower	Existing measures: • The measures are focusing on implementing and defining a set of requirements for renovations and construction of new buildings;

[378] https://www.mnb.hu/greenfinance/english
[379] https://www.mnb.hu/letoltes/green-retail-lending-in-hungary.pdf

	than in 2015 (10% with existing measures only); • The decrease will reach 30% in relation to natural gas and district heating consumption.	• These measures are complemented by a set of financing schemes mainly focusing on grants but including also financial instruments; • Block house (panel) refurbishment programmes have been implemented over the years with grant support; • For single houses and dwellings, the grant programme 'Warmth of homes' allowed the modernisation of more than 130,000 households since 2014, with EUR 86m of grant support; • An example of financial instrument is the New Residential Loan Scheme provided by the Hungarian Development Bank. New planned measures/priority objectives: • Development of household-scale small power plants (e.g. photovoltaic) combined with smart metering and electricity storage; • Modernisation of household heating equipment and use of modern biomass based heating fuels to ensure the sustainable use of fuel wood; • Installation of 1m smart energy meters in households.
Industry	• With new policy measures, energy consumption in the industrial sector in 2030 will be 29% higher than in 2015 (the largest increase expected in renewables and electricity consumption, while a decrease is expected in coal consumption);	Existing measures: • Since 2017 tax credit was introduced for EE investments, up to: 50% for SMEs; 40% for mid-caps; 30% for large enterprises[380]; • On the financing side, SMEs related measures rely on ESIF grants, combined with loan programmes for EE and renewables (see dedicate section later on in the report) mostly implemented by MFB. New planned measures/priorities: Hungary plans to explore the possibility of an EE obligation scheme to develop a large-volume ESCO programme, involving private funding, improving the energy performance of buildings, and a large volume multi-year household building energy programme, with the possible inclusion of the transport sector.
Public Sector	• The targeting is defined at 3% of central government buildings (circa 15,000 sqm) to be renovated every year[381]; • Under new measures, consumption in services (including public sector) at 2030 will be 8.2% lower than 2015.	Existing measures: • Owners and operators of public buildings are required to prepare an EE action plans every 5 years, and to report implemented measures to the National Network of Energy Managers'; • Renovation of public buildings has been supported with 100% grants. New planned measures/priorities: • The NECP refers to the intention to further promote the use of EPC contracting.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Hungary is briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• Sharp rise in the cost of building materials and construction in recent years.	• Weak ESCO market with negative reputation in the market.	• The economic conditions after 2014 have encouraged the

[380] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority
[381] EE trends and policies in Hungary; 2018; Hungarian Energy and Public Utility Regulatory Authority

			implementation of financial instruments in EE renovations.
Residential Sector	• High up-front costs for EE works (the ex-ante reports that beneficiaries are required to contribute to the investment with at least 10-30% own resources); • Households seem unwilling to undertake EE related debt; • In wider investment and construction projects, the EE and renovation components of such investments cannot be easily separated [from non EE related renovations]. This often lowers the financial return of the investment; • The financing of individual houses is not always profitable for commercial banks due to the high monitoring and administrative costs; • The COVID crisis could have a negative impact as it could reduce households' disposable income/ financial resources; • Due to the uncertainty about future economic conditions, generated by the COVID crisis, households may decide to postpone long-term investments, such as EE renovations.	• Lack of information on EE costs and returns, and lack of awareness on benefits from EE renovations and the use of financial instruments; • Lack of due diligence in the construction sector. This often leads to lack of quality results in renovations. High share of grey market in observed in the construction sector which hinders credibility; • The results of EE projects cannot be precisely measured and forecasted in all cases (the results also depend on changing consumer habits, weather), this can be a serious risk limiting ESCO-type financing; • A high number of renovations are self-performed [between 27% (central region) and 50% (other regions)] with limited energy savings; • As reported in the NECP, since 2013 subsidies on the energy supply are in place, thus household energy costs of Hungarian consumers are one of the lowest in Europe. This low cost could be a counter incentive for households to conduct renovations.	• Due to the availability of grants, increasing awareness for the benefits of financial instruments is important; • The use of financial instruments combined with technical assistance (ex-ante assessment reported that grant should be at least 30% of CAPEX), will lead to better quality results in renovations and higher energy savings; • Solutions able to support ESCO type financing could be very useful (as households tend to be reluctant to dedicate their (scarce) resources to EE).
Industry	• Payback period of EE investments tend to be too long to be attractive; • Banks are reluctant to finance SMEs, or investments below the value of EUR 1.4m; • Banks are not able/willing to assess the cash flows of companies and the positive implications of EE renovations. They rather only consider the financial situation of a company and their ability to repay a loan without taking into account the EE savings; • The COVID triggered economic recession will have an impact on enterprises that may have more difficulties to access the credit sector (due to the less performing economic and financial ratios);	• Companies (in particular SMEs) tend not to be aware of the benefits of EE improvements; • SME are unwilling to assume debt for EE renovations; • ESCO companies have a very bad reputation due to past failed projects and default of some companies. They do not have an organised association and the market seems to be at a complete halt.	• MFB has implemented several financial instruments for EE improvement for SMEs; • The combination of financial instruments with grants seems to be a preferred model; • Combining financial instruments with technical support would provide additional credibility to the implementation of EE projects and securing better quality results with additional savings; • Dedicated financial instruments for EE could also support the development of the EPC model in the industry sector and in the business sector at large.

	• Due to future uncertainty, enterprises may moreover reduce further their investment plans and they could postponing non-core investments.		
Public Sector	• Regulatory limits to borrowing capacity of municipalities and other public entities prevent from investing in EE related measures in forms different from grants; • Budget constraints deriving from need to respond to the COVID crisis and debt capacity could become a relevant issue, as the Hungarian debt to GDP ratio is expected to increase to 75% in 2020 (it was 66.3% in 2019) and to remain on a similar level (73.5%) also in 2021.	• ESCO market is very limited in the public sector due to both administrative constraints (e.g. procurement, regulation, etc.) and the availability of generous grants; • ESCO companies have a very bad reputation due to past failed projects and default of some companies. They do not have an organised association and the market seems to be at a complete halt[382]; • The weaknesses of the ESCO market have negative consequences also in the use of EPC contracting.	• Public sector buildings have been using grants up to 100% for renovations; • There is limited experience with financial instruments; • However, the additional and strict requirements implemented for public buildings will require technical assistance to achieve the high standards of renovations.

ESIF resources and existing financial instruments

Hungary is one of the largest per capita beneficiaries of EU support (ESIF funding of EUR 25bn, on average of 2,532 Euro per person from the EU budget over the period 2014-2020). For **low carbon economy**, circa EUR 3.25bn has been allocated (EUR 1.85bn from ERDF; EUR 994mln from CF and EUR 394mln from EAFRD) [383] while for overall (ESIF backed) **EE related support** has been estimated in circa **EUR 1.5bn**[384].

Hungary is the **second Country in Europe in terms of ESIF contribution to financial instruments** (EUR 2.3bn) or circa 9% of its EU budget. **EE related financial instruments** received **EUR 204m** [385], equal to circa 13.5% of EE related support. Several financial instruments are currently active in diverse sectors and most are managed by the **Hungarian Development Bank** (*Magyar Fejlesztési Bank or MFB)*. The agricultural guarantee fund AVHGA is also implementing guarantee financial instruments with ESIF.

Overall, MFA and AVHGA are implementing diverse financial instruments taking the forms of loans, guarantees, and equity. However, it is important to highlight the fact that several financial instruments are implemented in combination with ESIF grants[386]. This model is implemented through the coordination of MFB with the respective MAs whereby the financing products under the financial instrument are approved by the financial intermediary and the grant by the MA. In practise, these so called 'combined' programmes are distinct/separate operations targeting the same projects. This is an important aspect of the Hungarian financial instrument landscape that needs to be taken into account for the future.

Under MFB, 16 financial instruments have been identified as being implemented in the current programming period with ESIF. These financial instruments have been financed by The OPs Environment and Energy Efficiency (KEOP), Economic Development and Innovation (GINOP) and Regional OP for Central Hungary (VEKOP). Financial instruments specifically focusing on EE are further elaborated:

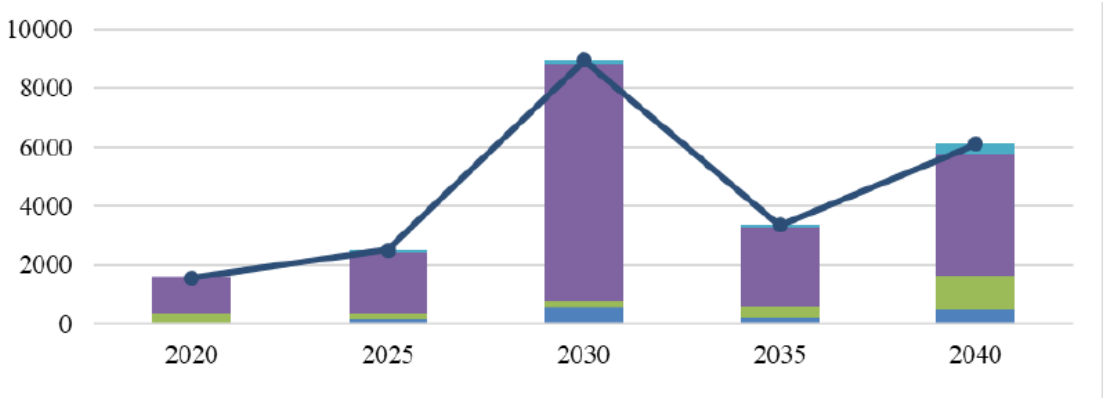
[382] JRC Science for Policy Report, Energy Service Companies in the EU 2017
[383] https://cohesiondata.ec.europa.eu
[384] Data provided by DG REGIO based on an analysis of fields of intervention
[385] Data provided by DG REGIO based on an analysis of fields of intervention
[386]https://www.fi-compass.eu/sites/default/files/publications/Fi-Campus-DAY2-CASE-STUDY-LowCarbon_G-Nykos_0.pdf

- **Energy loans for SMEs**: This facility was implemented in 2017, targeting SMEs and the improvement of EE in buildings with the use of renewables. The financing was provided with 0% interest rate loans with a tenure up to 15 years. The loan amount would cover 90% of the project (remaining 10% own participation). The budget of the facility was EUR 177m;
- **Loans for Improving EE in housing**: This facility was implemented in 2017, targeting individual home owners and home owners associations in multi apartment buildings. The financing was provided through 0% interest rate loans with a maximum tenure of 20 years. The financing would cover 90% of the EE renovations (10% own participation). The budget of the facility was EUR 370m;
- **Combined loans for EE for SME buildings**: The facility was implemented in 2017, targeting SMEs and their EE renovation projects with a focus on the usage of renewable energy (mostly solar panels). The financing was a combination of grant (max 45% of CAPEX and in the range of EUR 9k - 150k) and loan (EUR 9k-150k), while own resources were at least 10% of the investment. Tenor of the loan, up to 10 years.

It is worth also mentioning that a soft loan facility has also been implemented with national funds through the Ministry of Economy. The facility was called 'Home saving scheme' and was implemented in 2016 with a budget of EUR 143m.

Investment needs

The final NECP foresees total investment needs for the period 2016 to 2040 at circa EUR 60.0bn (HUF 20,401bn) equivalent to circa EUR 1.6bn per year. The NECP also provides a graph, with the breakdown of investment needs amongst the different policy areas (energy and heat production, transport, services, industry, households, and agriculture.



The purple colour[387] in the graph corresponds to the renovation needs for households. It is obvious that the main bulk of the foreseen investment needs are related to the specific priority for the period 2020 to 2040. The exact numbers are not provided but a rough visual estimate of the investment needs in household renovations is EUR 48bn (HUF 16,000bn).

[387] The remaining colours correspond to: Green-Transport; Dark blue-Energy production and heating; Light blue-Services; Industry and agriculture do not feature in the graph. The amounts are in bn HUF.

Ireland

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan of Ireland;*
- *EC assessment of the draft National Energy and Climate Plan of Ireland;*
- *Draft National Climate Action Plan 2019;*
- *Long Term Renovation Strategy, 2017;*
- *National Energy Efficiency Action Plan. 2017;*
- *Energy in the Residential Sector, 2018.*

Context overview

Ireland has a population of about **4.9mln inhabitants** (1.1% of the EU27) which has increased over time (8.36% during 2008 - 2018)[388]. The population is expected to grow continuously and reach 5.3mln by 2030. **Real GDP** per capita is about **EUR 58,000** (210% of the EU27 average). Over the last 5 years, Ireland had the strongest growing economy in the EU on a per capita basis[389].

Final energy consumption in 2018 was 12.3Mtoe (1% of the EU27) and it has **decreased by 3% since 2005,** while at the EU27 level it decreased by 4.8%[390]. **Consumption per capita** (2.54oe/person) is 14.5% higher than the EU average (2.2 toe/person) and it increased by 9% in the last 5 years (while at the EU27 level it remained the same)[391]. The carbon intensity of Ireland's energy consumption is significantly higher than EU average, due to the high fossil energy mix of Ireland. **Energy productivity** (GDP over the gross available energy) is 18.8 Euro per kg of oil equivalent (231% of the EU average)[392]. This shows Irelands transformation to an economy with a high share of services, a process accelerated by the economic crisis and subsequent recovery (this index increased by 49% in the last 5 years). **Sectors** contributing to final consumption are: transport (40%), residential sector (23%), industry (22%) services (13%) and agriculture and fishery (2%)[393].

	Overview	Consumption	EE
Residential Sector	• The residential sector consists of 1,7mln housing units (total floor area 202 mln m²)[394]: - 50% of all households live in single family houses, 43% in semi-detached housing and	• Households are responsible for 2.8 Mtoe (1.1% of EU27)[396];	• Residential sector energy efficiency has improved from 2000-2014 by 35% (compared to EU average of 29%). This is mainly through new buildings and not through retrofitting;

[388] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[389] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

[390] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020

[391] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[392] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

[393] Energy Statistics in Ireland (https://www.seai.ie/data-and-insights/seai-statistics/energy-data/

[394] Energy-in-the-Residential-Sector, 2018

[396] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

	only 7% in apartments (EU average 33%); - Over a quarter of the housing units are rented and 16% of all households live in social housing; - Ireland has the youngest residential housing stock of all EU MS[395].	• Consumption per dwelling 1.5toe (7% higher than EU average)[397]; • High share households using of high carbon fossil fuels oil (41%) and coal and peat (13%)[398]; • Only 4.4% of Irish households have difficulties to keep their home adequately warm, compared to 7.8% in the EU. On the other side the percentage of households with arrears on utility bills with 9.9% is higher than the EU average of 7.0%[399].	• About 25,000 mainly shallow and medium retrofits (to EPC class C) per year[400].
Public Sector	• More than 10,000 buildings in the public sector. Around half are schools. The remainder are approximately 3,000 offices and a further 2,000 health care facilities[401]; • Total central government floor space is 350,000m[2402].	• Public sector is responsible for 0.5 Mtoe consumption[403].	• For the period 2009-2015 energy efficiency was improved by 24% which is 0.3 Mtoe[404].
Industry	• Industry accounts for more than a quarter of real GDP (39% in 2017)[405]; • The industry production index increased by 56% between 2010 and 2017. The highest rate in the EU[406].	• Consumption of industry is 2.6Mtoe (1% of EU27) and it decreased by 2.7% in the last 10 years[407]; • Energy intensity of industry has improved by 27% relative to 2000 mainly through structural changes[408].	• During 2000-2012 0.8 Mtoe of energy efficiency measures were achieved equating to an improvement of 21%[409].

EE targets, measures in place/proposed

At the time this document was produced, the final version of the National Energy and Climate Plan (NECP) of Ireland was not available. The Department of Communication, Climate Change and Environment advised to use the draft NECP and the national Climate Action Plan.

[395] A national renovation strategy for Ireland, 2014
[397] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[398] Energy-in-the-Residential-Sector, 2018
[399] Energy Poverty Observatory, Ireland –Member State Reports, June 2019
[400] Draft National Energy and Climate Action Plan
[401] Better buildings - A National Renovation Strategy for Ireland, 2014
[402] National Energy Efficiency Action Plan For Ireland, 2018
[403] Energy Statistics in Ireland
[404] Annual Report 2018 on Public Sector Energy Efficiency Performance
[405] Central Intelligence Agency, the world fact book
[406] EUROSTAT
[407] EUROSTAT
[408] Energy-Efficiency-in-Ireland-2016
[409] Energy-Efficiency-in-Ireland-2016

Several policy measures are in place, relying both on **EU** (ERDF) and **national resources** (such as the Climate Action Fund). Existing measures (a list of them is reported in the following table) cover all sectors and they include investment grants, tax rebates, a carbon tax and revolving instruments.

For the **2020-2030 period**, the National Climate Action Plan (NCAP) envisages the continuation of some existing measures and new measures to be implemented from 2021. It is more ambitious and specific than the overall energy savings envisaged in the draft NECP (reported in the following table), which is considered to be **of very low ambition** by the EC.

(draft NECP) EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy consumption (PEC)	14.4	13.9	15.9
Final energy consumption (FEC)	11.8	11.7	13.0

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• After 2020 all new buildings to be nZEB[410] In 2021–2030 it is expected: • 45,000 deep retrofits per year (at least class B); • Quadrupling home renovation, doubling both the number of renovation and depth of renovation; • Installing 600,000 heat pumps (400,000 in existing buildings)[411]; • Rolling out district heating to 50,000 homes.	Existing measures (list of): • **Better Energy Programme** an umbrella for several residential retrofit grant programmes addressing the retrofit of private residential housing, with special programmes addressing energy poverty, elderly people as well as subsidies for local authorities for the purpose of social housing; • There are also tax incentives for home improvement measures; • Successful *Superhomes* project in Tipperary County supported by ELENA TA. New planned measures/priority objectives (draft NECP): Continuation of measures already in place, upscaling and adding to those measures set out in the National Development Plan • Warmth and Wellbeing – 1,500 homes for elderly people and children suffering from chronic respiratory condition; • Deep retrofit – moving from a pilot to a full scale programme covering 50% of the energy poor; • Energy Efficiency Obligation scheme – 25% of required savings to be delivered in residential sector.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings. In 2021–2030 it is expected: • 33% target of actual energy consumption for public sector buildings; • Target of all public buildings and at least one-third of total commercial premises to	Existing measures: • Public sector actions refer to improved standards of new buildings, improved energy management in existing buildings and designation of energy performance officers; • Financial support comes from the central or local budgets; • Carbon and Energy Fund Ireland (CEFI), a dedicated facility procuring ESCOs on behalf of its public sector clients and arranging financing with third party investors. The fund is the Irish subsidiary of a National Health Service (UK) affiliated facility; • Successful implementation of EPC projects with demand response control for leisure centres in Dublin by Codema. New planned measures/priorities (NCAP): • In 2020 a public sector energy efficiency investment programme is going to be defined supporting the 2030 climate and energy targets[412].

[410] This is a requirement coming from the Energy Performance in Buildings Directive (EPBD)

[411] National Climate Action Plan, 2019

[412] https://ec.europa.eu/info/sites/info/files/srss-technical-support-per-country_en.pdf

	be upgraded to energy performance class 'B'.	
Industry	• Reduce ETS industry emissions by 10-15% by 2030; • Enterprise must contribute to the more ambitious targets for buildings (20-25%) and transport (45-50%)[413].	Existing measures: • Energy audits in industry; • SME Programmes – awareness, training and energy audits financed from tax resources; • Large Industry Energy Network – voluntary cooperation between largest energy consumers; • Accelerated Capital Allowances – tax incentives for more energy efficiency equipment; • Ireland Energy Efficiency Fund (IEEF). The fund was set-up in 2014 with a contribution of the Irish Government and private investors. The fund is managed by a professional fund manager and invested at commercial terms in industrial EE projects, the service sector, health care and ESCO projects. The fund closed and invested by 2016[414]. New planned measures/priorities (NCAP): • **Climate Action Fund (CAF), a grant scheme** funded from petrol levies, providing financing for EE measures, expected volume by 2027 EUR 500m[415].

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Ireland are briefly reported in the following table. The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	Based on Draft National Mitigation Plan[416]: • Low willingness to finance energy efficiency measures through loans or top-up of mortgage; • Lack of financing scheme, soft-loans, beside grant based renovation scheme; • High share of energy poverty and people in social housing.	Based on Irish policy documents[417]: • Lack of advice on energy efficiency measures for housing owners; • Energy efficiency or energy bill reduction have a low motivational effect, but has a higher effect in combination with general home improvement; • Tendency for shallow retrofit, as people compare initial pricing and not life-cycle cost; • Split incentives between landlord and tenant; • Distrust in contractors to deliver quality in renovation measures; • Lack of skills regarding EE technology and deep retrofitting among contractors.	• TA programmes, to promote and to quantify EE benefits, to increase the likelihood of EE initiatives; • Financial support (e.g. grant/financial instrument combination) in order to reduce the pay-back period could be useful; • Support to the ESCO model via financial instrument.
Public Sector	Based on the National Renovation Strategy[418]:	Based on Irish policy documents[419]: • Lack of senior level leadership for energy efficiency measures;	

[413] National Climate Action Plan, 2019
[414] http://ieefund.ie/
[415] National Climate Action Plan, 2019
[416] Draft National Mitigation Plan 2017
[417] Draft National Mitigation Plan, 2017 and Better buildings - A National Renovation Strategy for Ireland, 2014
[418] Better buildings - A National Renovation Strategy for Ireland, 2014
[419] Draft National Mitigation Plan, 2017 and Better buildings - A National Renovation Strategy for Ireland, 2014

	• Public finances in Ireland are still a constraint and upfront investments into retrofitting pays off only over several budgetary periods; • Savings cannot be retained by several public entities.	• Fragmentation of public entities especially in the educational sector, resulting in lack of skills to prepare and procure and small scale investments; • Energy Performance Contracting is considered mainly a financing method and not an efficient implementation method.	
Industry	• Business decisions are taken with short investment horizons, typically 3-5 years. Comprehensive energy efficiency measures cannot repay in this period; • Very limited amount of investment grants are available for enterprises.	Based on the National Renovation Strategy[420] • Lack of information on actual energy consumption of different parts of installations; • Life-cycle cost of equipment and buildings is not taken into account when equipment is purchased or buildings are designed; • Lack of support from senior leadership for energy demand management; • Split incentives especially in rented property; • ESCO market is still in a development phase and not well understood by industry.	

ESIF resources and existing financial instruments

Ireland, through 4 national programmes, benefits from **ESIF funding of EUR 3.4 billion** (circa EUR 729 per person). For the **low carbon economy EUR 580m** has been allocated (EUR 175m from ERDF; EUR 404m from EAFRD; EUR 0.8m from EMFF)[421] while the overall (ESIF) **EE related support** is estimated in **EUR 168m**[422].

In the 2014 – 2020 period, Ireland has not set up a financial instrument funded by ESIF. All energy efficiency related support is provided in form of grants such as the Social Housing Retrofit and the Better Energy Warmer Homes Scheme addressing energy poverty, both deployed by the Sustainable Energy Agency Ireland (SEIA).

In the current period there were efforts made to set-up a non-ESIF financial instruments in Ireland. In 2018 discussions started on setting up a Smart Finance for Smart Buildings financial instrument under EFSI, with a national budget contribution of EUR 50m (no ESIF available). Currently, a cost benefit analysis (CBA) is undertaken to give a base for the budget decision.

Investment needs

The draft NECP mentions investment needs for climate action of EUR 21.8 billion for the 2018-2027 out of which EUR 7.6 billion would come from the state budget[423].

[420] Better buildings - A National Renovation Strategy for Ireland, 2014

[421] https://cohesiondata.ec.europa.eu

[422] Data provided by DG Regio based on an analysis of fields of intervention

[423] Draft National Energy and Climate Action Plan

Italy

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Final and draft version of the National Energy and Climate Plan of Italy;*
- *EC assessment of the draft National Energy and Climate Plan of Italy;*
- *Odysee-mure, Italy country profile;*
- *EU building stock observatory;*
- *EU Energy Poverty Observatory Member State Report Italy;*
- *JRC Science for Policy Report, Accelerating energy renovation investments in buildings 2019;*
- *Commission staff working document. The EU Environmental Implementation Review 2019 Country Report Portugal 2019;*
- *Commission Staff Working Document Country Report Portugal 2020;*
- *Allocation of Cohesion policy funding to Member States for 2021-2027. European Court of Auditors. 2019;*
- *EC; fi-compass; Multi-Region Assistance Project Revolving Investment for Cities in Europe (MRA-RICE). 2018;*
- *Puglia Sviluppo, Ex ante assessment on loan based financial instruments to be implemented in the 2014–2020 programming period in the Apulia Regio. 2015;*
- *t33, Ex ante assessment Marche Region / Energy Fund. 2015;*
- *CLES, Ex ante assessment Piedmont Region. 2017;*
- *Lombardy Regio, Ex ante assessment Lombardy Region. 2015;*
- *PwC, Ex ante assessment Emilia Romagna Region. 2016;*
- *KPMG, Ex ante assessment Lazio Region. 2016;*
- *Moderari, Ex ante assessment National OP on Enterprises and Competitiveness. 2016.*

Context overview

Italy has about 60.35mln inhabitants as of January 2019, which has (13.1% of the EU27) slightly decreased (-0.7% in the last 5 years)[424], however by 2030 the population is expected to reach 63.3mln inhabitants[425].

GDP per capita in 2018 was about EUR 26,760 (3% lower than the EU27 average) and has decreased by 5.21% in the last 10 years[426]. It should be highlighted that Italy has deep regional disparities (e.g. inhabitants of northern regions have a much higher GDP per capita than southern regions inhabitants).

Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Italy will suffer a sharp recession in 2020 with the gross domestic product **(GDP) expected to contract by 9. 5%,** before rebounding and grow by 6.5% in 2021.

[424] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[425] National Energy and Climate Plan
[426] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

Final energy consumption (FEC) in 2018 was 116.5Mtoe (11.8% of the EU27) and it has decreased by 15.1% since 2005, while at the EU27 level it decreased by 4.9%[427].

Consumption per capita in 2018 (1.9toe/person) was 13% lower than the EU27 average (2.2 toe/person) and it has decreased by 16% in the last 10 years (while at the EU27 level it decreased by 6%)[428].

Energy productivity (GDP over the gross available energy) in 2018 was 10.1 Euro per Kg of oil equivalent (24.7% higher than the EU average), showing limited reliance on energy to generate GDP[429].

Sectors contributing to FEC are: transport (36% of the total), households (28%), industry (21%) and services (16%)[430].

	Overview	Consumption	EE
Residential Sector	• Italy[431] has 12.42 million buildings intended for residential use, with nearly 32 million dwellings; • More than 60% of this stock is over 45 years old (built before the first energy-saving law came into force); • Of these buildings, over 25% have annual consumption ranging from a minimum of 160 kWh/sqm per year to over 220 kWh/sqm.	• In 2018, energy consumption was 32.06Mtoe (13% of EU27)[432] having decreased by 16% over the last 10 years (2008 – 2018) and by 18.1% compared with 2005 (while at the EU27 level it decreased by 7%); • Consumption per dwelling as of 2016 was 1.4toe (in line with the EU average)[433] but it has decreased by 5% over the last 10 years.	• During the 2011 – 2017 period the residential sector generated annual energy savings equal to **3.6Mtoe/year**, in line with the target foreseen in the Italian Energy Efficiency Action Plan[434].
Public Sector	• The public administration's building stock accounts for approximately 250mln sqm, of which 55 % is occupied by the public administration itself[435].	• In 2017, energy consumption in services (including public administration) was 18.2Mtoe, increasing over time (15% last 5 years VS +2.3% in EU28).	• During the 2014 – 2017 period, **energy renovations** in **buildings of the General State Administration** affected a floor area of **1.9mln sqm** (out of a stock of 15.2mln sqm)[436]; • In order to cope with the requirements of Art.5 of the EE Directive, during the **2021 – 2030 period**, **3.2m sqm of floor area** of buildings associated with the central public administration will need to be **subjected to energy renovation.**
Industry	• Industry accounts for 23.9% of real GDP (2017)[437].	• In 2018, industry consumed 24.3Mtoe (10% of EU27) with a	• During the 2011 – 2017 period, the industry sector generated annual energy savings equal to **2.5Mtoe/year**,

[427] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[428] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[429] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[430] EUROSTAT
[431] Information provided in this section are based on the National Energy and Climate Plan
[432] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[433] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[434] National Energy and Climate Plan
[435] National Energy and Climate Plan
[436] National Energy and Climate Plan
[437] Central Intelligence Agency, the world fact book

		decrease by 30% in the last 10 years[438]; • Industry consumption decreased by 28% in the last 10 years[439].	circa 50% of the target foreseen in the Italian Energy Efficiency Action Plan[440].

EE targets, measures in place/proposed [441]

Italy has a number of policies and measures in place to support EE, the most important are: (i) tax deductions connected to EE interventions in (residential and tertiary) buildings; (ii) the energy savings obligation scheme (white certificates) targeting electricity and gas distributor companies; (iii) the subsidy scheme (*conto termico*) for private entities and public bodies performing EE interventions; and (iv) the recently constituted National Energy Efficiency Fund. A brief description of these measures is reported in the following table.

For the 2021-2030 period, the National Energy and Climate Plan (NECP) largely builds on the 2017 Italian Energy Strategy and is intended to implement a vision of broad economic transformation, in which decarbonisation, EE and renewables (RES) priorities contribute to the objectives of a more environmentally friendly economy. In the following table, the key targets related to EE are reported.

NECP EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary Energy Consumption	148.9	158	125
final energy consumption	115.2	115.2	115.2

From a sectorial perspective, under the measures proposed by the NECP, in the 2005 (baseline) – 2030 period[442]:

- Energy industries will experience a drastic reduction of emissions (-65%), mainly due to the significant growth in electricity production from renewable sources that is needed to achieve the targets is the determining factor;
- The transport sector will reduce emissions by 36% due to the substantial electrification of car transport and, to a lesser extent, to the infiltration of biofuels;
- The residential sector will reduce emissions by 39% due to the significant building renovation rate, the continued efficiency and increasing electrification of the sector, mainly with regard to heating;
- Industry will reduce emissions by 41%, both as regards energy consumption and as regards processes.

In the following table information of main measures for the residential, industry and public sector are presented.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• The sector is expected to contribute to circa **35% of total savings** foreseen in the NECP[443]; • Savings are expected to be related to mainly: structural EE renovations, installation of heat pumps and	Existing measures (list of): • The **tax deduction scheme for EE interventions in (residential and tertiary) buildings** is one of the most important national EE measures. Introduced in 2007, the tax credit is typically equal to 65% of the investment cost. Circa 2.9mln interventions benefitted from this measures and in 2017 the financial impact on the State budget of this measure was circa EUR 1.4bn; • The **national grant scheme** (*conto termico*) can provide support to residential buildings, mainly for renovations to transform existing buildings into near Zero Energy Buildings

[438] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[439] EUROSTAT
[440] National Energy and Climate Plan
[441] Information reported in this section is based on the NECP (if not differently specified)
[442] National Energy and Climate Plan
[443] National Energy and Climate Plan

	improved efficiency of end-use devices.	(nZEB) and for RES based solutions. The annual budget of the scheme is EUR 900mln (EUR 200mln dedicated to the public administration and the rest for private entities); • The **National Energy Efficiency Fund** can support EE interventions in the residential sector. During 2014–2020 the Fund can receive resources for maximum EUR 490mln (national budget) and currently the Fund has an endowment of EUR 185mln. The Fund can (i) provide guarantees to loans connected to EE activities (30% of the Fund's budget); and (ii) it can provided soft loans to EE initiatives. The Fund is managed by the national company Invitalia. New planned measures/priority objectives (NECP): Existing measures are expected to be continued in the post 2020 period, with some improvement, in particular the **tax deduction scheme** will be improved with (i) new provisions to facilitate the transferability of the tax credit - already possible in some cases – in order to provide an immediate incentive to households and other beneficiaries of the scheme; and (ii) it will be complemented with a guarantee fund to support loans targeting EE renovations [no further information was provided about this proposal].
Public Sector	• During the **2021–2030 period**, **3.2 mln sqm of floor area** of buildings associated with the central public administration will be **subjected to energy renovation.**	Existing measures: • The aforementioned national **grant scheme** (*conto termico*) can be used by the public administration for EE interventions (to refurbish buildings and other infrastructures, such as public lighting), as like as soft loans from the **National Energy Efficiency Fund** (that can also support ESCOs); • **EISF backed grants** for EE in public buildings/infrastructures have been implemented and are in place in various regions, moreover some **ESIF backed EE financial Instruments (FI)** are operating in some regions, for instance: Marche, Molise and Lombardy (further information in the next section). New planned measures/priorities (NECP): • Existing measures are expected to be continued in the post 2020 period; • New measures (regulatory) to promote the use of Energy Performance Contracting (EPC) solutions are expected.
Industry	• The sector is expected to contribute to circa **11% of total savings** foreseen in the NECP[444].	Existing measures: • When performing EE interventions, enterprises can receive support (as guarantees or soft loans) from **National Energy Efficiency Fund** (briefly presented above); • Enterprises performing EE interventions can also receive support under the **white certificates** mechanism (connected to the national EE obligation scheme); • **ESIF backed grants** for EE activities performed by enterprises (in particular SMEs) have been implemented and are in place in various regions, moreover some **ESIF backed EE financial Instruments** are operating in some regions, for instance: Puglia, Piedmont, Emilia Romagna, Lazio, Liguria, Marche (further information in the next section). New planned measures/priorities (NECP): • Existing measures are expected to be continued in the post 2020 period.

[444] National Energy and Climate Plan

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Italy are briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Typical barriers preventing EE investments (besides externalities and asymmetric information) are related to: - limited financial resources to devote to EE initiatives (in particular for poor households, that in Italy are located mainly in Southern regions) . The COVID crisis could have a further negative impact as it could reduce further households' disposable income/ financial resources; - limited financial returns of EE interventions (in particular for deep renovations). Financial returns could be further lowered if current low energy prices will endure in the future. • Banks are reported to be reluctant to lend to condominiums due to their peculiar legal structure however some products and experiences have been developed on a small scale[445].	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions; - Difficulties, especially in large multi apartment buildings, to agree on renovation activities.	• TA programmes, to promote and quantify EE benefits, to properly structure EE interventions, in particular with respect to EPC type solutions, it could increase the likelihood of EE initiatives being developed; • Financial support (e.g. financial instrument/grant combination) in order to reduce the pay-back period would be useful.
Public Sector	• Italy has the second highest public debt compared to GDP in Europe and public administrations tend to have limited debt capacity, preventing them to perform EE interventions (the Italian debt to GDP ratio is moreover expected to sharply further increase, to support the economic during the COVID triggered recession); • Based on interviews with national practitioners and financial instrument managers it has been reported that EE projects, in many cases, lacks financial viability because of: - The limited level of energy consumption of buildings (especially in Southern regions); - The need to incorporate in the renovation also anti-seismic works (not generating any positive cash flow for the project); - Banks tend to be reluctant to provide long terms financing (with limited or no recourse) to ESCOs for Energy Performance Contracting (EPC) type transactions.	Based on interviews with national practitioners and financial instrument managers: • Public Authorities have difficulties (lack of skills and financial resources) to manage: - Preparatory activities (e.g. baseline, project structuring, contractual framework, etc.); - procurement process and monitoring activities, in particular for EPC. • Administrative procedures to prepare, procure and award projects is very complex and long, thus prevents preventing public works to be implemented; • The limited size of projects reduce the effectiveness of relatively complex solutions (such as EPC), however important difficulties are related with the aggregation of projects.	

[445] EC; fi-compass; Multi-Region Assistance Project Revolving Investment for Cities in Europe (MRA-RICE). Case Study – Milan. 2018

Industry	• Barriers to EE investments include: - long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities. • A recently passed law allows households to transfer the EE tax deduction to the enterprises providing EE interventions, thus obtaining a discount on the final bill (circa 50%- 65% of total costs). This is creating severe negative financial implications for enterprises (especially SMEs) performing EE works; • The COVID triggered economic recession will have negative impacts on enterprises that could have more difficulties to access the credit sector (due to the less performing economic and financial ratios). Due to future uncertainty, enterprises may moreover reduce further their investment plans and they could postpone non-core investments.	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	

ESIF resources and existing financial instruments

For the 2014–2020 period, Italy benefits from ESIF funding of EUR 44.7bn (circa EUR 735 per person)[446] of which, **EE related support** is estimated in **EUR 1.9bn**[447].

In the 2014–2020 period, Italy contributed **EUR 1.9bn**[448] **of its ESIF** (EUR 1.7bn from ERDF; EUR 142mln from ESF and EUR 90mln from EAFRD) **to financial instruments.**

Based on the data provided by DG REGIO (Geographical Unit for Italy), in 14 OPs it is foreseen to allocate resources of the TO4 to financial instruments (EUR 365m), however so far financial instruments have been implemented only in 8 OPs (EUR 241m)[449].

A brief description of a list of EE financial instruments is presented below:

Marche region, mobility and energy fund[450]

This financial instrument received an OP endowment of EUR 16.4m, and it is managed by Artigiancassa, a dedicated company of the BNP Paribas group, selected by the MA through an open call for tenders. The financial instrument supports, with soft loans, public and private entities performing EE interventions in public buildings, public lighting, public transport means and EE in SMEs. The financial instrument was created in 2016 and based on available information, as of 31/12/2018[451] EUR 12.3mln of the OP endowment was paid to the fund and EUR

[446] https://cohesiondata.ec.europa.eu
[447] Data provided by DG Regio based on an analysis of fields of intervention
[448] www.fi-compass.eu/financial-instruments/Italy
[449] Another regional instrument drawing upon TO4 resources has been moreover implemented in the Puglia Region (EUR 25m)
[450] Information is based on both documents reported on the web page of the financial instrument and of an interview with the Marche MA
[451] https://cohesiondata.ec.europa.eu

7.6m was paid to final recipients. All supported initiatives combine financial instrument and grant resources (under two separate operations).

Piedmont region, energy efficiency and renewable energies fund for enterprises[452]

The financial instrument is managed by the Regional Development Agency of Piedmont Region (FinPiemonte) and it supports enterprises (i) performing EE activities in production processes and/or buildings; and (ii) investing in renewable energies.
As of 31/12/2018453, the total amount committed to the financial instrument (EUR 71.8m) has also been paid to the financial instrument and payments to final recipients were EUR 50.2m.
The measure builds upon a similar supporting scheme developed in Piedmont during the 2007–2013 period. The product combines: a grant component (20% of investment costs); a zero percent interest rate loan (60%) and a loan provided by commercial banks (20%). Supported investments range between EUR 50,000 and EUR 3mln (for SMEs) and between EUR 100,000 and EUR 5mln (for larger companies). The grant/financial instrument combination is done within 2 operations.

Lombardy region, EE fund[454]

This financial instrument was created in 2016 and it is managed by Finlombarda, the regional development agency.
As of 31/12/2018[455], the total amount committed to the financial instrument was EUR 24.5m, the amount paid to the financial instrument was EUR 19.3m; the amount committed to final recipients was EUR 5.3m and payments to final recipients were EUR 2.8m.
The financial instrument supports public entities (i.e. Municipalities) and private enterprises operating for public entities (e.g. concessionaires, etc.) performing EE activities in buildings and other infrastructure. The fund offers a product combining: a grant component (30% of investment costs) and a soft loan (up to 40% of investment costs).
Based on information provided by the financial instrument manager, as of February 2020, 60 projects have requested the support of the financial instrument/grant scheme (12 EPC and 48 traditional public procurement) and all available grant and financial instrument resources (EUR 40m) have been allocated, although not yet paid.

Apulia region, EE loan fund[456]

This financial instrument was set up in 2017 and it is managed by the regional development agency Puglia Sviluppo. The fund offers a product combining: a grant component (40% of investment costs); a zero percent interest rate loan (30%) and a loan provided by commercial banks (30%).

SMEs performing EE/RES interventions can access the fund. Investments can span from EUR 80,000 to EUR 4mln and they must generate energy savings of at least 10% of the ex-ante consumption.

As of 31/12/2018[457], the total amount committed to the financial instrument was EUR 25m, the amount paid to the financial instrument was EUR 6.2m; the amount committed to final recipients was EUR 112,232 while no payments to final recipients were made.

[452] Information is based on both documents reported on the web page of the financial instrument and of an interview with FinPiemonte
[453] https://cohesiondata.ec.europa.eu
[454] Information is based on both documents reported on the web page of the financial instrument and of an interview with FinLombarda
[455] https://cohesiondata.ec.europa.eu
[456] Information is based on documents reported on the web page of the financial instrument
[457] https://cohesiondata.ec.europa.eu

Emilia Romagna region, EE fund[458]

This financial instrument was created in 2017 and received an initial OP endowment of EUR 36m (during interviews the MA informed that the endowment has been subsequently increased to EUR 40m), and it is managed by a private financial intermediary (UNIFIDI Emilia Romagna) selected by the Region via a competitive procedure.

As of 31/12/2018459, the total amount committed to the financial instrument was EUR 36m, the amount paid to the financial instrument was EUR 18m; the amount committed and paid to final recipients was EUR 17m.

The fund offers:

- A grant component (technical support) for the project preparation;
- A soft loan, covering up to 100% of project costs, funded by OP resources (70% of the total, no interest rate charged) and resources contributed by the financial instrument manager (30% of the overall loan, market based interested rate).

Based on information provided by the MA, as of February 2020 the fund allocated circa EUR 26m, mainly related to renewable energies investments (photovoltaics) and building envelopes.

Lazio region, energy fund[460]

The Lazio Region has create a financial instrument to support SMEs (Revolving Fund for small credit) and this financial instrument received also an endowment of OT4 resources, contributed as a dedicated compartment (Piccolo Credito Energia). The overall financial instrument has an OP endowment of EUR 39m while the energy compartment has an endowment of circa EUR 9.6m (recently reduced).

The financial instrument is managed by a private consortium including two financial intermediaries (Artigiancassa and Banca del Mezzogiorno – Medio Credito Centrale) selected by the Regional Development Agency (Lazio Innova).

The Energy compartment of the financial instrument provides soft loans (no interest rate) to SMEs to support investments targeting energy consumption reduction and renewable energies (for self-consumption only).

Although the Lazio financial instrument (Revolving Fund for small credit) is reported to have a very good uptake (more than 2,000 proposals received so far), the EE compartment (Piccolo Credito Energia) is experiencing a very low uptake (only 28 proposals since July 2017) therefore the dedicated endowment (EUR 9.6m) has been recently lowered (to EUR 3.8m).

The main issues seem to be connected with the other existing national grant schemes (e.g. conto termico) that are more appealing to final recipients and perhaps also relate to the lack of a grant component and to the small amount of loans.

Molise region, energy fund[461]

This financial instrument was created in 2018 with an OP endowment of EUR 6.7m (including management fees), and it is managed by the regional development agency FinMolise.

[458] Information is based on the web page of the financial instrument and of an interview with the Emilia Romagna MA
459 https://cohesiondata.ec.europa.eu
[460] Information is based on both documents reported on the web page of the financial instrument and of an interview with the financial instrument manager (Artigiancassa)
[461] Information is based on documents reported on the web page of the financial instrument

The financial instrument targets EE/RE projects in the public sector (e.g. EE in buildings, street lighting renovation, REs plants for self-consumption, etc.) providing zero percent loans ranging from EUR 20,000 to EUR 1m with up to 10 years tenor. To access financial instrument resources the potential recipients has to submit a project proposal, including an energy audit.

As of 31/12/2018[462], the total amount committed to the financial instrument was EUR 6.7m, the amount paid to the financial instrument was EUR 4.0m while no resources were committed/paid to final recipients.

Liguria region, energy fund[463]

This financial instrument was implemented in 2018 with an OP endowment of EUR 4m, and it is managed by the regional development agency FILSE and it is combined with an ESIF grant (also managed by FILSE) worth EUR 4m.

The financial instrument supports EE in SMEs providing:

- A soft loan, with a 0.5% interest rate, covering 40% of investment costs (up to EUR 200,000) provided up-front, with a tenor of up to 8 years with a grace period of up to 1 year; and
- A grant covering up to 40% of investment costs, provided 40% in advance and the remaining 60% at the end of the project.

Investments can range from EUR 25,000 and EUR 400,000. Regarding State Aid, the de-minimis regime was used. SMEs had 10 days to submit their proposals (from 1/3/2019 until 11/3/2019) on the online page of the financial instrument manager providing, among others: project documentation, energy audit, investment timetable, business plan, quotations.

Southern Regions energy/environmental fund

This measure (*Contratto di Sviluppo per la tutela ambientale*) received an endowment of circa EUR 100m drawing upon the National OP Competitiveness and Enterprises (TO4). The national development agency Invitalia is managing the measure that combines financial instrument (circa EUR 71.5m) and grants (both capital grants and interest rate subsidies).

The measure supports projects of important size (more than EUR 20m or more than EUR 7.5m for agriculture processing companies) promoted by enterprises in the five southern regions, to reduce energy consumption and greenhouse gases.

Eligible recipients can be either (i) enterprises operating in the context of a so called 'environmental protection development plan' (*piano di sviluppo di tutela ambientale*) in the energy sector; or (ii) energy intensive companies. Interested enterprises need to submit a detailed proposal using the web page of the programme.

As of 31/12/2018, the total amount committed to the financial instrument was EUR 71.5m, the amount paid to the financial instrument was EUR 17.9m while no resources were committed/paid to final recipients.

Besides existing financial instruments drawing upon 2014–2020 ESIF, it is also worth mentioning that:

- During the 2007 – 2013 programming period, three JESSICA type instruments were developed in the EE field (Sardinia, Sicily, Campania) supporting mainly EE in the public sector (e.g. renovation of public lighting systems, EE in public buildings, etc.);
- During the current programming period, the PF4EE instrument has been implemented in Italy via the commercial bank BPER. The PF4EE Italy (called Life4Energy) targets EE in industry, providing loans (min EUR 40,000; max EUR 5mln) to enterprises. Based on the most recent information 18 loans have been originated so far and more transactions should be supported in the next future.

[462] https://cohesiondata.ec.europa.eu
[463] Information is based on documents reported on the web page of the financial instrument

Investment needs

As reported in the following figure, considering all measures foreseen in the NECP, between **2017 and 2030 a cumulated investment of circa 1.2tn will be needed** (circa **EUR 91bn per year**).

Compared with current measures, the NECP implies an **additional investment of circa EUR 180bn** during the 2017–2030 period (equivalent to an 18% increase).

Table 1 - Investment needed for the development of the energy system (2017–2030)

Values in EUR bn	Investment needs (2017-2030)		(a-b)
	Under current measures (a)	As foreseen in the NEC (b)	
Residential	117	180	63
Tertiary	55	90	35
Industry	27	33	6
District heating (distribution only)	1	2	1
Transport (vehicles only)	732	759	27
Electrical sector (power plants)	47	83	36
Electrical system	30	46	16
Total	**1,008**	**1,192**	**184**

Source: National Energy Climate Plan (page 243)

As reported in the table, the **transport sector will require the large majority of investment** (64% of the all investment).

The **residential sector** is the second sector in terms of investment (15% of the total), with circa **EUR 180bn** during the planning period (circa **EUR 14bn per year**).

For **industry** circa **EUR 33bn** (3% of the total) will need to be invested (circa **EUR 2.5bn per year**)

With respect **EE** measures (excluding the transport sector)**,** an **investment of circa EUR 118bn is planned for the 2021 – 20130 period**, connected to the following measures:

- **White certificates** are expected to generate an **investment of EUR 13.7bn**, with a budgetary commitment for the State of EUR 6.8bn. This measure is a national energy saving obligation scheme targeting mainly electricity and gas distribution companies;
- **Tax deductions for EE retrofitting and renovation of existing buildings** are expected to generate an **investment of EUR 82.5bn**, with a budgetary commitment for the State (tax loss) of EUR 45.4bn. This measure targets both residential and tertiary buildings;
- ***Conto termico*** is expected to generate an **investment of EUR 17.5bn**, with a budgetary commitment for the State of EUR 7.5bn. This measure targets residential and tertiary buildings and the public sector;
- The **National Fund for Energy Efficiency** is expected to generate an **investment of EUR 4.4bn**, with a budgetary commitment for the State of EUR 80mln per year. This measure targets enterprises and public bodies and it will target also the civil sector (i.e. residential and tertiary buildings).

Lithuania

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final[464] versions of the National Energy and Climate Plan of Lithuania;*
- *EC assessment of the draft National Energy and Climate Plan of Lithuania;*
- *2019 and 2020 European Semester Country Reports;*
- *(National) Energy Efficiency Improvement Action Plan for 2017-2019;*
- *2014-2020 JESSICA Evaluation Study for Lithuania, PWC, 2013;*
- *Energy efficiency ex-ante assessment, Ministry of Finance, 2015.*

Context overview

As of the beginning of 2019, Lithuania has a population of about **2.8mln inhabitants** (0.63% of the EU27) which has **declined at a fast pace** over time (-12.57% in the last 10 years and being the worst in the EU)[465] and the negative trend is expected to continue: Lithuania's population in 2030 will be 2.73mln[466].

Lithuania's **GDP** per capita in 2018 was about **EUR 13,310** (48.2% of the EU27 average) and it reported a 31.65% increase in the last 10 years[467]. It is expected that GDP per capita in 2020 will be 24% higher than in 2015[468].

Final energy consumption in Lithuania in 2018 was 5.55Mtoe (0.56% of the EU27) and it has **increased** (+18.84% and being third highest in the EU) **since 2005**, while at the EU27 level, it decreased of 4.93%.[469]

- **Consumption per capita** (1.98toe/person) is 10.9% lower than the EU27 average (2.2 toe/person) and it increased by 23.7% in the last 10 years (while at the EU27 level it decreased by 6.1%)[470];
- **Energy productivity** (GDP over the gross available energy) is 4.85 Euro per Kg of oil equivalent and this index increased by 4.1% in the last 5 years (vs +42.2% in the last 10 years)[471];
- **Sectors** contributing to final consumption are: transport (40% of the total), households (27%) and industry (19%)[472].

[464] At the time of finalising the MS summary, only unofficial EIB machine-translated English version was available
[465] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[466] National Energy and Climate Plan
[467] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[468] Energy Efficiency Improvement Action Plan for 2017-2019
[469] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[470] EUROSTAT; Ratio between: Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[471] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[472] National Energy and Climate Plan

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[473] is 1.39mln (0.74% of EU27); • Out of total dwellings, roughly 37% are private houses, 60% private apartments and 3% municipal housing; • 35,192 apartment buildings (94.5% of total apartment buildings) were built before 1993 and 60% of all apartment buildings were built between 1961-1993[474]; • The absolute majority (98%) of Lithuanians live in privately owned property (being the highest in the EU).	• In 2018, energy consumption of households[475] was 1.49Mtoe (0.6% of EU27); • Consumption per dwelling was 1.06toe (23.7% lower than EU average)[476]; • Household energy use is dominated by space heating (70%) and electrical appliances and lighting (14%)[477]; • Apartment buildings consume the most amount of heat energy, i.e. 54% of final heat energy consumption[478].	• During 2000-2016, energy savings on residential buildings was estimated at 0.29Mtoe, or 21% of 2000 consumption[479]; • Energy intensity is still above the EU average and timely renovation of residential buildings remains a challenge[480].
Industry	• In 2018, the share of the industrial sector is around 22% of the national GDP[481]; • Energy costs in total product cost remains high and is on average 20% higher than the EU average[482].	• In 2018, energy consumption of industry was 1.1 Mtoe (0.46% of EU27) and it has increased (+6.6%) in the last 5 years[483]; • The most important energy consumer is the chemical industry (37%). Other sub-sectors contributing the most to consumption are the energy intensive industries incl. pulp and paper[484].	• During 2000-2016, energy savings undertaken in industry were worth 1.1Mtoe or 141% of 2000 consumption[485].
Public Sector	• There are approx. 5,500 State and 7,600 municipalities owned buildings (in total about 31% of all public buildings), and • 61% of buildings were built between 1961-1990[486];	• Energy consumption in services in 2018 (including public administration) was 0.65Mtoe (0.49% of EU27) increasing over time (9.8% last 5 years VS 0.3% in EU27)[488].	• During 2014-2018 247,898 sqm were renovated, on average 49,579.6 sqm per year[489].

[473] Odyssee database, stock of dwellings (permanently occupied) year 2016; www.indicators.odyssee-mure.eu/online-indicators.html
[474] Energy efficiency ex-ante assessment, 2015
[475] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[476] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[477] Odyssee database, Country Profile
[478] National Energy Independence Strategy
[479] Odyssee database, technical final energy savings
[480] National Energy and Climate Plan (draft version)
[481] Statistics Lithuania
[482] National Energy Independence Strategy, National Energy and Climate Plan
[483] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[484] Odyssee database, Country Profile
[485] Odyssee database, technical final energy savings
[486] Energy efficiency ex-ante assessment, 2015
[488] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[489] Annual report of National Energy Efficiency Improvement Action Plan

	• About 80% of total State buildings need to be renovated as they have energy performance category lower than C[487].		

EE targets, measures in place/proposed

Lithuania's National Energy and Climate Plan (NECP) is based on three main Government strategies (i.e. the 'National Energy Independence Strategy', the 'National Climate Change Management Policy Strategy' and the 'National Air Pollution Reduction Plan') and **EE improvement is one of the most important objectives in Lithuania**. Measures to increase EE focus on the housing sector and the use of renewable energy sources (RES).[490]

EXISTING POLICIES

Lithuania has number of **existing policy measures** in place that **mainly target residential and public sectors**. These include various EE investments, energy audit support and energy advice. The programme for multi-apartment buildings renovation started already in 2004 and was initially based only on grants (up to 50% of the costs for renovation works)[491]. Since the ESIF 2007-2013 programming period, multi-apartment renovation (modernisation) funds are combining financial instruments with grants from national resources. As of 2018, in total 2,941 multi-apartment buildings have been renovated with an estimated energy savings of 857 GWh.[492]

In 2018, Lithuania started issuing green bonds in order to raise funding for the renovation of multi-apartment buildings[493].

NEW POLICIES (2020-2030)

According to the preliminary assessment of the EC, the proposed contribution towards the 2030 collective EU EE targets in the draft NECP was of very low ambition considering the collective effort needed. The EC has also highlighted in the 2019 European Semester Country Report, that more effort is needed to reach the EE 2020 targets[494]. Taking into account the EC recommendations, in the final NECP, Lithuania increased the ambition of its contribution towards the 2030 target (reported in the following table)[495].

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy consumption	6.5	6.5	5.4
Final energy consumption	5.5	4.3	4.5

Unfortunately, it is worth noting that the figures above are not consistently presented in the final NECP and are subject to final discussions between the EC and Lithuanian authorities.

In order to achieve the objectives set out above, Lithuania has identified the following priority areas (list of detailed measures provided in the table below):

- Promote integrated renovation of multi-family residential and public buildings (with priority given to renovation of residential areas); and
- Rapidly develop low-energy and energy efficiency industries, deployment and acquisition of modern and environmentally friendly technology and equipment.[496]

[487] Energy Efficiency Improvement Action Plan for 2017-2019
[490] National Energy and Climate Plan
[491] 2014-2020 JESSICA Evaluation Study for Lithuania, PWC, 2013
[492] National Energy and Climate Plan
[493] 2020 European Semester Country Report Lithuania
[494] 2019 European Semester Country Report Lithuania
[495] National Energy and Climate Plan
[496] National Energy and Climate Plan

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• Upgrading an apartment building to class C and save 40% of energy; • By the end of 2030 about 5,000 buildings should be renovated and save around 5.5 TWh of energy(i.e. 500 buildings annually) • 50,000 biofuel boilers (equals up to 10% of total households) will be installed in households and save around 11 TWh of energy by 2030; • Renovation of 1,000 individual houses annually and save around 0.74 TWh of energy by 2030.	Existing measures: • Energy efficiency renovation of existing housing stock co-funded by ERDF (EUR 240mln, financial instrument); • Multi-apartment building modernisation fund co-funded by ERDF (EUR 74mln, financial instrument); • Replacement of old depreciated boilers in households with more efficient technologies using RES for heat energy co-financed by ERDF (EUR 32mln, grant); • Energy Efficiency Investment Platform (see more information below). New planned measures/priority objectives (NECP): • To promote integrated renovation of multi-apartment buildings (continuation); • Replacement of boilers in households (continuation); • Modernization of heating and hot water systems in apartment buildings (grant up to 30% of the investment costs); • Financial incentives for the renovation of individual houses; • Awareness raising as well as educational and counselling measures.
Industry	• Around 5.5 TWh of energy will be saved in industry by 2030.	Existing measures: • Energy audit for industry co-financed by ERDF (grant); • Agreements with energy companies on energy saving; • Agreements with energy suppliers on consumer education and counselling; • PSO relief for industry – a support mechanism to finance EE measures recommended by the energy audit in all major industrial companies. In return, companies will be allowed to recover part of their PSO fees; • Energy Efficiency Investment Platform (see more information below). New planned measures/priorities (NECP): • EE in enterprises – a support mechanism to increase the EE of businesses.
Public Sector	• By 2021, it is expected that the total floor area of central government buildings is 1.8mln sqm; • Renovated public buildings must not be lower than energy performance class C, and • By 2030, about 960,000 sqm of public buildings (510,000 sqm of central government and 450,000 sqm of municipal public buildings) will be renovated and save about 0.55 TWh of energy; • Modernisation of street lighting systems	Existing measures: • The Energy Efficiency Fund co-funded by ERDF (EUR 79.6mln, financial instrument) provides loans for central government buildings and guarantees for street lighting modernisation; • Municipal Building Fund co-financed by ERDF (EUR 17.3mln of ERDF, total budget EUR 37.3mln, financial instrument); • Municipal grant co-financed by ERDF (EUR 12mln). New planned measures/priorities (NECP): • To promote integrated renovation of public buildings (continuation); • Street lighting systems modernisation (continuation).

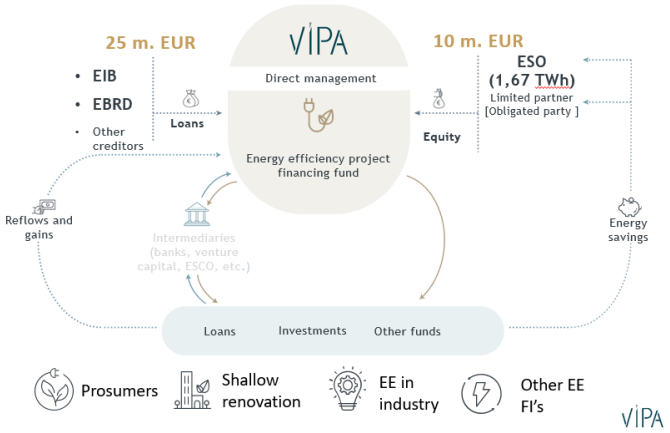
	requires to replace and update 25% of all lighting points (e.g. around 65,000) by 2030 and save about 0.11 TWh of energy.	

Energy Efficiency Investment Platform (EEIP)

The EEIP is the first national EE investment platform in Lithuania established by the Public Investment Development Agency (VIPA) jointly with the electricity and natural gas distribution company Energijos Skirstymo Operatorius (ESO). The EEIP is managed by VIPA.

The underlying investments will focus on the installation of solar (PV) panels on private homes, the renovation of multi-apartment buildings and EE investment in industry, mainly focusing on efficient lighting.

The EEIP is co-financed by the EIB lending to VIPA (up to EUR 25mln backed by EFSI).



Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Lithuania are briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• Rising prices for construction works in response to increased demand; • Generally long payback period and associated investment risks.	• Irrational consumer behaviour in the field of EE is still widespread and public awareness undeveloped; • Lack of skilled workforce in construction sector; • Quality of renovation works and insufficient control of it; • Impact on district heating system; • Distrust and lack of understanding of the ESCO concept.	• TA for awareness raising and supporting supervision of renovation works.

Residential Sector	• The risk of poverty and income inequality remains among the highest in the EU, and • 27.9% of inhabitants could not afford to keep their house adequately warm (second highest in the EU after Bulgaria) in 2018[497]; • Hence, low financial capacity of some households.	• Households tend to have varied level of awareness of the benefits of implementing EE measures and have difficulties to adequately assess it; • Difficulties to agree with the EE investments in apartment buildings i.e. cumbersome decision-making process.	• TA programmes to promote EE benefits and to support the project preparation are needed and should be continued; • Alternative ESCO type financing could be potentially useful (as it might be attractive to households who are reluctant to dedicate their (scarce) resources to EE).
Industry	• Energy costs in total product cost remains high and is on average 20% higher than the EU average.	• Lack of practical examples and awareness of existing technologies to save energy; • Unacceptable risks for investors are often barriers to invest: e.g. real energy savings, fluctuations in energy prices, etc.	• TA programmes to promote and to quantify EE benefits (incl. energy audits); • Financial support (e.g. financial instrument/grant combination) in order to reduce the pay-back period and reduce bank risk; • financial instrument should support more efficient and modern technologies, also energy management measures are needed to reduce energy costs and increase the competitiveness; • Support to the ESCO model via financial instrument could help.
Public Sector	• State and municipal budget institutions have limited possibilities to use their annual budget freely, and • Lithuanian legislation regulates municipal borrowing quite strictly; • Actual users of public buildings are not financially motivated to participate in contracts using energy performance contracts (EPC); • Lack of collaterals due to legal and other restrictions.	• Public procurement law is not suitable for concluding long-term EPCs; • Insufficient capacity and experience of municipality entities; • Lack of motivation to save energy due to the lack of direct vision/benefits of the savings.	• TA programmes to structure viable EE initiatives; • financial instrument targeting ESCOs, to offer an option to the public sector borrowing (requires changes in public procurement law).

ESIF resources and existing financial instruments

Lithuania benefits from ESIF funding of EUR 8.4 billion: on average of EUR 2,849 per person from the EU budget over the period 2014-2020. For **low carbon economy (TO4)**, **circa EUR 1 billion has been allocated** (EUR 577.2mln from ERDF; EUR 348mln from CF and EUR 107.5mln from EAFRD).

Lithuania has committed around **EUR 637mln of ESIF resources into financial instruments** or circa 7.6% of its EU budget and is one of the most contributed Member State. Eight financial instruments are active (7 ERDF and 1 ESF) and they are managed mainly by two main national public institutions – **VIPA** and **INVEGA** – and one EE Fund of Funds is managed also by **the European Investment Bank (EIB)**. **Total resources committed to EE financial instruments** implemented under the 2014-2020 programming period **is around EUR 411mln**.

[497] EUROSTAT; Inability to keep home adequately warm - EU-SILC survey

VIPA is primarily responsible for the implementation of EE-related financial instruments and INVEGA is implementing financial instruments supporting SMEs (incl. self-employment and entrepreneurship financial instrument co-financed by ESF). The **EIB was selected to manage JESSICA Holding Fund** under previous programming period **and has also been entrusted to manage the successor of it** under current programming period that is composed of so-called JESSICA II and the Leveraged Fund.

ESIF EE financial instruments are targeting primarily multi-apartment buildings and public sector, the former is served both by VIPA and EIB managed financial instruments. That has led to some overlaps in EE financial instruments and is worth considering to revisit for the next programming period. Financial instruments targeting multi-apartment buildings are complemented with grant support provided by the Housing and Energy Saving Agency (financed from national resources). The reason for this is partly caused by the CPR limitations to combine financial instruments and grants in a single operation, which is addressed by the Commission proposal for the next CPR (e.g. capital rebates).

ESIF EE financial instruments currently being implemented:

Name	Implemented by	ESIF budget (EUR mln)
JESSICA II and the Leveraged Fund	EIB	240
Multi-apartment Building Modernisation Fund	VIPA	74
Energy Efficiency Fund	VIPA	79.6
Municipal Building Fund	VIPA	17.3

Investment needs

Based on the final NECP, **significant investments are needed** to implement all NECP planned policies and the estimated overall figure **is EUR 14.1 billion over 2021-2030**. **It is assumed that around 50% (EUR 7 billion) could be sought from ESIF and other external sources**, 21% (EUR 3 billion) should be allocated from the national budget and the private sector would contribute 29% (EUR 4 billion). Out of EUR 7 billion, approximately half of it (EUR 3.5 billion) is assumed to be borrowed from international financial markets that would lead to an increase in public debt.[498]

The EE related investment needs are estimated to be in total EUR 2.6 billion out of which public funding would be in the range of EUR 976mln.Lithuania has clearly spelled out that to achieve the 2030 climate and energy objectives, the main sources of funding of the public sector will be the next programming period SMF (namely the European Regional Development Fund and the Cohesion Fund), but also the Modernisation Fund, the Connecting Europe Facility and LIFE programme[499]. The EC has also highlighted in Annex D of the 2020 European Semester Country Report the possibility to use Just Transition Fund resources for EE related investments[500].

[498] National Energy and Climate Plan
[499] National Energy and Climate Plan
[500] 2020 European Semester Country Report Lithuania

Luxembourg

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Initial draft and updated draft version of the National Energy and Climate Plan of Luxembourg;*
- *EC assessment of the draft National Energy and Climate Plan of Luxembourg;*
- *National Climate Action Plan 2019;*
- *Long Term Renovation Strategy, 2017;*
- *National Energy Efficiency Action Plan, 2017;*
- *Energy in the Residential Sector, 2018.*

Context overview

As of January 2019 Luxembourg has a population of about **613,894 inhabitants** (0.14% of the EU27) which has increased over time (24.43% in the last 10 years)[501]. The population is expected to grow continuously and reach 0.8mln by 2030.

Real GDP per capita in 2018 was about **EUR 83,470** (302.21% of the EU27 average).

Final energy consumption in 2018 was 4.35Mtoe (0.44% of the EU27) and it has **decreased by 2.9% since 2005,** while at the EU27 level it decreased by 4.93%[502].

- **Consumption per capita** (7.23toe/person) is 325.8% higher than the EU27 average (2.22 toe/person) and it decreased by 20% in the last 10 years (while at the EU27 level it decreased by 6%)[503];
- **Carbon intensity** of Luxembourg's energy consumption is significantly higher than EU average, due to the high fossil energy mix of Luxembourg;
- **Energy productivity** (GDP over the gross available energy) is 11.270 Euro per kg of oil equivalent (138.8% of the EU average), as Luxembourg is mainly a service based economy[504];
- **Sectors** contributing to final consumption are: transport (48.3%), residential sector (12%), industry (14.5%) and services (11%)[505].

All these statistics have not the same validity as in other countries due to fact that every day more than 200,000 t people commute to Luxembourg from neighbouring countries (France, Belgium and Germany). They represent around 30% additional population in comparison to the registered residents, therefore the statistics both for GDP and energy consumption per capita are heavily distorted. Moreover, a large number of passing by motorists buy their fuel from Luxembourg as it is much cheaper than in neighbouring countries.

[501] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[502] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[503] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[504] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[505] EUROSTAT

	Overview	Consumption	EE
Residential Sector	• The residential sector consists of 0.234mln housing units; • 50.7% of all households live in single family houses and 33% in apartments the same as the EU average. The existing housing stock is characterised by a high number of rooms per member of household[506].	• Households are responsible for 503.94toe[507]; • Consumption per dwelling 2.22toe (60% higher than EU average)[508]; • Luxembourg has a low Energy Poverty Index at 83.97 ranking at the 2nd place in the EU[509].	• During 2000-2016, energy savings achieved in the residential sector were worth 0.1Mtoe or 24% of 2000 consumption[510].
Public Sector	• More than 126,000 sqm of buildings in the public sector[511].	• Consumption in services (including public administration) is 477.960toe (0.4% of EU27) increasing over time (16.2% last 5 years).	• In 2019, the total floor area of central government buildings to be refurbished is 65,178sqm and the area to refurbish in 2019 and 2020 is 3,911 sqm[512].
Industry	• Industry accounts for 12% of real GDP[513]; • The industry production index has fallen by 1% since 2010[514].	• Consumption of industry is 0.630591Mtoe (0.26% of EU27) and it decreased by 19.8% in the last 10 years[515].	• During 2000-2016, energy savings undertaken in industry were worth 0.2Mtoe or 33% of 2000 consumption; • Most of these savings were achieved in the beginning of 2000s (80% of savings were made before 2008).

EE targets, measures in place/proposed

Several policy measures are in place, (a list of them is reported in the following table) covering all sectors and including among others investment grants and tax rebates. For the **2020 - 2030 period**, the updated draft version of the National Energy and Climate Plan (NECP)[516] published in February 2020 envisages the continuation of some existing measures and new measures to be implemented from 2021. In the following table the main existing and planned measures are reported.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• After 2017, all new residential buildings have to be AAA[517]. <u>In 2021–2030 it is expected:</u> • The biggest energy savings are planned to be achieved through the renovation of private residential houses. The target is to reduce primary energy	<u>Existing measures :</u> A series of instruments has been developed and introduced to support the energy renovation of buildings. These instruments include: • investment aid for private households (PRIMe House support scheme); • the launch of a climate bank (Klimabank), although for the time being it has only been a state mechanism, subsidising loans for energy renovation and loans to promoters that offer sustainable housing;

[506] OECD Economic Surveys: Luxembourg 2019
[507] EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[508] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[509] European Energy Poverty Index; 2019
[510] Odyssee database, technical final energy savings
[511] STATEC
[512] National Energy Efficiency Action Plan; 2017 (annex 2)
[513] Central Intelligence Agency, the world fact book
[514] OECD
[515] EUROSTAT
[516] https://environnement.public.lu/dam-assets/actualites/2020/02/Entwurf-des-integrierten-nationalen-Energie-und-Klimaplans-fur-Luxemburg-Version-200207.pdf
[517] Information reported in this section is based on the draft NECP (if not differently specified)

	consumption by 40% between 2020 and 2030.	• The provision of technical assistance through the public body 'myenergy', to raise the awareness of households concerning the benefits of EE measures and to provide financial aid for energy advice in conjunction with the renovation of existing residential buildings. New planned measures/priorities: • Zero interest loans for EE to households with low income; • It is planned to achieve the ambitious targets by enhancing already announced measures.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings. In 2021 – 2030 it is expected: • Over this period, the final energy saving will grow gradually from just under 169 GWh (2021) to 274 GWh (2030), corresponding to an increase of around 120 GWh. This will involve the renovation of on average more than 110 000 square metres of building space in public buildings each year; • As a result, the renovation of public buildings will contribute more than 19% towards the overall final energy saving through energy efficiency renovations of buildings.	Existing measures: • Public sector actions refer to improved standards of new buildings and improved energy management in existing buildings. New planned measures/priorities: • The municipalities have signed an agreement with the central government to implement environmental friendly policies in the fields of urban development, communal buildings, mobility and local administration. They will receive not yet specified financial assistance (environmental fund) and also technical assistance.
Industry	• Reduce ETS industry emissions by 17% by 2030.	Existing measures: • In accordance with the voluntary agreement with industry, the participating industrial companies undertake – in addition to improving their EE – to introduce an energy management system, by identifying and evaluating the potential for improvement (energy audit) and drawing up an action plan for implementing at least some of this potential. Almost all the large industrial companies present in Luxembourg (approximately 70) participate in the voluntary agreement; • 'Myenergy' has been recently introduced for industrial companies with identical aims as the housing sector. New planned measures/priorities: • It is planned to achieve the ambitious targets by enhancing existing measures.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Luxembourg are briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Based on NECP the need for low interest financing (or zero interest for lower income households) and subsidised loans to promoters for sustainable housing has been addressed by the Klimatbank.	• Further emphasis is envisaged by the NEEAP III to the national advisory body *myenergy* for raising awareness and providing suitable recommendation.	• Considering the limited experience with financial instruments, awareness raising and coaching activities may be needed; • Financial instruments may have potential especially for EPC type solutions, however, in order to reach a critical mass, also more straightforward solutions (e.g. direct loans) should be included.
Public Sector	• Based on the draft NECP the public sector is on track to renovate its buildings.	• Based on the draft NECP, an emphasis is put for the further development of the existing building renovation strategy in Luxembourg. This gives particular priority to highly efficient and high-quality renovations.	
Industry	• The investments in EE require significant capital, have a long pay-back time and there are considered risky.	• Together with the aforesaid voluntary agreement, the introduction of 'myenergy' to the industry sector aims to further overcome a reluctance to implement EE investments. Still EE investments are considered of low importance by the sector, or even often ignored, since they require a significant effort in management time and do not guarantee immediate tangible results.	

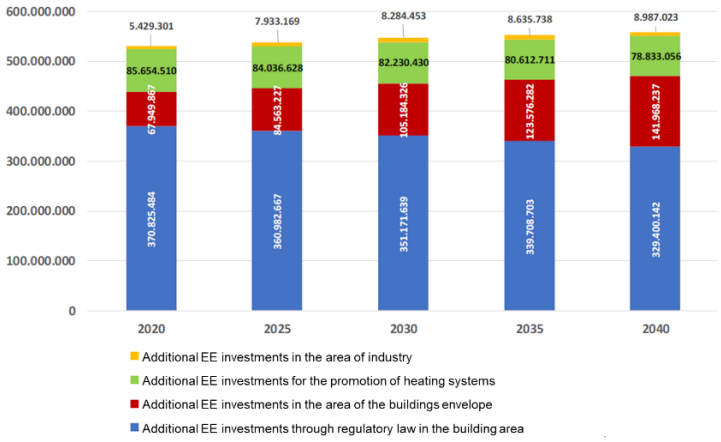
ESIF resources and existing financial instruments

Luxembourg, through 3 Operational Programmes, benefits from ESIF funding of EUR 140 mln. This represents an average of 255 euro per person from the EU budget over the period 2014-2020[518]. The overall (ESIF backed) **EE related support** is estimated at **EUR 9.4mln**[519]. In the 2014–2020 period, Luxembourg has not set up any financial instrument funded by ESIF. During 2019 and 2020, with the support of the European Investment Advisory Hub (EIAH), the EIB is cooperating with the Luxembourgish Ministry for Energy to set up an investment platform (potentially involving also resources from the European Fund for Strategic Investments - EFSI) to promote investments via Energy Performance Contracts for the public sector buildings, industrial companies and service companies.

[518] https://cohesiondata.ec.europa.eu/countries/LU
[519] Data provided by DG Regio based on an analysis of fields of intervention

Investment needs

As reported in the following figure, the updated draft version of the NECP (published on 07.02.20) foresees additional annual investments for EE starting at EUR 530m in 2020 and increasing up to EUR 560m in 2040.



Latvia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *National Energy and Climate Plan of Latvia, 2020;*
- *EC assessment of the draft National Energy and Climate Plan of Latvia, 2019*
- *Strategy for mobilising investments in the renovation of residential and commercial buildings existing at national level, both public and private, 2017;*
- *National Energy Efficiency Action Plan. 2017.*

Context overview

Latvia has about **1.9mln inhabitants** (0.4% of EU27). Over the last 10 years it had the second largest decrease of all MS (-12%)[520]. **GDP** per capita is about **EUR 12,200** (44% of the EU27 average) and has grown by 22% over the last 10 years[521].

Final energy consumption (FEC) is 4.2Mtoe (0.4% of the EU27) and it has **increased by 4% since 2005,** while at the EU27 level it decreased by 4.9%[522]. This is mainly due to an increase in the manufacturing and transport sectors. E**nergy consumption per capita** (2.2toe/person) is 3% lower than the EU average (2.2 toe/person) and it increased by 14% in the last 10 years (while at the EU27 level it decreased by 7%)[523]. **Energy productivity** (GDP over the gross available energy) is 4.9 Euro per Kg of oil equivalent (60% of the EU average), showing a strong reliance on energy to generate GDP (this index increased by 13% in the last 5 years)[524]. **Sectors** contributing to FEC are: households (29% of total), industry (22%), transport (27%) and services (14%)[525].

7.5% of all Latvians were exposed to **energy poverty** compared to 7.6% on an EU average.[526]

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 360,000 buildings (total floor area 90mln m²): ○ 56% of the of the dwellings are in multi-apartment buildings	• In 2017, households' energy consumption was 1.2 Mtoe (0.5% of EU27)[528]; • Consumption per dwelling is 1.4toe (1% higher than EU average)[529] Sources are biomass (mainly wood)	• During the 2008–2015 period, energy savings of 0.39Mtoe were achieved[532].

[520] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[521] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[522] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[523] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[524] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[525] EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020;
[526]EUROSTAT; Inability to keep home adequately warm - EU-SILC survey [ilc_mdes01]; extracted on 28/02/2020
[528] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[529] Odysse; Consumption per dwelling with climatic corrections; www.indicators.odyssee-mure.eu/online-indicators.html
[532] National Energy Efficiency Action Plan, 2017

	and 40% in single family buildings[527]; ○ Only about 6% of Latvia's multi-apartment dwelling buildings comply with the requirements for energy performance specified in the laws and regulations.	35%, district heating 31% and electricity 14%[530]; • Atypically, multi-apartment buildings in Latvia have on average a lower energy efficiency of 20% compared to single family buildings[531].	
Public Sector	• A total floor area of 6.75 mln m² is owned or rented by government entities[533].	• More than half of State buildings use district heating, followed by natural gas and wood[534].	• 1.3m m² of central government buildings have been renovated. Significantly above the 3% target of the Energy performance of buildings directive (EPBD)[535].
Industry	• Industry accounts for 22% of real GDP (2017)[536]; • The floor space of 18.1m² is used by production buildings[537].	• In 2017, industry consumed 0.9Mtoe (0.4% of EU27) with an increase by 32% in the last 10 years[538]; • Main energy source of industry is wood fuels[539].	• For 2015, it was estimated that energy efficiency decreased 80ktoe (incl.-ETS sector)[540].

EE targets, measures in place/proposed

Several policy measures are in place, relying both on **EU** (ERDF, Cohesion Fund) and national resources, either as co-financing of EU funds or sources of the national promotional bank Altum.

Existing measures cover all sectors and they include investment grants for renovation, energy efficiency obligation scheme and stricter construction code. Latvia is relying heavily on ESIF financial instruments, combined with grants or bank lending.

For the **2020-2030 period**, the NECP envisage the continuation of some existing measures and the implementation of new measures.

EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy consumption	4.3	5.4	3.9-4.1
Final energy consumption	4.0	4.7	3.5-3.6
Cumulative final energy savings	0.5	0.9	1.8

[527] Long-term Strategy for Renovation of Building 2017
[530] Long-term Strategy for Renovation of Building 2017
[531] Long-term Strategy for Renovation of Building 2017
[533] Long-term Strategy for Renovation of Building 2017
[534] Long-term Strategy for Renovation of Building 2017
[535] Long-term Strategy for Renovation of Building 2017
[536] Central Intelligence Agency, the world fact book
[537] Long-term Strategy for Renovation of Building 2017
[538] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[539] National Energy and Climate Plan, 2020
[540] Report on the Progress Recorded in the Achievement of the National Energy Efficiency Objectives, 2019

All information in the table below are from the National Energy and Climate Plan if not indicated differently:

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• From 2021, all new buildings to be nZEB[541]; • In the case of renovation, multi-apartment buildings 80 KWh/m^2 and single housing 90Kwh/m$^{2;}$ • Savings —1,690 GWh/year, average energy consumption for heating — 120 kWh/m2 by 2023. By 2030 30% lower average consumption than in 2020; • 2000 multi-apartment buildings and 5000 singe family houses with zero-emission renewable energy sources; • No targets for 2040 and 2050 have been defined.	<u>Existing measures (list of):</u> • **Increasing the energy performance multi-apartment buildings** financed from OP resources EUR 150m in form of grants and financial instruments; • **Smart** Meter roll out by energy grid operator under **Energy Efficiency Obligation** (EEO) to 100% of electricity consumer by 2023. <u>New planned measures/priority objectives (NECP):</u> • Continuation of existing measures; • Awareness raising on energy efficiency (50 local events); • **Financial incentives for single housing** renovation measures combining energy efficiency with non-emission renewable energy sources to be implemented through a one-stop shop; • VAT and PIT incentives for energy efficiency and renewable energy investments.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • NZEB: from 2019 for government buildings • In case of renovation of government buildings 90Kwh/m$^{2;}$ • Promoting EE and use of local renewable energies (RES) in district heating (DH). Share of RES in DH — 60 % by 2030.	<u>Existing measures:</u> • **Increasing the energy performance of State owned buildings** financed from OP resources EUR 98m in form of grants; • **Energy efficiency in municipal** buildings funded from OP resources EUR 55.3m – **grants;** • **District heating energy efficiency programme** from CF EUR 60m – **grants;** • Grants from ETS allowances are dedicated for specialised energy efficiency measures, such as smart technologies, low energy and zero energy buildings, renovation of historic monuments. <u>New planned measures/priorities (NECP):</u> • Current measures are expected to be extended to post 2020, in particular support for EE in public buildings, drawing upon post 2020 ERDF and CF; • District cooling; • Renewable energy and energy efficiency Fund funded by energy tax and fees to be managed by Altum providing loans to municipalities; • Development of model contract for EPC that is 'Maastricht neutral' and guidance for municipalities in procuring ESCOs, supported by ESCO financing through ALTUM.
Industry	• In case of renovation of non-residential buildings owned by private entities 100 Kwh/m^2; • No sector specific measures identified.	<u>Existing measures:</u> • EEO for electricity retailers; • Obligatory energy audits for large enterprises and large electricity consumers; • Green bond loans; • PF4EE loans by Altum;

[541] The requirement of 'nearly zero energy building' is a requirement coming from the Energy Performance in Buildings Directive (EPBD)

		• Increasing energy efficiency in industrial buildings financed from CF by means of grants EUR 25m; • Altum is using ELENA for project preparation in buildings used by enterprises (offices, hotels, manufacturing, …)[542]. New planned measures/priorities (NECP): • Including other fuels in EEO (transport fuel, gas and heating); • Improved energy efficiency monitoring.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Latvia are briefly reported in the following table[543].

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Across all sectors	• **High financing cost** of attracting financial resources from commercial banks.	• **'Energy efficiency first'** is not implemented in government policy; • **Insufficient number** of professionally trained **specialists** (building managers, independent energy auditors, designers, construction workers); • Lack of **capacity in construction sector** results in smaller project do not get realised; • **Poor quality** and the lack of control of construction works; • **Cost increases** in construction sector.	• **Project development assistance** for public and private beneficiaries for EE measures (e.g. ELENA).
Residential Sector	• **Long repayment periods** of investments (22-23 years without financing cost); • **Banks provide loans to single family housing owners** under conditions similar to consumer financing resulting in too high an interest rate. Experience from across Europe shows that default rates are much lower than for consumer loans[544]; • Limited availability of affordable bank lending for **disadvantaged groups** (rural areas, small multi-apartment buildings, building managers with large portfolio); • Loans and guarantees from ESIF do not support the disadvantaged groups above; • High level of debt of households who recently purchased a flat.	• **Low awareness** and understanding of EE and RES measures among households; • For single family housing the process of implementing EE and RES measures is too complex; • Inability of making decisions for investment in multi-apartment buildings; • **High renovation cost per square meter** (esp. social housing); • Many renovation schemes are not eligible for ESIF support as due to low heating tariffs, as **repayment time exceeds 20 years**; • **Poor quality of the technical** documentation; • **ESCO model for residential buildings is complex**. Limited awareness of its benefits.	• **Simplifying existing grant/financial instrument combination** scheme; • Set-up for one-stop shops for single family houses; • **Grant support** for projects should be the same for all projects, either realised via Energy Performance Contracts (**EPC**) or work contracts; • **Additional incentives for disadvantaged regions** to make EE measures supported by

[542] https://www.eib.org/attachments/documents/gieep-factsheet-en.pdf
[543] Long-term Strategy for Renovation of Building 2017
[544] Based on conversation with banking experts

Public Sector	• **Restrictions on taking** debt in central and local governments; • Uncertainties about the possibilities to use ESIF financial instrument for forfaiting or similar financing; • ESCOs cannot benefit from ALTUM guarantees[545].	• **Budgetary restrictions** to sign long-term service contracts hinders the use of the ESCO model and treatment of EPC as public debt.	financial instrument possible.
Industry	Typical barriers to EE investments include: • long pay-back period of EE interventions (esp. building related); • difficulties to obtain financing based on cash flows generated by EE activities.	• **Insufficient EEO scheme**, only applicable to electricity retailers, but not to other suppliers; • Voluntary energy efficiency agreements are hardly used; • L**ittle experience and limited knowledge** about energy efficiency in the manufacturing industry; • Very limited response to support schemes; • Industry tends to replace equipment and not undertake energy efficiency measures in production buildings.	• **Incentives for energy audits** in enterprises; • Integrating additional benefits for EE financing in general SME financial instruments.

ESIF resources and existing financial instruments

Latvia benefits from **ESIF funding of EUR 5.6 billion** (circa EUR 2.815 per person) during the 2014–2020 period. For the **low carbon economy, EUR 641m** has been allocated (EUR 337m from ERDF; EUR 229 from CF and EUR 75m from EAFRD;)[546]. The **EE related support** comes through one single national Operational Programme and it is estimated to be **EUR 365m**[547]. Support is provided for EE measures in the residential sector, for public buildings and to a smaller degree for SMEs and large enterprises.

In the 2014–2020 period, Latvia contributed **EUR 169.41m**[548] **of its ESIF** (circa 3% of its budget) **to financial instruments** (ERDF only).

There is one **ESIF financial instruments for energy efficiency** in Latvia: 'Programme for Improving Energy Efficiency in Multi-Apartment Residential Buildings', providing loans or guarantees, combined with ERDF grants. In total EUR 30.1m was contributed to the instrument managed by Altum. It provides loans with up to 20 years maturity and grants may reach up to 50% of the eligible expenditure depending on the achieved energy savings.

Further non-ESIF financial instruments are:

- **Green bonds loans** for energy efficiency in enterprises managed by Altum[549]. In 2017 Altum issued green bonds with a value of EUR 20M and a maturity of 7 years. Proceeds from the green bonds are among others used for lending to energy efficiency and small scale renewable investments in enterprises.

[545] Municipal Guarantee Scheme, report prepared under Accelerate Sunshine (H20202 action), 2019
[546] https://cohesiondata.ec.europa.eu
[547] Data provided by DG Regio based on an analysis of fields of intervention
[548] www.fi-compass.eu/financial-instrumentsLatvia
[549] Report on the progress achieved in 2019 towards national energy efficiency targets for the year 2020

- Altum has signed an agreement for the EU-level financial instrument **PF4EE** with the EIB in 2020, with a EIB loan of EUR 18m and a LIFE programme guarantee of EUR 3m. The instrument targets energy efficiency and renewable energy measures in enterprises[550]
- Latvia is considering the establishment of the EUR 60.6m **'Green Investment Fund'** financed with ETS allowances to provide loans and quasi equity for climate related investments in SMEs and mid-caps.[551]
- The NECP mentions the establishment of **fund for renewable energy and energy efficiency** financed from energy tax and fees which should provide loans to municipalities. The fund should be managed by Altum.[552]
- **Energy efficiency loan for ESCO** provided by Altum, a framework loan for ESCOs that accepts future receivables as collateral. Possibility to combine this with forfaiting or refinancing of portfolio[553].
- **LABEEF – a private fund buying future receivables (forfaiting) from ESCOs**. ESCOs in Latvia are active in the renovation of multi-apartment buildings via **energy performance contracting** with contract lengths of up to 20 years. After completion of the renovation works and verification of the energy performance, ESCOs can sell up to 80% of its future receivables to LABEEF. By 2018 LABEEF has financed the renovation of 110 buildings. The instrument was developed under the H2020 action 'Sunshine' and EBRD has provided a loan to the instrument.[554]

Investment needs

The NECP includes estimates for investment costs for energy savings for the 2021-2030 period of EUR 3.4bn. Estimated investments required in the period from 2020 to 2030 (at 2010 prices) are EUR 1.73bn for energy efficiency in buildings and EUR 1.66bn for energy efficiency and renewable energy in industry.

[550] https://www.eib.org/en/press/all/2020-074-altum-and-eib-join-forces-for-energy-efficiency-investments-in-latvia
[551] Informatīvais ziņojums 'Par Emisijas kvotu izsolīšanas instrumenta darbības stratēģiju' http://tap.mk.gov.lv/mk/tap/?pid=40478752
[552] National Energy and Climate Plan, 2020x
[553] https://www.altum.lv/en/services/enterprises/loans/energy-efficiency-loan-for-esco/energy-efficiency-loan-for-esco/
[554] Fact-sheet prepared for the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety (BMU) https://www.buildup.eu/sites/default/files/content/fact-sheet-labeef-latvian-energy-efficiency-facility-lv.pdf

Romania

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Draft version of the National Energy and Climate Plan of Romania;*
- *EC assessment of the draft National Energy and Climate Plan of Romania;*
- *Final version of the National Energy and Climate Plan of Romania;*
- *Odysee-mure database;*
- *EU Energy Poverty Observatory; Member State Report Romania;*
- *JRC; Science for Policy Report, Accelerating energy renovation investments in buildings. 2019;*
- *JRC; Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies. 2016;*
- *European Court of Auditors; Allocation of Cohesion policy funding to Member States for 2021-2027. 2019;*
- *EC; Spring 2020 Economic Forecast; May 2020;*
- *Romania Long-term renovation strategy (November 2019 draft);*
- *EC (DG ENER); Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU. 2019;*
- *World Bank; Gaps Analysis of the Current National Long-term Building Renovation Strategy and Action Plan – Final Report, August 2019.*

The following interviews were conducted:

- *ANRE;*
- *Ministry of Economy, Energy and the Business Environment;*
- *Ministry of EU Funds;*
- *DG REGIO – Romanian desk;*
- *ESCOROM – Romanian ESCO association.*

Context overview

Romania has about **19.4m inhabitants** (4.3% of EU27) with a continuous decreasing trend over time: over the last 10 years the population declined by 5%[555].

Real GDP per capita in 2018 was about **EUR 8,740** (31.6% of the EU27 average) and has grown by 30% over the last 10 years[556].

Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Romania will suffer a recession in 2020 with the gross domestic product **(GDP) expected to contract by 6.0%,** before rebounding and grow by 4.2% in 2021.

The **unemployment rate** is expected to increase from 3.9% (2019) to 6.5% (2020) and it is expected to slightly reduce in 2021 (5.4%).

[555] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[556] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

To support the national economy a strong public fiscal stimulus will be deployed, with the **Government deficit** expected to reach 9.2% of 2020 GDP and to remain very high also in 2021 (11.4%).

Due to the combined impact of the decrease of the GDP and the increase in the government deficit, the **debt/GDP ratio is expected to reach 46.2% in 2020** (it was 35.2% in 2019) and to further increase in 2021 (54.7%).

Final energy consumption (FEC) in 2018 was 23.4 Mtoe (2.4% of the EU27) and it has **decreased by 4.4% since 2005,** while at the EU27 level it decreased by 4.9%[557].

Energy consumption per capita (1.2 toe/person) in 2018 was 45% lower than the EU27 average (2.2 toe/person) and it increased by 1% in the last 10 years (while at the EU27 level it decreased by 6%)[558].

Energy productivity (GDP over the gross available energy) in 2018 was 5.1 Euro per Kg of oil equivalent (63% of the EU27 average), showing a strong dependence on energy to generate GDP (this index increased by 20% in the last 5 years)[559].

Sectors contributing to FEC are: households (34% of total), industry (28%), transport (27%) and services (8.4%)[560].

The **building sector** (residential and non-residential buildings) accounts for 40% of national FEC[561].

Circa 11.3% of households in Romania are reported not be able to keep their homes adequately warm, a much higher value than the EU average[562].

Electricity, heating and gas prices are among the lowest in Europe, due to **subsidised energy prices** (retail price is lower than wholesale price)[563].

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 5.3mln buildings (total floor area 492 mln m²)[564]: – single-family houses (SFH) 58% (74% in rural areas, 26% in urban areas); – multi-apartment building (MABs) 33%; – Over 63% of these homes are less than 50m2, which is much smaller than typical EU countries.	• In 2018, households' energy consumption was 7.75 Mtoe (3% of EU28) [565]; • Consumption per dwelling is 1.0toe (27% lower than EU average)[566] Sources are biomass (mainly wood) 48%, gas 28%, district heating 23% (using gas, oil products and coal); • Ongoing tendency to disconnect buildings from district heating and switch to individual gas boilers; • Low thermal efficiency of heating systems (43%).	• The estimated energy savings potential for residential buildings at cost optimal level is 41%[567]; • It is projected that 5% of the residential buildings floor space will be renovated by 2020. Highest renovation rate is in urban SFH 8%, 7% in MAB, and lowest in rural SFH 3%[568]: - During the 2014–2016 period, energy savings of 0.32Mtoe were achieved, mainly through retrofitting of blocks of flats (0.28 Mtoe) and only to a

[557] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[558] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[559] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[560] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[561] Strategy for mobilising investments in the renovation of residential and commercial buildings existing at national level. 2017
[562] EU Energy Poverty Observatory; Member State Report; Romania, 2019
[563] Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Households, 2018
[564] Long term renovation Strategy (November 2019 draft)
[565] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[566] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[567] Strategy for mobilising investments in the renovation of residential and commercial buildings existing at national level. 2017
[568] Long term renovation Strategy (November 2019 draft)

		• Increasing number of air conditioning systems.	minor extend through renovation of single family homes[569].
Public Sector	• There are 3,087 central government buildings in Romania, with a total floor area of 6.750 mln m^2; • There are over 80,000 buildings owned by regional or local governments[570].	• During the 2014 – 2016 period, energy savings of 0.025Mtoe were achieved, mainly through retrofitting of offices and to a minor extend of street lighting[571].	
Industry	• **The Industrial sector** accounts for 33.2% of real GDP (2017) [572].	• In 2018, industry consumed 6.6Mtoe (2.7% of EU27) with a decrease by 21% in the last 10 years[573].	• The estimated energy savings potential for buildings at cost optimal level is 13%[574]; • During 2014-2016, energy savings achieved in industry (ex-ETS) were worth 0.14Mtoe through improved energy management[575]; • For 2018 energy savings in industry have achieved over 0.8Mtoe (incl.-ETS sector)[576] and from 2000 to 2017 4.47 Mtoe[577].

EE targets, measures in place/proposed

Several policy measures are in place, relying both on **EU** (ERDF, Cohesion Fund) and national **resources** (mainly from State budget).

Existing measures cover all sectors and they include subsidies, alternative policy measures such as audits, metering, energy management and voluntary reporting and to a very limited extent with financial instruments or other revolving forms of aid. For the **2020-2030 period**, the draft National Energy and Climate Plan (NECP) envisages the continuation of some existing measures and the implementation of new measures.

EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy consumption	32.4	32.1	**32.3**
Final energy consumption	23.2	N.A.	**25.7**

The overall energy savings envisaged in the draft NECP compared to the potential identified are considered to be **of very low ambition** by the EC.

[569] National Energy Efficiency Action Plan, 2017
[570] National Energy Efficiency Action Plan, 2017
[571] National Energy Efficiency Action Plan, 2017
[572] Central Intelligence Agency, the world fact book
[573] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[574] Strategy for mobilising investments in the renovation of residential and commercial buildings existing at national level, 2017
[575] National Energy Efficiency Action Plan, 2017
[576] Report on the Progress Recorded in the Achievement of the National Energy Efficiency Objectives, 2019
[577] Odyssee database

	Context/targets	Existing and planned actions/priority objectives
Cross-cutting	• Creation of a National Fund for Energy Efficiency as recommended by the World Bank[578]. To be financed by private funds, Structural funds and possibly State budget. It is planned to finance the mechanism through a greenhouse gas emission tax. The combination with guarantees and interest rate subsidies for Green Mortgages or Green Loans. Target is renewable energy measures, energy efficiency in existing and new dwelling.	
Residential Sector	• After 2020 all new buildings to be nZEB[579] <u>In 2021 – 2030 is expected:</u> • According to the draft Long-Term Renovation Strategy (LTRS), EE savings of 3.4 Mtoe are planned; • Renovation of 309,190 buildings, of which 264,595 SFH with a floor space of 19.96m m²and 44,495 MAB with a floor space of 65.62m m²; • Three different levels of renovation are foreseen, minimal (up to class C), average and maximum (up to NZEB); • MAB should be renovated to class A and for SFH to class B.	<u>Existing measures (list of):</u> • **Casa Verde Plus and** Casa Verde Photovoltaics (PV) addressing energy efficiency measures and PV in buildings of physical persons. Casa Verde is managed by the Environmental Fund Administration funded by green certificates revenues[580]; • **National Programme for Improvement of Energy Performance in Residential Blocks (thermal rehabilitation fund)**. The programme provides grants from national resources. It is for example used in several districts of Bucharest together with EIB lending**[581];** • **Programme for the thermal rehabilitation of residential blocks** funded by ERDF with allocated budget EUR 345m; • EBRD's **Green Economy Financing Facility** (GEFF) in Romania is a credit line facility of up to €85 million to on-lend for energy efficiency and renewable energy in the residential sector through commercial banks for green personal loans or green mortgages[582]. <u>New planned measures/priority objectives (draft NECP):</u> • Continuation of existing measures; • **Thermal insulation of MAB and SFHs**; • Public support to thermal insulation for communities affected by **energy poverty**; • **Upgrade of ventilation, heat recovery systems, heat pumps**, etc.) if possible in combination with renewable energy sources (RES); • Support and development of **prosumers**; • **Training for key professions** in renovation and refurbishment of buildings (e.g. energy auditors) and introduction of certification; • Introducing and applying **restrictions on sale or rental of buildings in the lower categories**.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • According to the draft Long-Term Renovation Strategy (LTRS), EE savings of 0.6 Mtoe are planned in public buildings (by floor space, 51% in education, 32% in the health sector and 16% in public administration).	<u>Existing measures:</u> • **Energy Efficiency Improvement Programmes** which obliges municipalities over 5,000 inhabitants to develop EE programmes and strategies; • To elaborate a **regulatory framework** for the operation of ESCOs and energy performance contracts (EPC), the working group stopped working when the responsibility for this topic was shifted from ANRE to the Ministry of Economics; • **Casa Verde Plus** addressing energy efficiency measures in buildings of local administration and NGOs; • **ESIF funded public building renovation and public lighting renovation (planned EUR 595 m)**; • **District Heating 2006-2020 heat and comfort Programme** funded by CF;

[578] World Bank, Gaps Analysis of the Current National Long-term Building Renovation Strategy and Action Plan – Final Report, August 2019
[579] The requirement of 'nearly zero energy building' is a requirement coming from the Energy Performance in Buildings Directive (EPBD)
[580] https://www.afm.ro
[581] https://www.eib.org/de/projects/pipelines/all/20160766 and EIB internal calculations
[582] https://ebrdgeff.com/romania_facilities/ and World Bank, Gaps Analysis of the Current National Long-term Building Renovation Strategy and Action Plan – Final Report, August 2019

		• **EBRD's Municipal Energy Efficiency Financing facility** (MFFEE) is a credit line facility to participating financial institutions for on-lending to municipal borrowers for energy efficiency and renewable energy measures (also for residential buildings). New planned measures/priorities (draft NECP): • Continuation of existing measures; • Promotion of awareness on energy efficiency and climate change; • **Thermal insulation** of the building stock of the general government sector of apartment blocks and single-family homes, schools, hospitals and public buildings for any commercial purpose; • **Use of Energy Performance Contracting** in street lighting in the initial phase, with later application in public buildings; • No specific measures regarding district heating are proposed in the NECP.
Industry	• Annual energy savings of 0.6 Mtoe in industry are planned, which means doubling the annual savings as planned in the NEEAP IV for 2020.	Existing measures: • **Obligatory energy audits** for large energy consumers; • **Energy audits** and **energy management** in other enterprises; • **Romanian Fund for Energy Efficiency** – FREE. A revolving loan fund, funded by GEF and implemented by World Bank for EE projects in the industry sectors; • In 2019 Procredit bank has signed a climate action multi-beneficiary loan for SMEs & Mid-caps in Romania and Bulgaria with the EIB for EUR 30m[583]. New planned measures/priorities in the NECP: • Installation of **smart meters and demand side response systems** in the service sector; • **Energy audits programme for SMEs**; • **EE as a positive side effect of other measures**, e.g. use of best available technology in industry, promotion of circular economy, decarbonisation of the lignite firing power plant CE Oltenia; etc.

Market failures, main issues and barriers to investment

In the following table some information about the main (financial and non-financial) barriers preventing EE investments are reported per each sector. Information is from draft Long-term Renovation Strategy if not indicated otherwise[584].

	Financial issues	Non-financial issues	Financial instrument implications
Across all sectors	• **High commercial interest rates**; • **Lack of collaterals**; • **Small project sizes** resulting in high project development and transaction costs; • Lack of creditworthy borrowers; • **Grant dependency** – beneficiaries prefer to delay investments	• **Low energy prices** (particularly heating); • Lack of cost-optimal framework; • **Under-heating** of buildings, therefore lower saving potential through EE measures; • Structural and safety deficiencies from **past underinvestment**;	• Need for **technical assistance** component for financial instruments; • **Financial instruments combined with grants** should become default option, with exceptions for specific areas such as energy poverty; • Increasing **awareness on EE related financial instruments** among policy makers and financial institutions.

[583] https://www.eib.org/en/projects/pipelines/all/20190299
[584] Romania Long term renovation Strategy (November 2019 draft)

	waiting for grants to become available; • **Low awareness among financial institutions** to invest in energy efficiency[585].	• Variable quality of energy auditors; • Lack of proper building and energy use data; • Lack of awareness about EE opportunities and benefits; • **Limited capacity on implementation** (especially for new technologies such as renewable energy) **and contractor oversight** in key institutions; • Behavioural inertia[586].	
Residential Sector	• **Low income levels and disposable incomes** of homeowners; • **Dependence on public grants** and expectations of continued grant support; • **High share of non-EE investments required** (to address structural deficiencies and ensure seismic and fire safety); • MAB specific: - **lack of creditworthy house owner associations** and apartment owners; - **high level of municipal debt**, municipalities are not able to pre-finance investments of schemes financed via thermal rehabilitation tax schemes; • SFH specific: - high upfront costs and long payback periods of EE investments; - higher cost for cleaner fuels.	• **Lack of clear and credible delivery mechanisms**; • MAB specific: - lack of apartment-level consumption-based billing; - **weak house owner association legislation**; - **poor-quality district heating services**; - lack of clarity on decision-making for mixed-use buildings (residential & commercial); - lack of clear and credible delivery mechanisms; • SFH specific: - lack of awareness of economic and health costs of air pollution; - low prices/unregulated solid fuels; - lack of standards for existing heaters/boilers and buildings; - lack of legislation on dirty fuels; - limited access to gas and DH.	• **One-stop shop schemes** addressing bringing together project development assistance, grants and financial instruments; • **Retail credit schemes**, backed by a ERDF/CF guarantee scheme to support the purchase and installation of complementary investments, such as HVAC, solar panels, PV, smart meters • **Loan guarantees,** to facilitate commercial bank loans to residential buildings; • **Revolving funds,** e.g. funded by Modernisation Fund, which could cover co-financing requirements with an obligation for the building owners to repay over a fixed period.

[585] Based on stakeholder interviews
[586] Romania Long term renovation Strategy (November 2019 draft)

Public Sector	• **Heavy reliance of public authorities grants**, EU or national, to finance EE investments; • **Restrictive budgeting** (lack of multiyear budgeting, difficulties to use operational savings for investment budget); • **Split incentives** (energy savings cannot be retained by body implementing investment); • **Restrictions on taking** debt for regional and local governments (moreover to face the COVID related crisis, the national debt to GDP level is expected to sharply increase, thus further reducing public debt capacity); • **ESCOs have difficulties to access to finance**. This refers to access to equity and debt for long-term growth, to short-term financing for project implementation and for long-term financing for the performance period[587].	• **No political incentives** to save energy/budget; • Lack of legislative framework for EPC[588]; • **Procurement regulations** is not adopted to procuring EPC. As lowest cost is favoured and not highest value for money; • **Low development of ESCO market.** Only few ESCOs active, very few offer EPC and low level of quality and standardisation, for example there is no standardised measurements and verifications standard protocol; • There is **no 'off-balances sheet EPC model contract** that would not count as debt or deficit for municipalities[589].	• Specialised financial instruments (e.g., equity funds, performance guarantee funds, forfaiting) to support ESCOs, and other third-party service providers that can help renovate buildings with some repayment schemes. • The World Bank proposes the set-up of a public-private super-ESCO or utility based ESCOs. Public entities would sign an EPC contract with the super-ESCO, which then would sub-contract to local ESCOs as service providers. The (majority of) financing of EPC projects would be provided by the super-ESCO, which could come from a financial instrument[590].
Industry	• As **EE investments are not the core budgeting priority** for many companies, especially in foreign-owned companies investment decision are taken abroad according to repayment time; • Financial intermediaries **perceive EE investments as high risk**.	• **Weak enforcement of building codes** and Energy Performance Certificates • Difficulties for SMEs to assess the benefits of EE measures.	*Enterprises are not mentioned in the NECP as a focus for ERDF/CF. The following recommendations are given for the possible 'greening' of SME instruments.* • TA support for energy audits and advisory for the preparation of EE measures in combination with RES; • Allowing for TA for banks to build up the experts internally or externally; • EE measures to be integrated in mainstream SME financing,; • Financial instruments could also support the development of the EPC model in the business sector.

[587] Based on stakeholder interviews
[588] National Energy and Climate Plan, January 2020
[589] Based on stakeholder consultations
[590] Econoler, Super ESCO – An Innovative Approach to Unlock Energy Efficiency Potential, 2017 http://econoler.com/wp-content/uploads/2017/10/Econoler-Super-Esco-ANGLAIS_.pdf

ESIF resources and existing financial instruments

Romania benefits from **ESIF funding of EUR 30.8 billion** (circa EUR 1.577 per person) during the 2014–2020 period. For the **low carbon economy, EUR 3,731m** has been allocated (EUR 3,192m from ERDF; EUR 348m from EAFRD; EUR 188 from CF and EUR 3.6m from EMFF)[591]. The **EE related support** comes through 2 operational programmes managed at national level, Integrated Regional OP and Large Infrastructure OP, it is estimated in **EUR 1,243.6m**[592]. Support is provided for EE measures in the residential sector and for public buildings and infrastructure.

In the 2014 – 2020 period, Romania contributed **EUR 540m**[593] **of its ESIF** (circa 2% of its budget) **to financial instruments** (ERDF and EAFRD). There are **no ESIF financial instruments for energy efficiency** in Romania.

Investment needs

The NECP includes estimates for investment costs on the energy demand side or the 2021-2030 period of EUR 150bn, of which EUR 12.8 billion for renovation and small scale renewable energy source (RES) measures in buildings.

[591] https://cohesiondata.ec.europa.eu
[592] Data provided by DG Regio based on an analysis of fields of intervention
[593] www.fi-compass.eu/financial-instruments/Romania

Malta

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final version of the National Energy and Climate Plan of Malta;*
- *EC assessment of the draft National Energy and Climate Plan of Malta;*
- *Assessing the potential use of financial instruments in the low carbon economy in Malta in the 2014/2020 programming period. European Investment Bank. 2018;*
- *National Energy Efficiency Action Plan (2017).*

Context overview

Malta has about **493,559 inhabitants** (the EU Member State with the smallest population) strongly increasing (+14.9% in the last 5 years)[594], and expected to reach 554.822 inhabitants by 2030[595].

Real GDP per capita in 2018 was **EUR 21,630** (21% lower than the EU27 average) and has increased by 35.5% in the last 10 years[596].

Final energy consumption (FEC) in 2018 was 0.66Mtoe (0.07% of the EU27) and it has **increased by 43.5% since 2005,** while at the EU27 level it decreased by 4.9%[597].

Consumption per capita (1.4toe/person) is the second lowest in Europe (37% lower than the EU27 average: 2.2 toe/person) although it has increased by 13% in the last 10 years (while at the EU27 level it decreased by 6%)[598].

Energy productivity (GDP over the gross available energy) is 3.4 Euro per Kg of oil equivalent (57.5% lower than the EU27 average), showing very high reliance on energy to generate GDP (this index decreased by 2% in the last 5 years)[599].

Sectors contributing to FEC are: transport (35% of the total), services (18.5%), households (13%) and industry (5.4%)[600].

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings is 179,800 (0.1% of EU27) and circa 68% were built before 2000[601].	• In 2018, households' energy consumption was 88Ktoe (0.04% of EU27)[602];	• Consumption in residential buildings in Malta is the lowest in EU; • During the 2000 2016 period, the residential sector generated energy

[594] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[595] National Energy and Climate Plan

[596] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

[597] EUROSTAT

[598] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[599] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

[600] EUROSTAT; Final consumption - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

[601] Odyssee database, stock of dwellings (permanently occupied) year 2016

[602] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

		• Consumption per dwelling (0.46 toe) is the lowest in EU (circa 33% the EU average).	savings equal to 0.01Mtoe, equal to 16% of year 2000 consumption[603].
Public Sector	• Limited information is available about the stock of public buildings in Malta.	• In 2018, energy consumption in services (including public administration) was 122Toe increasing over time (18% last 5 years VS +0.3% in EU27).	• As reported in the 2017 update of the National Energy Efficiency Action Plan: *Notwithstanding the ongoing efforts towards EE within the public sector, an effective plan has yet to be developed, as studies have shown that only limited measures can be economically feasible, given the limited heating requirements and typically low consumption.*
Industry	• Industry accounts for 10.2% of real GDP (2017)[604].	• In 2018, industry consumed 55.7Toe (0.02% of EU27); • Industry consumption decreased by 6.8% in the last 10 years[605].	• limited information is available about EE performed in industry (as presented in following sections, the most effective measures in Malta are related to renewable energies).

EE targets, measures in place/proposed

Malta has a number of policies and measures in place to support EE, however thanks to the mild weather conditions of the islands and the absence of a district heating system, traditional EE measures have limited applicability to Malta. Due to this limitations, measures of Malta are focused on supporting:

- The production of renewable energies (RES) and in particular photovoltaic (PV), with fed-in-tariff solutions and with OP backed subsidies (some OP measures are also supporting EE interventions, such as roof insulation, double glazes, heat pumps, but the uptake of these measures is much lower than PV systems)
- The reduction of oil dependency; with the construction of new infrastructure (it goes in this direction the recent electricity interconnector with Sicily).

NEW POLICIES (2021-2030)

The National Energy and Climate Plan (NECP) identifies some priorities and policy measures for the post 2020 period. Excluding measures for transports, RES (especially PV) are at the core of the strategy. In the following table, the key targets related to EE are reported, alongside the EC comment on the document.

Draft NECP EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary Energy Consumption	0.8	0.8	0.8
final energy consumption	0.6	0.6	0.6

In the following table, information of the main measures for the residential, industry and public sector are presented.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• Heat pumps are expected to play a major role in the residential sector; increasing from	Existing measures (list of): • The most effective solution to reduce GHG in Malta is related to the use of renewables and in particular solar solutions. In this respect, Malta has different support schemes

[603] Odyssee database, technical final energy savings.
[604] Central Intelligence Agency, the world fact book
[605] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020

	204,500 (2017) to 403,000 (2030); • PV systems in the residential sector are expected to reduce their importance in the post 2020 period, compared with the huge increase registered since 2010 (as less roof tops will be available).	(e.g. fee-in-tariffs and capital grants). OP support in the form of grant is provided for the installation of new PV systems, with a very high uptake; • OP grants are also provided for traditional EE interventions in residential buildings (e.g. roof insulation, heat pumps, etc.) however the uptake of these measures is much lower than PV support; • A **new financial instrument** to support EE and RE initiatives (also) in the residential sector has been set up and it is expected to start providing support to final recipients in 2020 (more information in the following section). New planned measures/priority objectives (NECP): • Existing measures are expected to be continued in the post 2020 period, and the focus on renewables (especially PV) is expected to remain (e.g. new incentives for installation of PV on new or newly refurbished buildings are planned) in particular to incentivise own consumption of renewables, however a slower pace of PV investments is expected; • Investments in heat pumps are expected to strongly increase in the post 2020 period, however no public support is planned for this investment (as their installation is expected to grow even without public intervention).
Public Sector	• Limited information is available about the overall EE targets in the public sector, as this information is expected to be reported in the Long term renovation strategy to be released in 2020.	Existing measures: • Different measures supporting the development of PV systems on roof tops of public buildings are in place; • OP backed measures are also in place to promote combined RE and EE initiatives on public buildings and on other public infrastructure. New planned measures/priorities (NECP): • EE on public lighting will be needed (33,000 lamps are expected to turn to LED); • Investments to reduce the energy consumption related to water and wastewater plants are expected (overall investment estimated in EUR 52m); • With respect to support the use of Energy Performance Contracting (EPC), solutions on public buildings, Malta is exploring the opportunity to set-up a dedicated financial vehicle investing in ESCOs, however limited analysis has been done so far.
Industry	• The uptake of PV system in the sector is expected to continue post 2020; • Industrial sized PV installations are expected to be financially viable without public support from 2020.	Existing measures: • Malta implemented a number of measures to promote EE in industry (e.g. the voluntary scheme, to promote EE interventions in enterprises; a grant scheme to help SMEs carrying out Energy Audits, fee-in-tariffs on PV systems, etc.); • A new financial instrument to support EE and RE initiatives (also) SMEs has been set up and it is expected to start providing support to final recipients in 2020 (more information in the following section). New planned measures/priorities (draft NECP): • Malta plans to continue measures in the sector, by means of example, support will be provided to enterprises implementing energy management systems and grant support for energy audits in SMEs will be continued.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Malta are briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	• Due to the peculiar conditions of Malta, energy consumption in residential sector is low and traditional EE interventions have very low financial returns; • PV systems are a much more diffused investment, also in residential buildings, and as they are/were used to be heavily subsidised, banks were supporting them (in particular the grant co-financing part) with dedicated products.	• PV related investments are the most viable EE related investments, however the number of available roofs is decreasing and there could be a 'capacity issue' in the coming years; • Although energy consumption in the residential sector is the lowest in EU, Maltese residential buildings have the lowest energy performances in Europe. Awareness raising campaigns, focused on non-financial impacts of EE interventions (e.g. comfort, etc.) could help promoting EE initiatives.	• TA programmes, to support EE interventions could increase the likelihood of EE initiatives being developed; • Financial support (e.g. financial instrument/grant combination) in order to reduce the pay-back period would be useful.
Public Sector	• An analysis on implementing the ESCO model for EE in public buildings has been performed and some interventions could be financially viable; • The ESCO model is not used in Malta for the time being and banks could be reluctant to lend with unsecured conditions.	• Lack of capacity to structure EE interventions, in particular with ESCO and Energy Performance Contracting (EPC) solutions; • Several public buildings are historical, with important architectural constraints, preventing from depth renovations; • Limited size of the market and lack of enterprises able to properly develop and manage EPC type initiatives.	
Industry	• Barriers to EE investments include: - long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities. • Another sector, besides industry, with EE potential is the service sector (e.g. hotels, etc.).	• Typical non-financial barriers preventing EE investments: - limited awareness about benefits of EE interventions and difficulties in structuring EE interventions; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	

ESIF resources and existing financial instruments

For the 2014 – 2020 period, Malta benefits from ESIF funding of EUR 827m (circa EUR 1,946 per person)[606] of which, **EE related support** is estimated in **EUR 15m**[607].

In the 2014 – 2020 period, Malta contributed **EUR 15m**[608] **of its ESIF** (100% ERDF) **to financial instruments**.

Although not captured by data above, the Maltese Managing Authority (MA) has signed a Funding Agreement with the European Investment Fund (EIF) to set up a **financial instrument to support EE and renewable energies** in Malta:

- The financial instrument is expected to be deployed as a **'first loss piece' portfolio guarantee** with an OP contribution of circa EUR 12m, complemented with a circa EUR 2.5m interest rate subsidy and a dedicated technical assistance facility. Based on available data, financial intermediaries will be selected in the first half of 2020.

[606] https://cohesiondata.ec.europa.eu
[607] Data provided by DG Regio based on an analysis of fields of intervention
[608] www.fi-compass.eu/financial-instruments/Malta

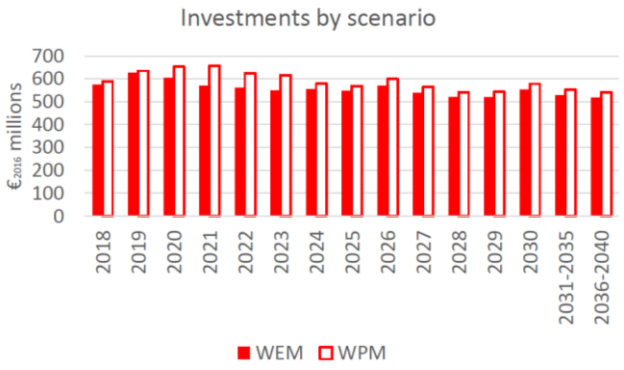
- The instrument is expected to contribute to reach the targets of the **Smart Finance for Smart Buildings** (SFSB) initiative, however it will also support non-buildings related EE/RE initiatives.

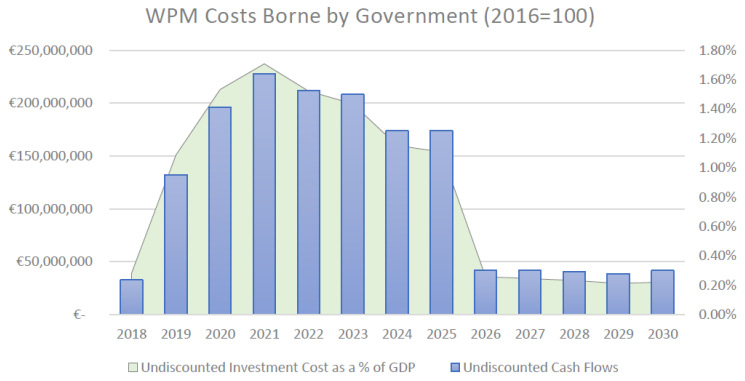
Investment needs

The final version of the NECP provides a quantification of the investment needed to support the overall energy and climate plan under two scenarios:

1) Under the scenario With Existing Measures (WEM), the annual investment needed would be EUR 562m during the 2018 – 2030 period;
2) Under the scenario With Planned Measures (WPM), investment needs would be circa EUR 597m per annum.

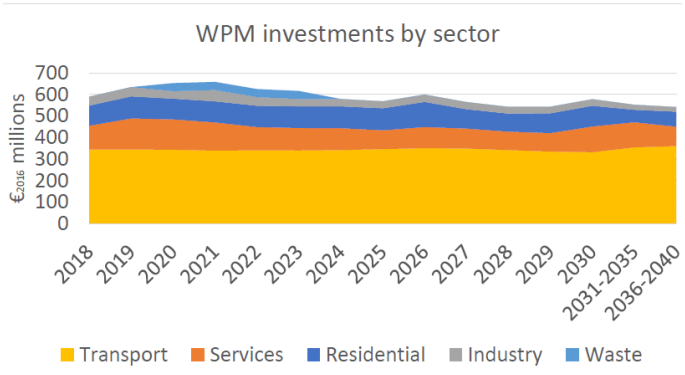
The part of the investments costs to be supported by the Government amounts to approximately EUR 1.66bn for the period between 2018 and 2030. Compared to GDP, the annual investment is expected to range between circa 1.4% (2020) and 1.7% (2021) while it is expected to diminish from 2026.

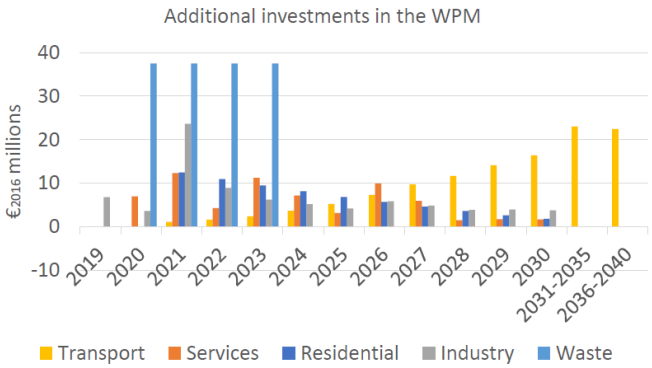




In terms of sectors, investments are expected to be concentrated in transport (circa EUR 343m per year or circa 55% of the overall investment) followed by services and the residential sector (just below and just above the mark of EUR 100 m/annually, respectively).

When considering the additional investment needed (WPM – WEM) per sector, as reported in the following figure, the largest investment forecast corresponds to the development of the Waste-to-energy facility in the period until 2024. In the short-term, investments are also envisaged in the residential, services and industrial sectors, while the element of electrification of the road transport vehicle fleet will be intensified towards the end of the next decade and beyond.





The NECP includes analysis on the **households sector**, where the **annual investment per household** in the period 2018-2030 under the WPM scenario is estimated to be at **EUR 500**. Households are expected to invest in the

installation of new and replacement of old appliances (including PV systems, solar water heaters and heat pumps).

The Netherlands

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Database of the Ministry for Infrastructure and Water management (klimaatmonitor.databank.nl)*
- *Draft version of the National Energy and Climate Plan of The Netherlands;*
- *Final version of the National Energy and Climate Plan of The Netherlands;*
- *EC assessment of the draft National Energy and Climate Plan of The Netherlands;*
- *Ex ante assessment Heat fund South-Holland. PwC. 2015;*
- *Ex ante analysis energy saving fund The Hague; Municipality of The Hague. Rebel Group. 2016;*
- *Ex ante analysis part I; SOFIE II; Municipality of Rotterdam. ERAC impact. 2016;*
- *Design of an Investment Platform for Circular Economy projects in the Netherlands. European Investment Advisory Hub. EuroPlus Consortium. Rebel Group. 2019;*
- *Building Market Brief. The Netherlands. Climate-KIC. 2018;*
- *National Energy Efficiency Action Plan (NEEAP). 2017;*
- *Climate Agreement. June 2019.*

Context overview

The Netherlands is a densely populated county (513 inhabitants/km^2)[609] and as of 1/1/2019 it has a population of about **17.28mln inhabitants** (3.87% of the EU27) which has **increased** over time (+4.73% in the last 10 years)[610]; this positive trend is expected to continue and by 2029 the population is expected to increase to 18 million[611].

The Netherlands's real **GDP** per capita in 2018 was about **EUR 41,540** (50% higher than the EU27 average) and it increased by 4.35% in the last 10 years[612].

Final energy consumption (FEC) in the Netherlands in 2018 was 50.3Mtoe (5.1% of the EU27) and it has **decreased by 7% compared with 2005,** while at the EU27 level it decreased by 4.9%[613].

- **Final energy consumption per capita** in 2018 (2.93toe/person) was 31.9% higher than the EU27 average (2.2 toe/person) however, it decreased by 11.8% compared with 2005 (at the EU27 level it decreased 7.4%)[614];
- **Energy productivity** (GDP over the gross available energy) in 2018 was 8.1 Euro per Kg of oil equivalent (slightly lower than the EU average) and it has increased by 16% in the last 5 years[615];

[609] National Energy and Climate Plan (NECP)
[610] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[611] National Energy and Climate Plan (NECP)
[612] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[613] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[614] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[615] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

- **Sectors** contribution to final consumption in 2018 were: industry (27%), transport (22%), households (19%) and services (14%)[616].

	Overview	Consumption	EE
Residential Sector	• The total stock of dwellings is 7.5 million: 56% are occupied by the owner and 44% are rented[617]; • 79% of the total residential building stock is made of single-dwelling buildings; • Circa 2.3 million of homes (30% of the housing market) pertain to the non-profit housing sector; • The residential floor area accounts for about 62% of the total building area (1,438 million m²), whilst the non-residential stock is 38% of the total.	• In 2018, FEC in the residential sector was 9.6Mtoe (4% of EU27)[618]; • Consumption per dwelling is 1.35toe (3% lower than EU average)[619]; • In households, the fuel used for space heating is pre-dominantly gas (87%), while the share of renewable energy in heating and cooling was 5.5% (as of 2015).	• Roughly 48% of Dutch residential dwelling stock was built before 1970; • Around 2.9 million dwellings (out of circa 7.5 million) have an Energy Performance Certificate[620], and the average rating in 2015 was C[621]; • During 2000-2016, energy savings in residential buildings were estimated at 5.5Mtoe, or circa 51% of 2000 consumption[622].
Industry	• Industry represents circa 18% of the national GPD and it employs circa 17.2% of the labour force[623].	• In 2018 FEC related to industry was 13.7Mtoe (5.7% of EU27)[624] with an increase by 1.4% in the last 5 years; • Over 60% of carbon dioxide emissions from industry in the NL are related to the 12 major energy-intensive industrial concerns[625].	• During 2000-2016 energy savings undertaken in industry were worth 5.6Mtoe or 38% of 2000 consumption [626]; • 80% of aforementioned savings were achieved during 2000–2008, while only 20% during 2009 to 2016.
Public Sector	• The Central Government Real Estate Agency has a building portfolio of 12.3 million sqm: almost half are occupied by the Ministry of Defence and 19% are offices buildings[627]; • Central government buildings are 257[628].	• In 2017 the public sector consumed circa 1.798 million of m³ of gas (27% less than in 2010) and circa 10,620 million of kWh of electricity (3% less than in 2010)[629].	• Over the 2008-2015 period around 21% in energy was saved per sqm (3% on average per year) in buildings owned and occupied by the government[630]; • 72% of government buildings have an Energy Performance Certificate and 40% of them have a letter equal/higher than C.

[616] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[617] Building Market Brief. The Netherlands. Climate-KIC. 2018 (all information reported in residential sector is based on this source)
[618] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[619] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[620] The Energy Performance Certificates (Dutch: *Energielabel*) rate properties from A (most efficient) to G (least efficient)
[621] Building Market Brief. The Netherlands. Climate-KIC. 2018
[622] Odyssee database, technical final energy savings, which excludes savings achieved thanks to economic or behavioral factors.
[623] Central Intelligence Agency, the world fact book (data refers to year 2017)
[624] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[625] Climate Agreement
[626] Odyssee database, technical final energy savings, which excludes savings achieved thanks to economic or behavioral factors.
[627] Central Government Real Estate Agency of the Netherlands
[628] National Energy Efficiency Action Plan (NEEAP). 2017
[629] Ministry for Infrastructure and Water management (klimaatmonitor.databank.nl)
[630] Central Government Real Estate Agency of the Netherlands

EE targets, measures in place/proposed

Existing policies are based on the Energy Agreement of 2013 and the Coalition Agreement of 2017. For the post 2020 period, new policies will be implemented, based on the Climate Act of May 28, 2019 and as reflected in the final version of the NECP.

MAIN POLICIES

Several policy measures are already in place, covering all sectors and including subsidies, energy taxes and revolving instruments. A list of these measures is reported in the following table.

The NECP has the overall objective to reduce emissions so that by 2030, emissions will be 49% compared with 1990 levels and to cut 95% of all emissions by 2050. The plan foresees important transformations (2050 horizon), including:

- A much stronger role/use of **electricity** (to replace natural gas, that is expected to strongly reduce its role in the coming years) and a much higher share of electricity generated from **renewable sources** (70% in 2030, based mainly on *wind turbines at sea, on land and with solar panels on roofs and in solar parks*);
- A more energy efficient and **gas free residential sector** (*by 2050, 7 million homes and 1 million buildings will have to be rid of natural gas*);
- A much **greener industry** that relies on circular economy solutions (*by 2050, the industry will be circular and will virtually no longer emit any greenhouse gas. The factories then run on sustainable electricity*).

In the following table some existing and planned new measures (with a 2030 horizon) are reported.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• By 2030, 1.5 million existing homes must be made more sustainable; • EE activities to be increased to over 50,000 existing homes per year by 2021 and to 200,000 per year by 2030; • Participative processes to be established to identify the best EE solutions for each district; • With respect to new buildings (as per 2018 national rules), they will be in principle no longer be fitted with gas connection.	Existing measures: • Several EE **subsidies schemes** are in place[631], including (i) the STEP grant scheme, for landlords in the social rental sector investing in EE (this measure costed EUR 400m in the 2014-2017); (ii) Energy-saving at Home grant scheme, covering approximately 20% of EE investments (2016–2018 budget EUR 56m); and (iii) Sustainable energy investment grant scheme (ISDE), targeting the use of renewables in residential buildings; • EE **revolving instruments** are in place, the most important is the National Energy Savings Fund, providing long term financing to owners and large Home owner Associations (EUR 600m budget provided by the government, Rabobank, ASN Bank and the Council of Europe Development Bank); • A number of **EE financial instruments** are operating, the Energy Fund Den Haag, SOFIE instrument of Rotterdam (more information in the next section). New planned measures/priority objectives (Climate Agreement): • The most relevant existing subsidies are expected to be extended and reinforced[632], including (i) ISDE will have a 100mln/year budget; (ii) subsidies for landlords worth EUR 100m/year are expected; (iii) EUR 100m/year up to 2021 and EUR 70m/year from 2020 will be provided for the neighbourhood approach and the renovation accelerator from the climate Budget funds; (iv) energy taxes will be redesigned in order to provide a stronger incentive to EE investment; and (v) VAT on insulation will be lowered from 21% to 6%;

[631] National Energy Efficiency Action Plan. 2017
[632] Climate Agreement. 2019

		• A stronger role of **revolving instruments** is expected, in addition to existing solutions, the government plans to set up a '**heat fund**' providing financing to owners not able to obtain funding due to existing lending standards (government plans to contribute EUR 50m–80m to the fund until 2030 and to crowd-in other resources, to reach a EUR 1bn financing portfolio); • **Regulatory changes** are also expected in order to facilitate building-related financing thus improving products the financial sector can provide for EE.
Industry	• The emission reduction target during the 2021-2030 is 19.4Mt; • Reductions are considered to be cost efficient; • To the 12 most energy-intensive industrial concerns (the big 12) of the NL a major effort will be requested; • The agreement reports the need to push on circular economy solutions and the use of hydrogen in industry.	Existing measures: • The most important **subsidy schemes** are (i) the SDE+, supporting investments in renewable energies and (ii) the Energy Investment Allowance, a tax deduction on investments in energy-saving technology and sustainable energy; • A number of EE revolving instruments are operating, including some financial instruments, like as the Energy Fund Den Haag, SOFIE instrument of Rotterdam and programmes managed by regional development agencies. New planned measures/priorities (draft NECP): • In the 2021-2030 period the SDE+ subsidy is expected to be reinforced (up to EUR 550m per year until 2030) and financed by an increase of energy taxes; • Other new measures include: a tax incentive for green investments, public resources for innovation/pilot programmes (EUR 100m/year matched by at least the same amount of private resources, thus mobilising EUR 2bn by 2030).
Public Sector	• No information is provided about public buildings in the Climate Agreement: a roadmap for social real estate (including public buildings) will be finalised in 2020.	Existing measures: • Although no measures are reported in the NECP, some existing financial instruments (e.g. Energy Fund Den Haag) can provide support on initiatives involving public buildings/assets. New planned measures/priorities (draft NECP): • More information are expected to be reported in the Long Term Renovation Strategy that will be released later in 2020.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in The Netherlands are briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• Some innovative and intense EE initiatives (e.g. geothermal, deeper renovations, etc.) are not financially viable for the market (inadequate risk/ return profile) without support.	• Need to generate awareness and consensus towards energy efficiency measures.	• To support the preparation and implementation of EE initiatives, as it is also reported in the NECP, TA and awareness raising programmes will be needed Dedicated revolving
Residential Sector	• Although numerous support schemes are in place, there are sub-sectors (e.g. small home owner associations, low income households) with difficulties to access financing; • Although the financial system is well functioning, there can be difficulties to secure financing for the riskier/more innovative EE solutions.	Considering the ambitious and innovation of the plan (residential buildings to be gas free by 2050): • coordination among involved entities may be difficult;	

		• it may be difficult to have dedicated and skilled workforce.	instruments need to include a facilitation component.
Industry	• Financial intermediaries tend not to consider EE related cash flows, but rather companies' economic/financial conditions.	• Enterprises (in particular SMEs that are the largest majority of NL enterprises) may not be able to structure effective EE interventions and to assess savings potential.	
Public Sector	• There can be cases (e.g. too high perceived risk, internal rate of return of the project too low compared with expected risk, etc.) when EE initiatives could have difficulties to attract private investors to implement public private partnerships (PPP).		

ESIF resources and existing financial instruments

The Netherlands, through 7 national programmes, benefits from **ESIF funding of EUR 1.9 billion** (circa EUR 112 per person, one of the lowest in EU). For the **low carbon economy EUR 121m** has been allocated (100% from ERDF)[633] while for overall (ESIF backed) **EE related support** has been estimated in circa **EUR 152m**[634].

For ERDF, a total of EUR 159m has been committed to financial instrument, of which ERDF contributes 53m (ARI 2018). Allocations to energy related financial instrument amount to EUR 54m, of which EUR 14m is supported by ERDF.

An example of financial instruments operating in the EE sector in NL is The Hague - Sustainability Fund Owners' Associations (*VvE Duurzaamheidsfonds Den Haag).*

City level financial instrument targeting home owner associations (HoA) smaller than 10 buildings (not eligible for the National Energy Fund). The financial instrument is managed by the private company SVN and in the 2014–2020 period it has received an ERDF contribution of EUR 8m. The financial instrument provides soft loans (from EUR 2,500 to EUR 15,000 per apartment) with the condition that maximum of 50% of the loan amount can be spent on regular maintenance, while at least 50% of the loan must be invested in sustainable measures. Depending on the amount, the loan can be repaid in 10 or 15 years.

To support applicants, a dedicated assistance scheme has been implemented (through the so called VvE desks) providing a wide range of advices (e.g. technical, legal, etc.) and awareness raising activities.

Although this financial instrument is capitalised with 2014–2020 ESIF resources, it builds upon the experience done by the city of The Hague in the 2007–2013 when a dedicated Holding Fund (HEID) and different urban development funds were created, also in the field of energy efficiency (with the Energy Fund The Hague, that is still operating, although no 2014–2020 resources were contributed).

Investment needs

The NECP makes a preliminary quantification of investment needs to support climate policies.

Regarding EE, the NECP reports that **investments in energy savings** increased from EUR 2.5 bn in 2010 to EUR 4.2 bn in 2017 and that the continuation of these investments (in the base scenario) are expected to reach circa **EUR 5bn in 2030** (annual investment).

[633] https://cohesiondata.ec.europa.eu
[634] Data provided by DG Regio based on an analysis of fields of intervention

In order to reach the new, more ambitious targets of the NECP, an **additional investment** need in the 'built environment' has been estimated at the **EUR 6.8bn – 13.5bn range, over the 2019–2030 period**.

Poland

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *National Energy and Climate Plan of Poland;*
- *EC assessment of the draft National Energy and Climate Plan of Poland;*
- *National Energy Efficiency Action Plan. 2017.*

Context overview

Poland has about **38.0mln inhabitants** (8.5% of EU27). Over the last 10 years the population declined by 0.4%. Poland shows uneven population development with an increase in suburban areas and a decline in rural areas and cities[635].

GDP per capita is about **EUR 12,430** (45% of the EU27 average) and has grown by 40% over the last 10 years[636].

Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Poland will suffer a sharp recession in 2020 with the gross domestic product **(GDP) expected to contract by 4.25%,** before rebounding and grow by 4% in 2021.

The **unemployment rate** is expected to increase from 2.9% in 2019 to 7.5% (2020). Unemployment rate is expected to drop again in 2021 to 5.3%.

To support the national economy a strong public fiscal stimulus will be deployed, with the **Government deficit** expected to reach 9.5% of 2020 GDP and to be 3.8% in 2021.

Due to the combined impact of the decrease of the GDP and the increase in the government deficit, the **debt/GDP ratio is expected to increase from 46% in 2019 to 58% in 2020** while it is expected to remain on that level 2021.

Energy generation in Poland is **very carbon intensive**, 77% of electricity is generated from coal and lignite[637].

Final energy consumption (FEC) is 71.9 Mtoe (7.3% of the EU27) and it has **increased by 23% since 2005,** while at the EU27 level it decreased by 5.9%[638]. This is mainly due to an increase in the manufacturing and transport sectors.

Energy consumption per capita (1.9 toe/person) is 15% lower than the EU average (2.2 toe/person) and it increased by 16% in the last 10 years (while at the EU27 level it decreased by 7%)[639].

Energy productivity (GDP over the gross available energy) is 4.5 Euro per Kg of oil equivalent (55% of the EU average), showing a strong reliance on energy to generate GDP (this index increased by 12% in the last 5 years)[640].

[635] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[636] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020

[637] National Energy and Climate Plan, 2019

[638] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020

[639] Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020

[640] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020

Sectors contributing to FEC are: households (27% of total), industry (23%), transport (31%) and services (11%)[641].

5.1% of all Poles were exposed to **energy poverty** compared to 7.4% on an EU average[642].

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 14.2 mln dwellings (total floor area 1,084 mln m^2)[643]: ○ 78% of the dwellings are owned by physical persons, 13% by housing cooperatives; ○ 76% are from before 1989[644];	• In 2018, households' energy consumption was 19.3 Mtoe (7.9% of EU27)[645]; • Consumption per dwelling is 1.5toe (6% higher than EU average)[646]; • The source of space heating for 43% of dwellings was solid fuel (hard coal and firewood), 41% district heating and 9% gas. [647].	• In 2015 energy savings for floor heating of 3Mtoe where achieved compared to consumption in 2008[648].
Public Sector	• A total floor area of 1.1 mln m^2 in 281 buildings owned by the central government does not fulfil energy efficiency standards[649].	• No information available.	• In central government buildings in 2018, energy efficiency measures of 425toe where achieved[650].
Industry	• Industry accounts for 40% of real GDP (2017)[651]; • The industry production index increased by 32% between 2010 and 2017[652], compared to 9% for the EU.	• In 2017, industry consumed 16.4Mtoe (6.8% of EU27) with an increase by 17% in the last 10 years[653].	• For 2015, it was estimated that energy savings of 3.1Mtoe where achieved (incl.-ETS sector)[654].

EE targets, measures in place/proposed [655]

Several policy measures are in place, relying both on **EU** (ERDF, Cohesion Fund) and national resources, either as co-financing of EU funds, revenues of the national environmental fund NFOŚiGW and WFOŚiGWs or resources of the National Promotional Bank BGK (Bank Gospodarstwa Krajowego).

Existing measures cover all sectors and they include investment grants combined with soft loans for thermal insulation, white certificates and energy management. Poland is relying heavily on ESIF grants, in some cases

[641] EUROSTAT; Final consumption - other sectors - energy use; extracted on 13/02/2020
[642] EUROSTAT; Inability to keep home adequately warm - EU-SILC survey [ilc_mdes01]; extracted on 28/02/2020
[643] Główny Urząd Statystyczny Gospodarka mieszkaniowa i infrastruktura komunalna w 2018 r. l
[644] National Energy Efficiency Action Plan, 2017
[645] EUROSTAT; Final consumption - other sectors energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[646] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[647] National Energy Efficiency Action Plan, 2017
[648] National Energy Efficiency Action Plan, 2017
[649] National Energy Efficiency Action Plan, 2017
[650] National Energy Efficiency Action Plan, 2017
[651] Central Intelligence Agency, the world fact book
[652] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[653] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[654] National Energy Efficiency Action Plan, 2017
[655] Information reported in this section is based on the draft NECP (if not differently specified)

combined with ESIF or non-ESIF financial instruments. Poland also uses the mechanism of tradable energy efficiency credits (white certificates) to incentivise energy efficiency measures in industry.

For the **2020-2030 period**, the NECP envisage the continuation of some existing measures and the implementation of new measures.

The overall **primary energy** savings envisaged in the draft NECP compared to needs to reach the 2030 targets are considered to be **modest** by the EC.

EE targets (Mtoe)	2017 data	Target 2020	Target 2030
Primary energy consumption	99.1	96.4	91.3
Final energy consumption	71.0	71.6	67.0

In the following table more details of current and planned measures are reported, based on the NECP.

	Context/targets	Existing and planned actions/priority objectives
Across all sectors	Expected EE savings from **White certificates** 2016-2020 is 2.6Mtoe.[656]	• **White certificates** – energy providers are obliged to invest directly or via white certificates in EE measures-[657] ESCOs can aggregate smaller projects to reach minimum size of white certificates (min 10 toe); • **Advisory support** for EE and RES for the across all sectors financed by OP Infrastructure and Environment (OPEI)- around 100 energy advisors; • Information and educational campaigns.
Residential Sector	• From 2021, all new buildings to be nZEB[658]; • Renovation targets: by 2030 70% of buildings thermally renovated, compared to 59% in 2015; • People living in sub-standard conditions to decrease to 3.3mln in 2030 from 5.4mln in 2011; • By 2040 all households shall be covered by district heating networks or by (near) zero emission heating sources.	<u>Existing measures (list of):</u> • **'Clean Air'** – grants for replacement of coal/wood boilers with low emission heat sources, PV, thermal insulation in residential buildings – **grants of 15% - 90% of cost,** depending on income **combined with soft-loans**. Planned volume PLN 103bn (EUR 24bn)[659]. **Target: 3 mln buildings**.[660] (2018-2029). The programme is currently financed with revenues of NFOŚiGW. The use of ERDF and Cohesion Fund resources is considered for next MFF, but measures (e.g. high efficiency coal boilers) are not going to be eligible;[661] • **'My electricity' –** PV for *prosumer*s (production for own consumption) to be installed on buildings. **Grant** up to 50%. Available budget EUR 235m (PLN 1bn)[662]; • Norway and EEA Funds 2014-2020 EUR 112m for energy efficiency in buildings, geothermal heating and small scale hydropower – **grants**; • **Tax rebate** on personal income tax for EE measures in single family houses not covered by aid programmes[663]; • **'Stop smog'** – **grants** of up to 100% for boiler replacement, thermal insulation and connection to district heating or gas network for poor households. Implemented by

[656] The Energy Efficiency Law of 20 May 2016: white certificates scheme
https://www.ca-eed.eu/content/download/3934/file/Energy%20Efficiency%20Law%20-%20Poland.pdf/inline
[657] National Energy Efficiency Action Plan for Poland, 2017
[658] The requirement of 'nearly zero energy building' is a requirement coming from the Energy Performance in Buildings Directive (EPBD)
[659] An exchange rate of EUR 1 = 4.25 is used throughout the document.
[660] http://www.nfosigw.gov.pl/czyste-powietrze/o-programie-czyste-powietrze-/
[661] Ochrona powietrza w Polsce. Dziennik Gazeta Prawna, 25-27 October 2019
[662] Ochrona powietrza w Polsce. Dziennik Gazeta Prawna, 25-27 October 2019
[663] Ochrona powietrza w Polsce. Dziennik Gazeta Prawna, 25-27 October 2019

		local governments with State budget subsidy of 70% of investment. PLN 1.2bn (EUR 280m) available in State budget;[664] • **Thermal insulation and renovation fund –** since 1998 BGK is providing soft-loans combined with grants through commercial banks (up to 20% of loan). Total volume of the fund is PLN 2.575bn (EUR 606mln). More than 45,000 buildings have profited from the programme, 95% are multi-apartment buildings; [665] • **National and regional OP contributions** through grants and financial instruments – almost EUR 800m[666]; • Three commercial banks use ELENA support to pay energy audits and project documentation linked to lending for the renovation of residential housing. New planned measures/priority objectives (NECP): ▪ Continuation of existing measures; ▪ Improvement of housing conditions and energy efficiency, combined with revitalisation of degraded areas. To be supported by using national and EU funds.
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • NZEB: from 2019 for government buildings; • By 2030 at least 85% of district heating and cooling system shall fulfil criteria for efficiency systems.	Existing measures: • **National and regional OP contributions** through grants and financial instruments – almost EUR 1.5bn[667]; • **'Energy efficient building' –** grants up to 95% combined with soft-loans for hospitals, cultural institutions, historic buildings, church entities EE measures and small scale RES. Financed from resources of NFOŚiGW PLN 1.65bn (EUR 388mln) [668]; • Various support programmes for local governments from the Regional environmental and water management funds (WFOŚiGW). New planned measures/priorities (NECP): • Current measures are expected to be extended to post 2020, in particular support for EE in public buildings, drawing upon ERDF and Cohesion Fund resource; • Priority being given to ESCOs. Measures will be undertaken in the period 2021-2030 to support also SME-sized ESCOs with ERDF and Cohesion Fund resources.
Industry	• No sector specific targets identified.	Existing measures: • Mandatory **energy audits** and energy management systems for large enterprises; • **National and regional OP contributions** through grants and financial instruments – of EUR 186m for SMEs and EUR 160m for large enterprises[669]; • One commercial bank uses ELENA support to pay energy audits, project documentation and advice on available grants linked to lending for the renovation of commercial buildings. New planned measures/priorities (NECP): • Continuation of existing measures; • Support from ERDF and Cohesion Fund for Building Energy Management System and Demand Side Response technology;

[664] Ochrona powietrza w Polsce. Dziennik Gazeta Prawna, 25-27 October 2019
[665] https://www.bgk.pl/osoby-fizyczne/fundusz-termomodernizacji-i-remontow/
[666] https://cohesiondata.ec.europa.eu
[667] https://cohesiondata.ec.europa.eu
[668] http://nfosigw.gov.pl/oferta-finansowania/srodki-krajowe/programy-priorytetowe/budownictwo-energooszczedne/
[669] https://cohesiondata.ec.europa.eu

		• Improvement of heat consumption, through thermal insulation, change of heating technology, alternative heating systems, heat recovery to be supported with public funds, e.g. ERDF and Cohesion Fund; • Linking energy management systems with demand side response tools in industry.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Poland are briefly reported in the following table[670].

	Financial issues	Non-financial issues	Financial instrument implications
Across all sectors	• High investment cost for energy efficiency building materials and works; • Competition between various grant programmes and financial instruments.	• Continued shortage of highly qualified and reliable staff to deliver quality construction works.	
Residential Sector	• Lack of own resources • High collateral requirement for loans provided by NFOŚiGW • **Long repayment periods** of investments; • Difficulties to obtain bank loans or grants; • Lack of information about grant or loan schemes; • High share of **low income households**[671]**;** • Competing instruments on national and regional level; • Public support is crowding out bank financing.	• Comprehensive renovation requires for inhabitants to move out. Difficult in multi-apartment buildings with individual ownership of flats; • Partial renovation (e.g. only windows) leads to lock-in effect and delays future comprehensive renovation; • Lack of information among building owners; • Administrative burden, e.g. energy audits; • Savings (energy and financial) not achieved due to energy certificates not fulfilling standards and poor quality installation.[672]	• **Project development assistance** for public and private beneficiaries for EE measures (e.g. ELENA or advisory support financed by the OP Infrastructure and Environment); • **Simplifying and standardising existing grant/financial instrument combination** schemes; • Gradual shift from soft-loan instruments to guarantee funds; • **Setting up a dedicated EPC financial instrument;** • Integrating EE aspects into existing SME financial instruments; • Integrating financial instrument/grants into a **one-stop** shop scheme for single apartment buildings.
Public Sector	• **Restrictions on taking** debt for regional and local governments; • ESCOs have difficulties to access financing for implementation period and long-term financing of performance period[673];	• **Lack of standardised of Energy Performance Contracts;** • Insufficient number of EPC service providers; • Complexity of procuring EPC for public entities, lack of qualified consultants[674].	

[670] National Energy Efficiency Action Plan for Poland, 2017
[671] Financial Instruments to Support Energy Efficiency Measures in Single Family Buildings in Poland. Report prepared for EC, Ministry of Economics, Malopolska and Silesia Region and World Bank, 2017
[672] Efekty termomodernizacji wielorodzinnych budynków mieszkalnych będących w zasobach spółdzielni mieszkaniowych, realizowanej z udziałem środków publicznych, Najwyższa Izba Kontroli, 2019
[673] Proceedings of National Roundtable On Financing Energy Efficiency In Poland, Warsaw 15th of May 2018, https://ec.europa.eu/energy/sites/ener/files/documents/proceedings_en.pdf
[674] Proceedings of National Roundtable On Financing Energy Efficiency In Poland, Warsaw 15th of May 2018, https://ec.europa.eu/energy/sites/ener/files/documents/proceedings_en.pdf

	• Difficulties to combine grants and ESCO implementation;		
Industry	Typical barriers to EE investments include: • long pay-back period of EE interventions (esp. building related) • difficulties to obtain financing based on cash flows generated by EE activities	• Industry tends to replace equipment and not undertake energy efficiency measures in production buildings; • Little knowledge about using ESCO services in enterprises; • Cost of energy audits; • White certificates are not accessible for SMEs[675].	

ESIF resources and existing financial instruments

Poland is the largest beneficiary of **ESIF funding. It receives of EUR 86bn** (circa EUR 2.262 per person) during the 2014–2020 period. For the **low carbon economy, EUR 11.6bn** has been allocated (EUR 6.7bn from ERDF; EUR 4.9bn from CF and EUR 31m from EMFF)[676]. The **EE related support** comes through the national Operational Programme Infrastructure and Environment and 16 regional OP, the total amount is estimated to be **EUR 2.6bn**[677]. Support is provided for EE measures in the residential sector, for public buildings, SMEs and to a limited extend for large enterprises. The EE support is provided by one national OP and all 16 Regional OPs. There are large differences regarding the eligibility of final recipients and measures between regional OPs[678].

In 2014–2020, Poland contributed **EUR 2.8bn**[679] **of its ESIF** (circa 4% of its budget) **to financial instruments** (ERDF and ESF).

Under OPIE there is a repayable assistance scheme which is implemented by NFOŚiGW and addresses energy efficiency in large enterprises. It consists of a repayable and a non-repayable part, which is depending on energy savings achieved between 5% and 15% of eligible expenditure[680]. The scheme has met limited interest as it involves complex calculations of the financial gap for the non-repayable part. The original allocations of EUR 150m have been reduced to EUR 78m. Support to ESCO implemented projects was considered, but never implemented.

For energy efficiency in multi-apartment buildings, a national repayable assistance scheme is implemented by NFOŚiGW, originally it was supporting buildings in the capital cities of the regions and cities covered by integrated territorial development. The support combines a repayable and non-repayable part, depending on energy savings achieved between 25% and 45%. The scheme was less successful than expected. In response the eligibility was extended to the whole country, which led to overlap with regional OPs and allocations were reduced from EUR 225m to EUR 83m. .

In the **OP Smart Growth** there is the guarantee instrument Biznesmax, which supports beside innovative investments also investment in energy efficiency, renewable energy and circular economy. The instrument is combined with an interest rate subsidy. The instrument is reported as TO3 (SME competitiveness) and not TO4 (low carbon economy). One of the financial intermediaries, PNB Paribas Polska, combines Biznesmax with project development support form ELENA[681] to provide a global package of services (energy audits, preparation of the

[675] Proceedings of National Roundtable On Financing Energy Efficiency In Poland, Warsaw 15th of May 2018, https://ec.europa.eu/energy/sites/ener/files/documents/proceedings_en.pdf

[676] https://cohesiondata.ec.europa.eu

[677] Data provided by DG Regio based on an analysis of fields of intervention

[678] National Energy Efficiency Action Plan, 2017

[679] www.fi-compass.eu/financial-instruments/Poland

[680] Wykorzystanie finansowania zwrotnego w ramach Programu Operacyjnego Infrastruktura i Środowisko 2014-2020 https://www.pois.gov.pl/media/22171/Instrumenty_finansowe_i_pomoc_zwrotna_POIiS_2014_2020.pdf

[681] https://www.eib.org/attachments/documents/project-factsheet-energy-eficiency-financing-eeffcb-en.pdf

technical documentation, technical advice and advice related to available grants) to enterprises for undertaking energy efficiency investments (above 30% energy savings) and renewable energy investments in buildings.

In regional OPs EUR 204m, 13% of the total allocation, is allocated to financial instruments for energy efficiency. The financial instruments in the regional OPs are implemented by BGK or EIB, acting as fund of funds manager and a very large number of financial intermediaries implementing under fund of funds. These financial intermediaries are commercial banks operating on a national scale or many small agencies, debt funds or foundations operating on a local scale.

There are in particular three financial instruments dedicated to EE that could be of interest: (i) a financial instrument operating in the multi-apartment building sector in Pomerania, Mazovia and Kujawsko-Pomorskie; (ii) a financial instrument operating in the SME sector in Lower Silesia and (iii) PF4EE in Poland, which financed multi-apartment building through a one-stop-shop approach. There are several non-ESIF financial instruments combining soft-loans and grants managed by BGK and NFOŚiGW.

The EBRD also offers the GEFF (Green Economy Finance Facility) a EUR 350m credit line to leasing companies for investments in energy efficiency, renewable energy and resources efficiency. This facility is successful without investment grants and very limited technical support to financial institutions.

Investment needs

The NECP estimates the investments needs for the non-energy sector for the 2020-2040 period at EUR 165 billion. For the period 2021-2030 the estimate investment needs are EUR 105 billion. Majority of these investments will be for energy efficiency, in combination with small scale renewables. For the household sector these are EUR 30.4 billion, for industry EUR 10.2 billion and for services EUR 9.4 bn.

Portugal

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Portugal, Cedru, Avaliação ex-ante dos Instrumentos Financeiros de programas do Portugal 2020 – Lote 3 – instrumentos financeiros para a eficiência energética e gestão eficiente das águas e dos resíduos, Relatório final; 2015;*
- *Final version of the National Energy and Climate Plan of Portugal;*
- *EC assessment of the draft National Energy and Climate Plan of Portugal;*
- *Odysee-mure, Energy Efficiency Trends and Policies in Portugal, 2018;*
- *Odysee-mure, Portugal country profile;*
- *Ibroad project, Portugal: Current use of EPC and potential links to iBRoad;*
- *INS Statistics Portugal, data on building stock;*
- *INS Statistics Portugal, Publication on construction and housing statistics;*
- *EU building stock observatory;*
- *EU Energy Poverty Observatory Member State Report Portugal;*
- *National Renewable Energy Action Plan for Portugal, 2019;*
- *National Law (Portaria) 332/2018;*
- *JRC Science for Policy Report, Accelerating energy renovation investments in buildings 2019;*
- *JRC Science for Policy Report, Synthesis report on the assessment of member states' building renovation strategies, 2016;*
- *Commission staff working document. The EU Environmental Implementation Review 2019 Country Report Portugal 2019;*
- *Commission Staff Working Document Country Report Portugal 2020;*
- *National Renewable Energy Action Plan Portugal 2017-2020 ;*
- *https://certus-project.eu/portugal;*
- *Allocation of Cohesion policy funding to Member States for 2021-2027. European Court of Auditors. March 2019;*
- *Research on the Portuguese building stock and its impacts on energy consumption-an average U-value approach, Archives of Civil Engineering 2013;*
- *European Social Policy Network, In-work Poverty in Portugal, 2019;*
- *EC, Spring economic forecast 2020;*

The following interviews were conducted (i) IFD; (ii) PME Investimentos; (iii) SPGM; (iv) Portugal Tourismo; (v) IAPMEI; (vi) Portugal Ventures; and (vii) DG REGIO- Portugal desk

Context overview

Portugal has a population of **10.291.027 inhabitants** (2.00% of the EU27). The population of the country has decreased in the last 10 years by 2.57%.

It is important to mention that the country underwent a difficult period during the crisis with a strong economic slowdown and high unemployment rates (more than 17% in 2013)[682]. During the crisis period and especially between 2010 and 2014, the country was unable to repay or refinance its public debt and was obliged to request financing from the IMF and the EU to prevent an insolvency situation. This so called bailout programme was accompanied by austerity measures and a very tight fiscal consolidation process.

[682] EUROSTAT

In the last few years, the country underwent a process of economic recovery with an increase of GDP per capita (10% in the last 5 years) that has managed to supersede the pre-crisis levels.

Based on the European Commission 'Spring 2020 Economic Forecast', released in May 2020, due to the COVID-19 outbreak, Portugal will suffer a sharp recession in 2020 with the gross domestic product **(GDP) expected to contract by 8.25%,** before rebounding and grow by 7.5% in 2021. The **unemployment rate** is expected to increase from 6.5% (2019) to 9.7% (2020) and it is expected to decrease again in 2021 (7.4%). To support the national economy an important public fiscal stimulus will be deployed, with the **Government deficit** expected to reach 6.5% of 2020 GDP and 1.8% in 2021. Due to the combined impact of the decrease of the GDP and the increase in the government deficit, the **debt/GDP ratio is expected to reach 131.6% in 2020** (it was 117.7% in 2019) while it is expected to be 124.4% in 2021.

Final energy consumption (FEC) in Portugal **in 2018** was 16.470Mtoe (1.5% of EU 28 consumption)[683]. In the last decade it seems that FEC has been influenced by the economic crisis. More specifically, consumption fell steadily in the last 10 years by close to 13%. Especially in the period from 2008 to 2014, consumption fell from 18.40Mtoe to 15.77Mtoe[684]. A slight increase is reported in the last three years aligned with the economic recovery.

- **Consumption per capita** (1.61toe/person) is 27% lower than the EU average (2.2 toe/person) moreover in the last 10 years, this rate decreased by 7.9%, slightly more than the EU average (-7%)[685];
- **Energy productivity** (GDP over the gross available energy) is 7.28 Euro per Kg of oil equivalent (close to the EU average), showing a moderate reliance on energy to generate GDP;
- **Sectors** contributing to final consumption are: transport (5.794 toe), households (2.572 toe), industry (4.526 toe) and services (1.899 toe)[686].

	Overview	Consumption	EE
Residential Sector	• Stock of dwellings[687] is 6m of which residential households account for about 4m (representing 2% of EU27), circa 83% are built before 2000[688]; • About 37% correspond to detached houses and 17% semi-detached houses; • There are about 1.5m multifamily buildings[689]; • 22.5% of households are unable to maintain a desirable level of warmth in their houses.	• Households[690] are responsible for 2.5 toe (1% of EU28) or 16% of the national consumption; • Consumption per dwelling is 0.65 toe (53% lower than EU average)[691]; • Consumption reduced by 24% in the last 10 years (10% in the last 5 years); • The residential building stock is the third largest consumer of energy; • The average energy consumption is lower than the EU average to an extent because of economic	• The potential for EE is very high, since 86% of buildings are built before 1990; • A large percentage of the building stock was built without thermal regulations in place[692] (energy efficiency requirements defined after 1991); • Buildings built between 1960 and 1980 have the highest energy saving potential; • 44% of heating in households is generated from electricity with very low use of natural gas (9%) and solar thermal (1%);

[683] Final NEPC
[684] EUROSTAT
[685] EUROSTAT
[686] EUROSTAT
[687] INE Statistics Portugal
[688] Odysee-mure database
[689] EU building stock observatory
[690] EUROSTAT
[691] Odyssee-Mure, Database
[692] Ibroad country factsheet Portugal

		constraints of households from the crisis.	• According to the Odysee-mure methodology, the residential sector noted a significant development in EE gains between 2000 and 2016.
Industry	• About 1m buildings are considered non-residential; • About 104m sq.m of building area is considered non-residential. Of which 26% correspond to offices, 13% hotels and restaurants and 28% commercial activities (shops)[693].	• Industry is responsible for approximately 4.526 toe of energy consumption; • Consumption reduced from 5.523 toe in 2008 to 4.382 toe in 2016 (lowest point); • The economic slowdown reduced the contribution of industry in the overall energy consumption in the country[694]; • High dependency of buildings in oil and electricity with low use of natural gas.	• The same as in the residential sector, buildings in industry and services have a large potential for EE improvements[695].
Public Sector	• In the public sphere, from 104m sq.m, 21% correspond to schools and 7% to hospitals. Government buildings are included in the 26% corresponding to office buildings.	• High dependency of buildings in oil and electricity with low use of natural gas.	• Same as the industry and service sector, a large percentage of buildings require improvements[696]; • Financing programmes through ERDF grants are currently targeting energy efficiency in buildings with a budget exceeding EUR 100m.

EE targets, measures in place/proposed

Portugal is currently implementing a number of policies (covering the period from 2016 to 2020) and planning additional measures to reach the 2030 targets. The NECP mentions a number of policy objectives without a high degree of granularity in terms of actual measures. These policy objectives are intended to be achieved with the support of financing schemes including grant schemes and financial instruments. However, it has to be noted that the measures are not directly linked to specific financing schemes.

EXISTING POLICIES

Under the **existing policy measures**, the objective for Portugal is to achieve energy savings of at least 35% until 2030[697]. Currently, the state is promoting the review of the relevant legal framework to strengthen the monitoring systems and energy requirements. Moreover, the requirements for energy audits and energy management systems have been reinforced, while in terms of awareness efforts, more active consumer information programmes and trainings are being implemented. According to the NECP, the strategy for renovation of the building stock will soon be finalised and will define the main objectives in improving buildings in the country. Moreover, a target will be defined in order to gradually require that all buildings are built at Near

[693] National Renewable Energy Action Plan for Portugal, 2019
[694] Ibroad country factsheet Portugal
[695] Portuguese building stock and its impacts on energy consumption-an average U-vlaue approach, Archives of Civil Engineering 2013
[696] Portuguese building stock and its impacts on energy consumption-an average U-vlaue approach, Archives of Civil Engineering 2013
[697] NECP

Zero Energy levels. In order to achieve this, special trainings will be provided for technicians and specialists in the building sector

On the financing side, a dedicated financial instrument called IFE2020[698] was planned to be implemented in the beginning of the programming period using ESIF but eventually was suspended. Eventually, a financial instrument was put in place using ESIF but also financing from EIB and CEB. This financial instrument, called IFRRU2020, is mostly targeting urban regeneration but it also includes an EE component (more details provided in a following section). In addition, financing programmes in the form of grants are being implemented by a state owned entity called Energy Efficiency Fund (more information presented in the table below).

The NECP lists a number of measures and then in a separate section a number of financing sources. The main tool for achieving the objectives in the following years will be the long term strategy for the renovation of the national stock of residential and non-residential buildings, both private and public. The long term strategy is currently still being developed in accordance with the relevant Directives.

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• There are about 4m residential household buildings in Portugal with poor overall insulation and a high percentage of families unable to achieve comfortable heating conditions in their homes.	<u>Existing measures:</u> • The certification system for building defines specific requirements for residential buildings; • Almost 500k residential buildings have been issued energy audits; • Awareness campaigns have been launched in order to induce behavioural changes. For the residential buildings, ADENE (Portuguese Energy Agency) is responsible for these campaigns; • One of the main financing schemes available is the grant scheme of the Energy Efficiency Fund; • Casa Efficiente is a dedicated financial instrument for EE financed by the national budget, however the uptake from the market has been rather slow. <u>New planned measures/priority objectives (NECP):</u> • A dedicated programme will be implemented to replace inefficient household appliances and other electrical equipment. Also, the household appliances sold in the market will be required to have energy labelling; • The Energy Efficiency Fund already provides grants for replacement of windows and solar thermal systems and will continue in the future; • IFRRU2020 also targets residential buildings and building on this experience, it is expected that similar financial instruments will be implemented in the future.
Industry	• From the overall building area in Portugal, 26% correspond to offices (including government buildings), 13% hotels and restaurants, 4% sport buildings and 28% commercial buildings.	<u>Existing measures:</u> • Energy audits framework in place for companies; • Intensive energy consumption management system established for high consuming companies with requirements for regular energy audits; • Requirements for high consuming companies to deliver rationalisation plans; • The energy certification system for buildings includes special requirements for commercial and service buildings; • Awareness campaigns for interventions in private buildings in industry and services by the Directorate General for Energy and Geology; • A financing initiative was recently announced to support the renovation of buildings in industry and services through ERDF and Cohesion Fund grants with a budget of EUR 24.5m;

[698] Interviews with stakeholders

		• The Energy Efficiency Fund also implements programmes whereby the cost of audits and the cost for rationalisation of energy consumption in companies is subsidised; • IFRRU2020 is supporting industry buildings for rehabilitation. New planned measures/priorities (NECP): • The improvement of buildings in the industry and services sectors will constitute a priority of the long term strategy for the renovation of the national building stock currently being drafted; • It is expected that financing schemes such as the ones provided by the Energy Efficiency Fund and IFRRU2020 will continue to play a leading role.
Public Sector	• From the overall building area in Portugal, 21% correspond to schools, 7% to hospitals and government buildings are included in the overall office space (26%).	Existing measures: • Awareness campaign for the improvement of public buildings implemented by the state owned company Government Shared Services Entity (eSPap). This company is mandated to provide diverse services to public authorities towards a more sustainable governance; • The Energy Efficiency Fund covers 100% of costs for all types of public buildings to improve their energy management systems and acquire certifications and conduct audits; • Continuous training provided to senior technical staff of public buildings in Energy Management Systems; • Recently an ERDF grant programme was announced for public buildings and more specifically EUR 19m for local government buildings (in regions) and EUR 25m for social housing buildings; • IFRRU2020 combines a loan and a guarantee and is mostly targeting public buildings at regional level; • The initiative ECO AP is a mapping exercise in order to identify public building that require renovation and EE upgrade. The purpose is to match these projects with ESCOs. There is no financing component under this exercise. New planned measures/priorities (NECP): • The Improvement of buildings in the public sector will constitute another priority of the long term strategy for the renovation of the national building stock currently being drafted. In this context, the Public Administration Energy Efficiency Programme will be implemented; • In order to attain the objectives (that will be set) in the renovation of public buildings, an Energy Efficiency Barometer will monitor the energy performance of such buildings; • It is expected that financing schemes such as the ones provided by the Energy Efficiency Fund and IFRRU2020 will continue to play a leading role.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Portugal are briefly reported in the following table. To the extent possible, the main potential implications of the COVID crisis on barriers to EE investments have been considered.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The financial crisis affected most stakeholders and although the situation has largely improved, there is still a lack of liquidity in the market.	• Very low awareness on the benefits of EE improvements;	• Lack of past experience in implementing a dedicated financial instrument for EE in all sectors.

		• Very high electricity consumption and oil dependency compared to the rest of Europe.	
Residential Sector	• Households are still recovering from the crisis and trying to cope with lack of liquidity[699]; the COVID crisis could have a further negative impact as it could reduce further households' disposable income/ financial resources; • Portugal has a very high energy poverty rate, demonstrating that renovations are not a priority for households; • The liquidity problems of the banking system[700] increased the difficulties for households to acquire credit; • Banks remain reluctant to lend to multi apartment buildings and ESCOs.	• In apartment buildings, asymmetry of needs and priorities between owners renting out their apartments and owners living in their apartments; • Low awareness of EE benefits in urban and rural areas; • High dependency on electricity and kerosene fuelled central heating systems with high cost; • Low use of natural gas; • The economic crisis changed the dynamic on the housing market with most families looking to rent rather than own a house[701]; • ESCOs are active in the market but their accreditation process from the state is lengthy and their credibility in the market remains low[702]; • Lack of awareness on alternate contracting solutions such as EPCs.	• There is no experience in the sector with dedicated financial instruments due to availability of grant programmes; • Financial instruments could support bridging the financing gap reported in multi-apartment-buildings (where banks tend to be reluctant to lend to Home-Owner-Associations); • Financial instruments could support innovative financing solutions (e.g. ESCO model), not developed in the residential sector also due to the reluctance of banks to finance them (mainly due to risk).
Industry	• Predominance of SMEs in the market which by default have limited access to finance; • During the crisis, and especially in the period from 2009 to 2014, access to finance became very scarce due also to the liquidity problems of the banking system[703]; • The COVID triggered economic recession will have negative impacts on enterprises that could have more difficulties to access the credit sector (due to the less performing economic and financial ratios). Due to future uncertainty, enterprises may moreover reduce further their investment plans and they could postpone non-core investments.	• Very low awareness on the benefits of EE improvements; • The use of ESCO remains low with some projects being reported in the case of hotels and shopping centres[704]; • Lack of awareness on alternate contracting solutions such as EPCs.	• IFRRU2020 is a positive case study for an financial instrument targeting building regeneration but still not targeting the typical SME company; • SME financial instruments remain generic in nature not targeting EE but there is extensive experience in the market in the use of guarantees for SMEs; • Dedicated financial instruments for EE could also support the development of the EPC model in the industry sector and in the business sector at large.
Public Sector	Portugal has limited debt capacity to support EE investments with own resources, moreover to face the	• Political priorities during the crisis years were focused on fiscal recovery;	• IFRRU2020 is a positive case study for the promotion of building regeneration especially targeting

[699] Portuguese building stock and its impacts on energy consumption-an average U-value approach, Archives of Civil Engineering 2013
[700] Portugal, Cedru, Avaliação ex-ante dos Instrumentos Financeiros de programas do Portugal 2020 – Lote 3 – instrumentos financeiros para a eficiência energética e gestão eficiente das águas e dos resíduos, Relatório final; 2015
[701] Portuguese building stock and its impacts on energy consumption-an average U-value approach, Archives of Civil Engineering 2013
[702] https://certus-project.eu/portugal/
[703] Portugal, Cedru, Avaliação ex-ante dos Instrumentos Financeiros de programas do Portugal 2020 – Lote 3 – instrumentos financeiros para a eficiência energética e gestão eficiente das águas e dos resíduos, Relatório final; 2015
[704] https://certus-project.eu/portugal/

	COVID related recession, the debt/GDP level of Portugal is expected to further increase.	• Low awareness for the benefits of EE amongst public stakeholders managing public buildings; • Lack of awareness on alternate contracting solutions such as EPCs.	social housing or very old public buildings; • Financial instruments could support the development of the EPC model in the public sector, providing technical support and financial support both directly to Public Sector Entities (e.g. municipal lending) and to private or public-private entities (loans and/or equity financing).

ESIF resources and existing financial instruments

Portugal has been allocated **EUR 25.79bn** in ESIF in the current programming period 2014-2020. The ESIF funds are implemented through 16 national (thematic) and regional programmes. One of the main Operational Programmes (OPs) financed by the Cohesion Fund is the OP Sustainability and Efficiency in the Use of Resources identified with the acronym POSEUR with a budget of EUR 2.6bn. POSEUR is the main source of ESIF targeting EE in the country. Other OPs with EE aspects are mainly the ERDF OPs such as the OP Competitiveness.

As already mentioned, most widely used financing schemes targeting EE are implemented in the form of grants (available ESIF for EE grants amount to EUR 260m in the current period) mainly through the Energy Efficiency Fund.

Regarding financial instruments, Portugal has extensive experience in their set up and implementation. Currently there are several state owned institutions specializing in financial instruments namely IFD, PME Investimentos, Portugal Tourismo, SPGM, IFFRU2020, and Portugal Ventures. The EIB is currently conducting an analysis on the set up and implementation of financial instruments in Portugal for another project. This analysis has highlighted 35 financial instruments currently implemented in the country by all the public institutions mentioned above. Although financial instruments in the form of loans and equity are aslo implemented, the majority of identified financial instruments are implemented in the form of guarantees. Portugal has a long standing and well tested guarantee system which is focussed on SME financing and which supports all types of investments for companies. This system is based on the experience of SPGM but often the different institutions cooperate to implement the diverse instruments. SPGM operates as a national counter-guarantee organisation taking part of the risk from 4 underlying guarantee societies which in turn guarantee individual loans extended by commercial banks. In the current period 3 guarantee lines are financed by ESIF.

In the beginning of the programming period a dedicated financial instrument for EE was being set up namely IFE2020. This instrument was meant to be managed by the EIB and would target EE investment in all sectors (financed by ESIF). However, in 2018 a political decision was made not to implement the financial instrument. It was assumed by the government that due to the still sensitive financial situation especially of households, such a dedicated financial instrument would not motivate investments.

On the positive side, another initiative namely **IFRRU2020** was created, with the ability to initiate investments in EE. IFFRU2020 is a building rehabilitation financial instrument combining different sources of funding including ESIF, EIB financing and CEB financing. This financial instrument has been set up in the form of a FoFs with 4 underlying funds (in the model of JESSICA). Although this financial instrument should be considered more as an urban development financing scheme rather than an EE dedicated instrument, it is still prioritising the improvement of the efficiency of buildings. The instrument is targeting private and public buildings but in practise it is seeking projects in cooperation with municipalities for the rehabilitation of abandoned buildings, or the improvement of public housing. The instrument is being implemented through 3 commercial banks and the total available funds are about EUR 1.4bn. The end product for the project promoters are loans with long tenures and below market interest rates combined also with a guarantee provided through the SPGM network.

Recently, a loan instrument was launched targeting residential EE with national funds. The instrument is called **Casa Efficiente 2020** with a total budget of EUR 200m (partially financed by EIB with a EUR 100m loan). The instrument consists of extending preferential loans to single households or apartment buildings implemented through 4 commercial banks. The scheme is implemented by the Portuguese Confederation of Constructors and Property Developers under the technical support of the ADENE (Agency for Energy). According to interviewed stakeholders, the uptake has been slow in the market, with a disbursement of EUR 600.000.

Investment needs

The NECP includes estimates for investment needs, summarised in the following table. It needs to be highlighted that the Portuguese NECP provides investment needs only until 2040. The actual needs are presented in ranges. The main scenario does not consider additional investments to achieve energy neutrality by 2050. In the table below, additional investment needs are also defined for the scenario of achieving energy neutrality by 2050.

Investment needs (EUR bn)	2016 - 2030	2031 - 2040
Overall investment without neutrality target		
Electricity	22.4 – 22.1	16.6 – 19.6
Transport	193.7 – 201,3	74.5 – 62.3
Buildings	165.0 – 176.4	124.0 – 138.3
Industry	14.0 – 16.0	14.4 – 14.7
Other	0.7 – 0.8	0.2 – 0.1
Total	**395.9 – 416.6**	**229.7 – 235.1**
Additional investment needs to achieve neutrality		
Electricity	1.2 – 2.2	9.0 – 11.3
Transport	5.1 – 6.2	17.3 – 17.6
Buildings	3.1 – 4.8	5.6 – 6.1
Industry	1.0 – 1.3	1.2 – 0.9
Total	**10.8 – 14.7**	**33.7 – 37.9**
Grand Total	**406.6 – 431.3**	**263.4 – 273.0**

The NECP does not provide granularity as per the investment needs within the sub area of buildings. As such, information is limited also in this case. According to the table below, the state considers the transport sector of higher priority than buildings for the period until 2030. For the period 2031 to 2040, investment needs for buildings become higher than those for transport.

Sweden

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final versions of the National Energy and Climate Plan of Sweden;*
- *EC assessment of the draft National Energy and Climate Plan of Sweden;*
- *Sweden's National Energy Efficiency Action Plan; 2017;*
- *Ex-ante assessment of support for financial instruments with the ERDF 2014-2020, Swedish Agency for Economic and Regional Growth (Tillväxtverket), February 2015.*

Context overview

As of the beginning of 2019 Sweden has a population of about **10.23mln inhabitants** (2.3% of the EU27) which **has grown at a high rate** since 2006 (+10.2% in the last 10 years being 4th highest in the EU)[705] and the positive trend is expected to continue: in 2030 population is expected to increase to 11.17 million[706].

Sweden's **GDP** per capita in 2018 was about **EUR 43,810** (158.6% of the EU27 average) and it reported a 9.72% increase in the last 10 years.[707]

Final energy consumption in Sweden is 32Mtoe (3.2% of the EU27) and it has **decreased (-4.5%) since 2005** (average of the EU27 is -4.9%).[708]

Consumption per capita (3.16toe/person) is **42.6% higher** than the EU27 average (2.2 toe/person) and it decreased by 15% in the last 10 years (while at the EU27 level it decreased by 7.4%)[709];

Energy productivity (GDP over the gross available energy) is 8.5 Euro per Kg of oil equivalent – slightly higher than the EU27 average (8.12) – and this index increased by 13% in the last 5 years[710];

Sectors contributing to final consumption are: industry (37% of total), followed by transport (25%) and households (23% of total).[711]

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings[712] is 4,643,000 (2.5% of EU27), 90.4% built before the year 2000;	• Households are responsible for 7.5Mtoe (3.1% of EU27)[715];	• During 2000-2016, energy savings achieved in residential buildings are estimated in 4.3Mtoe, or 55.3% of 2000 consumption[718];

[705] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[706] National Energy and Climate Plan
[707] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[708] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[709] EUROSTAT; Ratio between: Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[710] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[711] Odyssee database, Country Profile; https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/sweden.html
[712] Odyssee database, stock of dwellings (permanently occupied) year 2016; www.indicators.odyssee-mure.eu/online-indicators.html
[715] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[718] Odyssee database, technical final energy savings

	• Around 90% of apartment buildings are using district heating, and • Apartment buildings built in the 1941-1970 period account for almost half the heated area in the stock of apartment buildings[713]; • In Sweden, only 39% of housing has ownership right, and • Almost all ownership rights are in single-family houses. It was not possible to build ownership apartments in multi-family houses until 2009[714].	• Consumption per dwelling 1.67toe (20% higher than EU average)[716], and • The energy consumption for heating and warm water is normally approximately 60% of the energy consumption[717].	• Considerable energy savings in apartment buildings often lies in extensive measures for heating, ventilation systems and building envelope (e.g. attics and cellars)[719].
Industry	• Swedish manufacturing industry contributes significantly to the country's economy (industry generated 33% of Sweden GDP[720]); • Almost 80% of non-residential buildings use district heating.	• Consumption of industry is 11 Mtoe (4.5% of EU27) and it has slightly decreased (-0.1%) in the last 5 years however, it has decreased (-6%) in the last 10 years[721]; • The energy-intensive pulp and paper, steel and chemical industries are the largest energy consumers (51%, 12% and 7%, respectively)[722].	• During 2000-2016, energy savings undertaken in industry were worth 2.56Mtoe or 19.4% of 2000 consumption[723].
Public Sector	• There are in total of 731 central government buildings, with total floor space of 1.68mln sqm, and two authorities own around 95% of the buildings[724].	• Consumption in services (including public administration) is 4.1Mtoe (3.1% of EU27) increasing over time (4.2% last 5 years)[725].	• The average energy performance for buildings owned by State authorities is 172 kWh/sqm/year[726].

EE targets, measures in place/proposed

The Swedish National Energy and Climate Plan (NECP) is based primarily on the national energy policy (incl. Energy Bill) and the Climate Policy Framework (incl. the Climate Act) with a focus on i) security of supply, ii) ecological sustainability, and iii) research, innovation and competitiveness dimensions.

[713] Sweden's National Energy Efficiency Action Plan, 2017
[714] The Swedish National Board of Housing, Building and Planning, www.boverket.se
[716] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[717] Sweden's National Energy Efficiency Action Plan, 2017
[719] Sweden's National Energy Efficiency Action Plan, 2017
[720] CIA, The world fact-book (data refers to 2017)
[721] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[722] Odyssee database, Country Profile; https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/sweden.html
[723] Odyssee database, technical final energy savings
[724] Sweden's National Energy Efficiency Action Plan, 2017
[725] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[726] Sweden's National Energy Efficiency Action Plan, 2017

The NECP states that **Sweden's energy use in 2030 is to be 50% more efficient than in 2005** (primary energy consumption in relation to GDP) and the target by 2040 is 100% renewable electricity production. **The high ambition of Swedish climate policy is well noted by the EC.**

EXISTING POLICIES

The foundation of Swedish EE policy is based on the energy and CO_2 taxation, instead of an EE obligation scheme. Swedish initiatives to promote EE are targeted both at energy consumption and supply by identifying and rectifying market failures. Sweden has number of existing policy measures for residential and industry sectors (see the list of measures below).

NEW POLICIES (2020-2030)

The NECP doesn't indicate new EE related measures. However, Sweden's National Energy Efficiency Action Plan indicates that there is a need for more renovation in the apartment building stock than is taking place at present in order to maintain the state of the buildings.[727]

According to the preliminary assessment of the EC, the **proposed contribution towards the 2030 collective EU EE targets** (reported in the following table) **is modest**. Especially, the **ambition for final energy consumption is considered to be low**. The final NECP doesn't provide information about more ambitious targets being set.

EE targets (Mtoe)	Latest data 2017	Target 2020	Target 2030
Primary energy consumption	46.5	43.4	42.5
Final energy consumption	32.6	30.3	32.3

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• The Government aims to build at least 250,000 new homes by 2020; • Approximately 3% of apartment buildings will need to undergo renovation by 2020, and • There will be a new peak around 2040, when large-scale investments in the stock of apartment buildings will be required[728].	Existing measures: • Grant support (until 2020) for renovation and EE of rental apartments in areas of socioeconomic challenges (SEK 165mln/EUR 14.9mln has been allocated for 2020): i) The renovation support is up to 20% of the costs, and is given directly to the tenants as a rent rebate over seven years; ii) The EE support is calculated based on the energy savings achieved after the renovation and is given to the property owners (minimum energy performance improvement has to be at least 20%). • Income tax reduction on labour costs for ROT (Repairs, Conversion, Extension) in the taxpayer's home – the tax reduction is 30% of the labour costs and is up to SEK 50,000/EUR 4,500 per person per year. Eligible beneficiaries are owners of small buildings, owner-occupied apartments and holiday homes and tenants; • Various awareness raising and training measures; • Energy performance certificates – obligation to declare the energy use of buildings and certain parameters of the indoor environment; • Credit guarantees for new buildings and conversions (but not for renovation) (the Swedish National Board of Housing, Building and Planning, national budget). New planned measures/priority objectives: • No specific information reported in the NECP.

[727] Sweden's National Energy Efficiency Action Plan, 2017
[728] Sweden's National Energy Efficiency Action Plan, 2017

Industry	• Swedish firms invest relatively more in EE – the share of investments in EE in 2019 was higher than the EU average (14% vs 10%), and • 50% of firms have done an energy audit in the last 3 years[729].	Existing measures: • Energy audits for large enterprises (as an obligation to carry out at least every four year); • Energy step – based on energy audits companies may apply for support; • Grants for SMEs for energy surveys (max support SEK 50,000/EUR 4,500 and 50% of the cost); • Grants for EE investments in SMEs (co-financed by ERDF in an amount of SEK 280mln/EUR 25.4mln); • EE networks and advisors for SMEs for sharing experiences and learning; • *Energisteg* programme to support EE in industry. The total funding for the period 2018-2020 is SEK 125mln/EUR 11.3mln and the programme is targeted particularly at the mining and manufacturing industries; • *Development of technologies and innovation* – investment support (up to 50% of related costs) for some EE measures that are expensive but necessary for the companies to achieve the higher level of EE (source and budget unknown). New planned measures/priorities: • No specific information reported in the NECP.
Public Sector	• By the end of 2020, total energy consumption of central government buildings is forecasted to be 270GWh/year, and • Where appropriate, the State authorities must use energy service companies (ESCOs) and energy performance agreements/contracts (EPC) to finance renovations and implement plans to maintain or improve EE[730].	Existing measures: • Support for refurbishment of schools and outside environments adjacent to schools (budget for 2018 was SEK 680mln/EUR 61.7mln); • State support for municipal energy and climate advisory services; • State support for local and regional capacity development for the energy and climate transition; New planned measures/priorities: • No specific information reported in the NECP.

Market failures, main issues and barriers to investment

A limited number of specific issues preventing EE activities in Sweden is briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	Financial instrument implications
Horizontal	• The profitability problem is the greatest barrier for renovation; • Taxes and fees on materials and labour are high[731].	• Many operators lack information on which EE measures are suitable for implementation; • Competition in the construction market is low and labour shortage.	• More analysis are needed to understand the possibilities for the ESIF financial instruments.
Residential Sector	• Property owners lack financing (own capital or the ability to borrow) for future renovations;	• Property owners have insufficient insight into the need for renovation;	• Financial instruments could provide long term soft loans or guarantees for those who cannot

[729] European Commission 2020 European Semester Country Report for Sweden
[730] Sweden's National Energy Efficiency Action Plan, 2017
[731] Sweden's National Energy Efficiency Action Plan, 2017

	• The residents have moderate or low ability to pay which limits necessary rent increases.	• Property owners have insufficient knowledge of possible measures for renovation and of the size of costs and benefits of renovation.	provide sufficient collateral to obtain market-based loans or for those who consider monthly instalments too high.
Industry	• The scale of capital required due to highly capital-intensive investments; • Returns on investments.	• Risks arising from regulatory issues; • Difficulties in verifying the technical aspects of proposed investment; • The length of investment horizon.	• More analysis are needed to understand the possibilities for the ESIF financial instruments targeting EE and renovations.
Public Sector	• Nothing specific has been reported.	• Nothing specific has been reported.	• More analysis are needed to understand the possibilities for the ESIF financial instruments.

ESIF resources and existing financial instruments

Sweden is a relatively small beneficiary of EU support (ESIF support being EUR 3.6 billion, total funding of EUR 7.1 billion: on average of EUR 378 per person from the EU budget over the period 2014-2020). For **low carbon economy (TO4)**, circa EUR 377mln has been allocated (EUR 340mln from ERDF and EUR 37mln from EAFRD) and EE support accounts EUR 196mln.

The Swedish Managing Authority conducted the ex-ante assessment between March 2014 and February 2015 and proposed financial instruments to contribute to the regional and national ERDF OPs' objectives to **support SMEs (TO3) as well as** the national OP objective to support **the shift to low-carbon economy in all sectors (TO4)**. The result of the ex-ante assessment highlighted the lack of available funding for SMEs as a significant challenge in Sweden. Available public funding to mitigate this gap through loans and guarantees were viewed as satisfactory. However, **available funding from external equity sources to address SMEs in their early stages was considered insufficient**.[732]

Under the 2014-2020 programming period, Sweden has **10 ESIF financial instruments** under management and has **committed in total EUR 134mln of ERDF resources** (EUR 275.4mln of OP contribution). The **majority of ERDF resources** (EUR 95.4mln) **have been allocated to the SME supported financial instruments** managed by the public venture capital company ALMI Invest (subsidiary of Swedish state owned national promotional institution ALMI).

Additionally, there is the **Swedish Venture Initiative (SVI)**, a venture capital fund of funds, managed by the European Investment Fund (EUR 23.1mln of ERDF, and total EUR 46.2mln of OP contribution). SVI also **benefits from the support of the European Fund for Strategic Investments (EFSI) being one of the few ESIF-EFSI combinations**.

The remaining **EUR 38.7 of ERDF** (EUR 77.5mln of total OP contribution) **has been allocated to the financial instrument supporting EE** with the focus on EE and demonstration projects in SMEs (more information about it in the box below).

[732] Ex-ante assessment of support for financial instruments with the ERDF 2014-2020, Tillväxtverket, February 2015

GreenTech Fund

ALMI Invest is a venture capital company which operates through eight regional venture capital companies in all the Swedish regions, thereby investing OP contribution of EUR 151mln, of which EUR 72mln ERDF. The current ALMI Invest funds are a follow-up to the funds set up in the 2007-2013 programming period.

An interesting novelty in this period is that the ALMI Invest's GreenTech venture capital fund, which operates nationally and invests an OP contribution of EUR 77.5 million, of which 50% ERDF. This fund focuses on innovative SMEs that develop products and services that have a CO_2-reducing effect. Investments will be made in areas such as renewable energy, recycling systems, energy, waste management, and combustion.[733]

There are no ESIF-funded EE financial instruments in other sub-sectors (i.e. residential and public sectors).

Investment needs

The final NECP doesn't include any information about EE related investment needs.

[733] Almi Invest, www.almi.se

Slovenia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft version of the National Energy and Climate Plan of Slovenia;*
- *EC assessment of the draft National Energy and Climate Plan of Slovenia;*
- *Final version of the National Energy and Climate Plan of Slovenia;*
- *National Energy Efficiency Action Plan; 2017;*
- *Ex-ante assessment of financial Instruments in Slovenia; 2015; PwC.*

Context overview

Slovenia has about **2.1m inhabitants** (0.47% of the EU27) increasing over time (2.8% in the 2018-2008 period)[734]. However, after 2023 a slight decrease of the population is projected[735]. **Real GDP** per capita in 2018 was about **EUR 20,170** (73% of the EU27 average) and outperformed the EU27 average over the last 5 years years[736].

Final energy consumption (FEC) is 4.98Mtoe (0.5% of the EU27) and it has **decreased by 5.5% since 2008,** while at the EU27 level it decreased by 4.54%[737]. **Consumption per capita** (2.41toe/person) is 8.6% higher than the EU27 average (2.22 toe/person) and it decreased by 8% in the last 10 years (while at the EU27 level it decreased by 6%)[738]. **Energy productivity** (GDP over the gross available energy) is 5.924 Euro per Kg of oil equivalent (73% of the EU average), showing a strong reliance on energy to generate GDP (this index increased by 14% in the last 5 years)[739]. **Sectors** contributing to FEC are: households (24% of total), transport (38%), industry (27%) and services (11%)[740]. The **building sector** (residential and non-residential buildings) accounts for 42.3% of national FEC: most buildings in Slovenia are rated as E or F energy classes, and many are G-rated (which represents the worst option)[741].

	Overview	Consumption	EE
Residential Sector	• The residential building stock consists of 852,181 buildings with almost 64m sqm[742]; • 77% of residential buildings were built prior to 1990.	• In 2018, households' energy consumption was 1.065Mtoe (0.43% of EU27)[743]; • Consumption per dwelling is 1.57toe (13% higher than EU27 average)[744].	• During 2000-2015, EE activities undertaken in the residential sector was 0.3Mtoe, equal to 27% of year 2000 consumption.

734 EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
735 Republic of Slovenia Statistical Office
736 EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
737 EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
738 Ratio between: EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff] and EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
739 EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
740 EUROSTAT
741 Statistics Slovenia
742 Proposal of the Long-Term Strategy for Mobilising Investment in Renovation of the National Building Stock. 2017
743 EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
744 Odyssee database, Consumption per dwelling with climatic corrections, year 2016

Industry	• Industry accounts for 28.4% of real GDP (2018)[745]; • The industry production index increased by over 26% since 2015[746].	• In 2018, industry consumed 1.387Mtoe (0.57% of EU27) with a decrease by 6.6% in the last 10 years[747].	• During 2000-2015, EE undertaken in industry sector was 2.7Mtoe, equal to 30% of year 2000 consumption.
Public Sector	• Public buildings in Slovenia have a total floor area of 9.3m sqm[748]; • 504 Central government buildings have a total useful floor area of more than 250 sqm (782,158sqm)[749].	• Consumption in services (including public administration) is 0.425Mtoe (0.3% of EU27) decreasing over time (8.9% last 5 years VS +0.3% in EU27).	• Based on the 2017 update of the National EE Action Plan (NEEA), each year (until 2020) 23,465sqm of buildings of the central government need to be renovated to comply with Art. 5 of EPB Directive; • The 2020 target of Slovenia, related to the energy rehabilitation and the sustainable construction of public buildings foresees 362 EE operations and 148,166 MWh/year of energy savings. Target buildings are in the fields of health, education, higher education and science, retirement homes and buildings owned by local communities.

EE targets, measures in place/proposed [750]

Several policy measures are in place in Slovenia in the EE sector, relying both on EU (CF and ERDF) and national resources. For the **2021-2030 period**, the National Energy and Climate Plan (NECP) envisages the continuation of some existing measures and the implementation of new measures.

EE targets (Mtoe)	2018 data	Target 2020	Target 2030
Primary energy consumption	6.67	6.75	6.36
Final energy consumption	4.98	4.90	4.57

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• After 2020 all new buildings to be nZEB[751];	<u>Existing measures (list of):</u> • Grant for EE and the use of RES in residential buildings; • Energy Advisory Network for Citizens—ENSVET;

745 Republic of Slovenia Statistical Office
746 EUROSTAT
747 EUROSTAT
748 Republic of Slovenia Statistical Office
749 National Energy Efficiency Action Plan (2017 update)
750 Information reported in this section is based on the NECP (if not differently specified)
751 This is a requirement coming from the Energy Performance in Buildings Directive (EPBD)

	• The level of energy poverty stands measured as inability to keep a household warm at 3.9% lower than the EU28 average of 7.8%[752]. In 2021 – 2030 is expected: • Enhanced pace of the renovation of older buildings based on the incentives given; • To reduce final energy consumption in all buildings by 20% by 2030 compared to 2005 levels and to reduce GHG emissions in buildings by at least 70% by 2030 compared to 2005.	• The most important revolving measure is the national Eco Fund (Eko Sklad) that provides soft loans to various recipients, including the residential sector. The Eco fund is co-financed by different sources, including EIB, IBRD (World Bank), EC Phare programme[753]. New planned measures/priority objectives (NECP): • Grant for financing renovation in buildings with multiple owners; • New regulations governing decisions in multi-apartment buildings; • Distribution of incentives between owners and tenants in multi-apartment buildings; • Establishing a guarantee scheme schemes for risk-sharing, refinancing of investments (factoring, repurchase of green bonds), and capital injections for new Energy Service Companies (ESCOs)[754].
Public Sector	• Obligation to renovate (every year) 3% of the total floor area of central government buildings; • To reduce final energy consumption in all buildings by 20 % by 2030 compared to 2005 levels and to reduce GHG emissions in buildings by at least 70 % by 2030 compared to 2005; • From 2018 onwards, all new public sector buildings need to be nearly-zero energy buildings.	Existing measures: • Financial incentives in the form of grants and cohesion funds are in place; • The most important revolving measure is the national Eco Fund (Eko Sklad), presented above, that can provide soft loans to public sector entities. New planned measures/priorities (NECP): • Current measures are expected to be extended to post 2020; • External funding to be used to accelerate the pace renovation.
Industry	• In 2021 - 2030, ETS (Emission Trading System) remains the main policy instrument for reducing industrial sector emissions; • The target is to have a reduction by 42% in this sector by 2020 vs 2005 and it seems that this objective is on track; In addition, it is expected that the energy efficiency obligation scheme to the energy suppliers will also contribute to improving energy efficiency in this sector.	Existing measures: • The state is providing grants and operating incentives, also leveraging on ESIF resources; • Additional state financial resources for the implementation of suitable projects: including favourable loans, guarantees, promotion of third-party financing (contractual provision of savings and energy supplies) via the aforementioned Eco Fund. New planned measures/priorities (NECP): • Current measures are expected to be extended to post 2020; • An EE obligation scheme is expected to be implemented, aiming at reaching a 32% reduction of energy usage; • Non reimbursable financial incentives be tied with set objectives achieved.

Market failures, main issues and barriers to investment

A number of specific issues hindering EE activities in Slovenia – mainly reported in the ex-ante assessment[755] - are briefly reported in the following table. The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

[752] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_slovenia.pdf
[753] https://ekosklad.si/english
[754] https://epbd-ca.eu/ca-outcomes/outcomes-2015-2018/book-2018/countries/slovenia
755 Ex-ante assessment of financial Instruments in Slovenia; 2015; PwC.

	Financial issues	Non-financial issues	Financial instrument implications
Residential Sector	Based on the ex-ante assessment, available financial products don't meet market needs, in particular: • *Multi-apartment buildings would need deep EE renovation. However, these require huge investments and are characterised by long term, low profitability;* • *Due to the low cost of energy in Slovenia, apartment owners do not see any immediate financial benefit and are not encouraged to undertake the investment;* • *Difficulties obtaining financial resources for the renovation of multi-residential buildings (not the appropriate credit instruments or by the law inhibits);* • *The possibility to use the ESCO model to overcome some of the financing limitations is hindered by several issues and challenges that are restricting the potential for this type of model to be scaled up. Current legislation presents an obstacle as 75% of the multi-dwelling building owners needs to agree to a building renovation. The ownership is very fragmented.*	Based on the ex-ante assessment, there are limited awareness and skills, in particular: • *Still relatively poor informing (mainly on organizational and operative part of the renovation);* • *Lack of interest of the owners that sublet their apartments;* • *Difficult negotiation in multi-apartment buildings;* • *The lack of trust in the managers of multi-apartment buildings;* • *Lack of technical skills to estimate energy savings and to plan EE/RE interventions resulting in a lack of interest in energy saving interventions;* • *Low energy prices in Slovenia limits the willingness of private owners of apartments/houses to invest in EE improvement interventions.*	• Need for awareness raising activities and support to further develop the EE market (and in particular the ESCO sector); • As reported in the ex-ante assessment, there could be potential for financial instruments in all sector, including loan instruments for the public and residential sector and dedicated equity instrument targeting ESCOs.
Public Sector	Based on the ex-ante assessment: • *Due to the average age and maintenance conditions of public assets, EE/RE interventions cannot be limited to minor measures (such as replacing windows, replacing lighting systems, etc.). Most of the buildings shall require deep, capital intensive, renovation interventions. In cases in which the investment is sustainable, the long term, low rate returns make them not to be attractive (hampered by the low cost of energy in Slovenia);* • *Lack of awareness of commercial banks that ESCO model investments are cost-effective. In fact, commercial banks often perceive ESCO projects as high risk ones requiring high collateral/guarantees.*	Based on the ex-ante assessment: • *Limited availability of skilled personnel (educational gap) both in the public and private sector to initiate, develop and implement EE/RE projects;* • *Lack of information, specialized to carry out energy renovation of buildings and energy efficiency measures in buildings;* • *Lack of competencies for executing procurement of ESCO projects;* • *General lack of energy efficiency financing experience within commercial financial institutions and high perceived end-user credit risk;* • *Underestimated EE effects resulting in a lack of interest in energy saving interventions.*	
Industry	Based on the ex-ante assessment: • *Companies* [willing to implement EE investments] *have similar obstacles in accessing finance as the overall SME population. These reasons are mostly related to the willingness of the banks to provide finance (19%) and costs of obtaining funding (14%). Other significant obstacles are other terms of finance (12%)*	Based on the ex-ante assessment, there is a lack of awareness and skills, in particular: • *Lack of technical skills to estimate energy savings and to plan EE/RE interventions resulting in a lack of interest in energy saving interventions;* • *Lack of pre-determined long-term projects portfolio and lack of sufficiently developed*	

	and financial situation of the company (11%); • *Low cost of energy in Slovenia disincentives interventions in EE (as it reduces the pay-back period and project's return).*	*projects (beneficiaries apply according to the EU calls published and not as a consequence of a project that they intend to develop);* • *EE/RES interventions are not the core priority in budgeting for companies.*	

ESIF resources and existing financial instruments

Slovenia, through 3 national programmes, benefits from **ESIF funding of EUR 3.9bn** in the 2014–2020 period (circa EUR 1,880 per person).

With respect to EE, it can be interesting reporting that Thematic Objective 4 (low carbon economy) has and ESIF endowment of circa **EUR 362m** (Cohesion Fund EUR 307m and European Regional Development Fund EUR 55)[756].

In the 2014 – 2020 period, Slovenia contributed **EUR 253mln**[757] **of its ESIF** (ERDF and CF) **to financial instruments** equal to circa 6.5% of its ESIF endowment.

ESIF resources of the Thematic Objective 4 contributed to financial instruments amounted to EUR 25m as of 31/12/2018 and these resources are managed by the National Promotional Bank.

The Slovenian Export and Development Bank (**SID Bank**) has been appointed to manage a EUR 253mln Fund of Funds (FoF) drawing upon European cohesion funds and targeting several sectors (e.g. research, development and innovation, SMEs, EE and urban development). In addition to European cohesion policy funds, financial intermediaries provide additional funds due to the leverage requirement, such that more than EUR 400mln will be available to enterprises and other end-users.

Investment needs

Slovenia has developed its 2021–2030 National Energy and Climate Plan (NECP), identifying its strategic objectives in the energy and climate sectors and it has estimated investment needs over the planning period of EUR 28.4bn.

The main investment needs budgeted are in residential buildings renovation (EUR 9.5bn), which represents almost 34% of total investment, another EUR 6.5bn is budgeted in mobility (23% of total investment), EUR 4.6bn in electricity networks (16% of total investment) and EUR 1.5bn (5% of total investment) in solar and wind plants.

756 https://cohesiondata.ec.europa.eu
757 www.fi-compass.eu/financial-instruments/Slovenia

Slovakia

Information reported in the following sections is based on publicly available sources, in particular:

- *Eurostat national statistics;*
- *Odyssee database;*
- *Draft and final version of the National Energy and Climate Plan of Slovakia;*
- *EC assessment of the draft National Energy and Climate Plan of Slovakia;*
- *Study on the EE lending market including the review of the legal framework in Slovakia. PwC. 2018;*
- *Using financial Instruments in the Slovak Republic in the 2014-2020 programming period. A study in support of the ex-ante assessment. PwC. Final Report December 2014. Study updates, June 2018;*
- *Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017;*
- *Creation of a multi-sectorial investment platform in Slovakia; EY. 2018.*

Context overview

Slovakia has a population of about **5.45m inhabitants** (1.2% of the EU28) which has slightly increased over time (+1.25% in the last 10 years)[758]. By 2025 to 2030, an increase from the current 5.45m (2019) to 5.48-5.55m is expected. A population decline over several decades will follow. By 2060, the population is expected to be just above 5m[759]. Real **GDP** per capita in 2018 was about **EUR 15,560** (56.3% of the EU28 average) and a 23.5% increase was reported in the last 10 years[760].

Final energy consumption (FEC) in 2018 was 11.11Mtoe (1.12% of the EU28) and it has **decreased by 3.9% compared with 2005,** while at the EU27 level it decreased by 4.9%[761].

- **FEC per capita** at 2018 (2.04toe/person) is 8% lower than the EU27 average (2.2 toe/person) and it decreased by 5.1% compared to 2005 (while at the EU27 level it decreased by 7.4%);
- **Energy productivity** (GDP over the gross available energy) is 4.97 Euro per Kg of oil equivalent (one of the lowest in EU), showing a strong reliance on energy to generate GDP (this index increased by 73% compared with 2005, while at the EU27 level it increased by 28.1%)[762];
- **Sectors** contributing to final consumption in 2018 are: industry (28% of total), transport (25%), households (19%) and services (12%) [763]. The building sector accounts for circa 40% of national final energy consumption[764].

[758] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[759] National Energy and Climate Plan
[760] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[761] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[762] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[763] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[764] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017

	Overview	Consumption	EE
Residential Sector	• The stock of dwellings is circa 1.7m (1% of EU27), 95% built before 2000[765]; • By the end of 2004, there were 867,704 apartments in multi-apartment buildings and 792,555 single family buildings with apartments[766].	• In 2018, FEC in the residential sector was 2.06Mtoe (0.8% of EU27)[767]; • Consumption per dwelling 1.2toe (13% higher than EU average)[768].	• As of 2018, it was estimated that 65% of apartments in multi apartment buildings and 49% of apartments in single family buildings had been renovated[769]; • During 2000-2016, EE initiatives undertaken in residential buildings were estimated at 1.1Mtoe, or 44% of 2000 consumption[770].
Industry	• SK is an industrial country: industry accounts for almost a quarter of real GDP (28% in 2016)[771]; In nominal terms, the industry GVA is more than a quarter of the total value added of the economy of Slovakia (26.93 % in 2016)[772].	• In 2018, FEC in industry is 3.66Mtoe (1.5% of EU27) and it increased by 2% compared with 2005 and by 17%) in the last 5 years[773]; • SK has the 7th highest energy intensity in the EU-27; this is mainly due to its industrial structure (mainly high energy intensity industries).	• During 2000-2016 EE undertaken in industry was worth 3Mtoe or 66% of 2000 consumption; • Most of the savings achieved in the beginning of 2000s (more than half of 2000-16 EE were made before 2006).
Public Sector	• 15,435 buildings (114.7mln m^3) are owned by government bodies: 51% schools, 13% healthcare facilities, 13% offices and 10% accommodations[774]; • The total floor area of central administration is 445.791 sqm.	• Consumption in services (including public administration) in 2018 is 1.31Mtoe (1% of EU27) decreasing over time (-23% last 5years VS +0.3% in EU27); • Average annual energy consumption on space heating of State owned (non-residential and non-manufacturing buildings) is 55.2kWh/m^3 [775].	• As foreseen by Art.5 of the Energy Performance in Buildings Directive (EPBD), 3% of the floor area of central administration buildings has to be renovated every year. In SK this corresponds to an annual renovation of circa 13,374 sqm, with attached energy savings of 52.17GWh/year[776].

[765] Odyssee database, stock of dwellings (permanently occupied) year 2016
[766] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017
[767] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[768] Odyssee database, Consumption per dwelling with climatic corrections, year 2016
[769] National Energy and Climate Plan
[770] Odyssee database, technical final energy savings, which excludes savings achieved thanks to economic or behavioral factors.
[771] National Energy and Climate Plan
[772] National Energy and Climate Plan
[773] EUROSTAT; Final consumption in industry; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[774] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017 (data refers to the period between 1994 and 2003)
[775] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017 (Annex 6) the average considers data from 1995 to 2003
[776] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017

EE targets, measures in place/proposed [777]

Several policy measures are already in place, relying mainly on **EU resources** (e.g. Quality of Environment OP, Integrated Infrastructure OP, Integrated Regional OP) and national EE programmes (e.g. State Housing Development Fund, SlovSEFF III, subsidies of the Ministry of Economy, etc.).

For the 2021 – 2030 period, the National Energy and Climate Plan (NECP) identifies priority sectors for EE (e.g. EE in industry, EE in buildings, etc.), it describes measures in places that will be continued in the post 2020 period and it preliminary defines the new measures to be implemented from 2021.

In the final version of its NECP, Slovakia reports to have the target to reduce energy consumption by 30.3% by 2030 compared with 2007 level (against an EU target of 32.5%).

	Context/targets	Existing and planned actions/priority objectives
Residential Sector	• Under existing policy measures, all multi-apartment buildings should be renovated by 2029 and all family homes by 2043[778], • (Private) buildings are expected to contribute to 20% of total savings generated by measures implemented in 2021 – 2030.	Existing measures (list of): • ESIF are the main sources of funding existing EE measures; • State Housing Development Fund (more information in the next section 'ESIF resources and existing financial instruments'); • Green for Household grant programme (*Zelená domácnostiam*); • Slovseff programme (more information in the next section 'ESIF resources and existing financial instruments'); • Other national subsidies. New planned measures/priority objectives (NECP) Current measures are expected to be continued in the post 2020 period, combining both grant programmes (e.g. aforementioned Green for Household grant programme) and revolving solutions, via the State Housing Development Fund and Slovak Investment Holding.
Industry	• Industry will be the most important sector in terms of savings in 2021-2030; • Industry is expected to contribute to 58% of total savings generated by measures implemented from year 2021 (this is a SK peculiarity compared with other MS).	Existing measures: • Several measures funded by ESIF (e.g. promoting EE and the use of RES in enterprises, under OP QoE, etc.); • National measures (e.g. subsidies provided by the Ministry of Economy for energy audits, etc.); • SlovSEFF III (EE in industrial production). New planned measures/priorities (NECP): • Existing measures are expected to be continued in the post 2020 period although limited information is reported about specific schemes.
Public Sector	• The public Sector is expected to contribute to 9% of total savings generated by measures implemented from 2021.	Existing measures: • Schemes in place are mainly supported by ESIF grants. New planned measures/priorities (NECP): • A stronger effort is expected to be needed to renovate public buildings and circa EUR 1.24bn investment will be needed in the 2021–2030 period; • Energy renovation of public lighting systems is also a key priority for SK and investment of circa EUR 600m will be needed in this sector in 2021–2030;

[777] Information reported in this section is based on the NECP (if not differently specified)

[778] Update of the residential and non-residential building stock renovation strategy, Slovak Republic, 2017. This estimate assumes: *financial resources are secured at the same level as in previous years (approximately EUR 100 million per year), materials and staffing are in place to continue building renovation at the same pace as in recent years.* The current EE annual renovation rate is: 29,000 apartments in multi-apartment buildings and 22,000 apartments in single-family buildings

		• An increase in the use of Energy Performing Contracts (EPC) supported also with dedicate technical assistance programmes, is expected in the post 2020 and dedicated ESIF backed financial Instruments are expected to be implemented to support EPC investments in buildings and public lighting.

Energy Performance Contracting (ECP) are mentioned to be an **important tool to be exploited in the post 2020** period to improve EE activities, in all sectors. In the public sector, the first ECP procurement based on the new model contract is ongoing. Activities to develop dedicated financial instruments to lend to ESCO are ongoing.

Although EPCs are more commonly implemented in the public sector, there are examples of the implementation of this solution in the residential sector. An example is the Sunshine project[779], developed in Latvia, and that led to the establishment of the LABEEF fund.

Market failures, main issues and barriers to investment

A number of specific issues preventing EE activities in Slovakia are briefly reported in the following table.

The table is based on data and information released prior to COVID-19 outbreak. The economic recession triggered by the COVID-19 outbreak could have further negative impacts on (financial and non-financial) barriers to EE investments.

	Financial issues	Non-financial issues	financial instrument implications
Residential Sector	• Although not reported in the ex-ante assessment, it is assumed that typical barriers preventing EE investments could apply to SK, e.g.: - limited financial resources to devote to EE initiatives (in particular for poor households); - reluctance to borrow for EE related investments also for a limited awareness of benefits of EE initiatives. • Regarding Home Owner Associations (HoA), although commercial banks report to be willing and able to finance them, some difficulties are reported to lend to small building apartments (due to the higher impact of single tenants on debt repayment)[780]; • Financing is usually required to perform renovations including also non EE components (non-eligible under EE specific schemes) this can lead to less competitive financing conditions for comprehensive renovations.	• Although not reported in the ex-ante assessment, it is assumed that typical barriers preventing EE investments could apply to SK, e.g.: - the limited know how on the preparation/deployment of EE interventions; - difficulties in precisely measure and forecast results of EE activities. • Red tape to access EE related financing supporting measures (i.e. the preparation of supporting documents) was reported as an obstacle[781].	• TA programmes, to promote EE benefits and to support the project preparation should be provided; • Solutions able to support ESCO type financing could be useful (as households tend to be reluctant to dedicate their (scarce) resources to EE) the viability of these solutions in SK needs to be tested.
Industry	• Although not reported in the ex-ante assessment (EE in SMEs was not covered), it is assumed that typical issues related to EE investments could apply to SK, e.g.:	• Although not reported in the ex-ante assessment (EE in SMEs was not covered), it is assumed that typical issues related to EE	• TA programmes, to promote and to quantify EE benefits, to increase the likelihood of EE initiatives;

[779] https://ec.europa.eu/energy/sites/ener/files/documents/015_1.2_nicholas_stancioff_seif_warsaw_30-11-17.pdf
[780] Study on the EE lending market including the review of the legal framework in Slovakia. PwC. 2018
[781] Study on the EE lending market including the review of the legal framework in Slovakia. PwC. 2018

	- long pay-back period of several EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities; - reluctance of enterprises to use their borrowing capacity for non-core activities (like EE).	investments could apply to SK, e.g.: - limited know how of enterprises of advantages of EE interventions; - difficulties to obtain financing based on cash flows generated by EE activities.	• Financial support (e.g. grant/financial instrument combination) in order to reduce the pay-back period could be useful; • Support to the ESCO model via financial instrument could help
Public Sector	• Regulatory limits to borrowing capacity of municipalities and other public entities prevent from investing in EE related measures in forms different from grants[782].	• A list of barriers related to the national regulation was reported in the ex-ante assessment (in particular with respect to Guaranteed Savings solutions) but in the draft NECP it was reported that '*the fundamental political and regulatory barriers to energy services […] have largely been removed*'.	• TA programmes, to structure viable EE initiatives (especially EPC type solutions); • Financial instrument supporting the development of EPC solutions.

ESIF resources and existing financial instruments

Slovakia is **one of the largest beneficiaries of EU support** (ESIF funding of EUR 15.18bn over the period 2014-2020). For the **low carbon economy EUR 1.06bn has been allocated** (EUR 1.05bn from ERDF and EUR 11.64mln from EAFRD)[783]. In the 2014–2020 period, Slovakia committed **EUR 628mln[784] of its ESIF (less than 5% of its budget) to financial instruments** (11 using ERDF, 1 using ESF and 4 using CF) mainly managed by a public dedicated entity: Slovak Investment Holding (SIH). With respect to **EE**, support from the EU budget is estimated to be EUR 922mln out of which circa 46.4% was channelled through financial instruments (EUR 427mln). Examples of financial instruments operating in the EE sector in SK are reported below:

State Housing Development Fund (*Štátny Fond Rozvoja Bývania* - SFRB)[785]

National instrument (operating as Fund of Funds) to whom an endowment of EUR 139.25mln has been contributed (ESIF contribution of EUR 111.4mln from IROP TO4). SFRB provides soft loans supporting: the purchase of apartments/family houses; residential renovations, etc. The loan supporting EE in residential can have a tenor of 20 years, financing 75%-100% of the investment costs, with an interest rate between 0 and 2%. Recipients include: HoAs, individuals, non-for profit organisations, municipalities and self-governing regions. Based on available information[786], the total amount paid to financial instrument was EUR 34.8mln (EUR 29.6mln ESIF).

Slovak Sustainable Energy Efficiency Finance Facility III (SlovSEFF II)[787]:

SlovSEEF is an instrument developed by EBRD and operating in Slovakia since 2007. Although the instrument is not funded with ESIF resources, its operational model could be interesting for ESIF financial instruments as it combines repayable resources (loans), grants (capital rebates) and technical assistance. SlovSEEF is channelled

[782] Using financial Instruments in the Slovak Republic in the 2014-2020 programming period. A study in support of the ex-ante assessment. PwC. Final Report December 2014. Study updates, June 2018.
[783] https://cohesiondata.ec.europa.eu
[784] https://cohesiondata.ec.europa.eu/stories/s/Tracking-progress-in-ESI-Funds-Financial-Instrumen/dtw6-5akv
[785] https://www.sfrb.sk
[786] ESIF financial instrument data-set (updated to 01/01/2018)
[787] http://www.slovseff.eu/index.php/en/

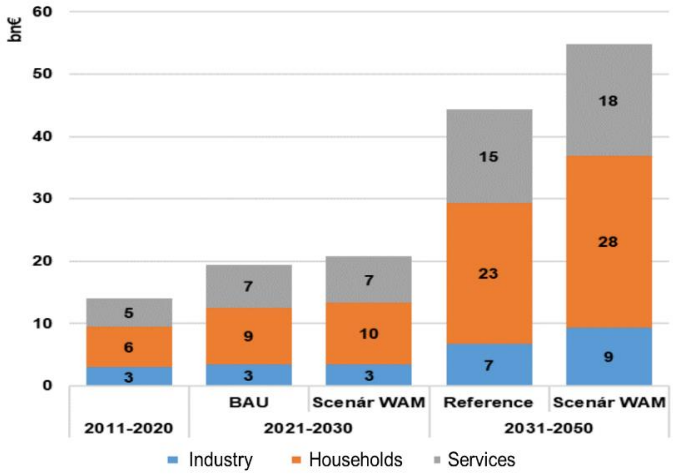
through a net of commercial banks and it provides resources for EE initiatives (both residential and industrial sector). To be eligible, the EE projects must result in at least 30% savings and if savings are achieved, then a capital rebate is provided, in the range of 10% - 30% of the overall investment. Loans range between EUR 20,000 and EUR 2m combined with grants ranging between 7.5% and 20% of the loan amounts and technical assistance is made available through participating banks.

National Development Fund II (NDF II)[788]

SIH is the national vehicle created for managing financial instruments and it operates in various sectors: transport infrastructure, waste management, social economy and SMEs financing. Based on public available information it is not possible to precisely quantify allocated resources, absorption and financial products offered in the EE sector. Based on discussions with representatives of the Ministry of Finance, in the second semester 2020 a new financial instrument targeting EE in SMEs is expected to be implemented by SHI, with an endowment of circa EUR 21.9m (including ESIF and national co-financing). No information has been provided regarding the financial product that will be developed.

Investment needs

The NECP quantifies **investment needs for energy efficiency** initiatives at circa EUR 20bn during the 2021 – 2030 period (With Additional Measures 'WAM' scenario), as reported in the following graph (Investments in energy efficiency by sector, by policy scenario, 2011 to 2050, in EUR billion).



Households represent the sector with the highest investment needs (EUR 10bn over the period or circa EUR 1bn per year) followed by the service sector (EUR 7bn over the period or EUR 700m per year) and industry (circa EUR 3bn during the period or EUR 300m per year).

[788] https://www.sih.sk/stranky/cinnosti/national-development-fund-ii/o-spolocnosti-ndf-ii

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