advancing with ESIF financial instruments

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

Romania in-depth analysis

May 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 Romania, and a preliminary assessment of investment needs and potential use of ESIF financial instruments to cover them. This report would serve as an input to the negotiations of operational programmes for the period 2021-2027.

This document is based on data and information released prior to the outbreak of the Coronavirus (COVID-19) pandemic. Although it is still not possible to properly estimate the impact of COVID-19, a severe economic recession is currently (May 2020) forecasted for year 2020 in the European Union (EU).

The recession may have deep repercussions in the years to come in the economic and financial systems of EU Member States (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.

There is a risk that, at least in the short run, the crisis will lead to lower energy costs due to a lower demand, thus can create lower incentives for EE investments. 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.

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

1. 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%[1].

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[2].

Impact of the COVID crisis

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%).

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%).

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 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%[3].

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%)[4].

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)[5].

Sectors contributing to FEC are: households (34% of total), industry (28%), transport (27%) and services (8.4%)[6].

At the national level, final energy consumption in the building sector accounts for 42% of total final energy use, of which 34% is in residential building and the rest (about 8 %) in commercial and public buildings[7].

Annual technical energy savings by sector (Mtoe)

During the **2001–2015** period, Romania reported about **11.26 Mtoe of cumulative** (technical) final energy savings[8] **mainly related to the residential sector (38%) and industry sector (37%)[9].**

1.1. Overview of the residential sector

There are about 5.6m buildings in Romania[10], corresponding to 644m m^2 of heated floor area:

- Residential buildings account for 90 percent of the entire building stock, representing 492m m^2; and
- Non-residential buildings account for the remainder (about 62m m^2, or 10%).

Among residential buildings, single-family houses (SFH) represent the largest share, at about 58% of the total, followed by multi-apartment building (MABs) at about 33%.

As presented in the following figure, the majority of Romanians live in small SFH and apartments in MABs.

Over 63% of these homes are less than 50m^2, which is much smaller than typical EU countries.

Romania also has the **highest rate of owner-occupation in the EU** and the highest proportion of residents who are homeowners (94.7%). These homes, however, are well below EU standards; only four in five households in Romania has an indoor toilet (77.8%) or bath (78.0%).

Romania also has an **aging building stock** (50% was built before 1970 while only 6% was built after 2000) with a low degree of EE measures (no or minimal thermal insulation, single-pane windows) and structural deficiencies after decades of use with little or no maintenance or repairs.

The following figure presents a brief overview of buildings in Romania.

Building stock – key characteristics and projected renovation shares by 2020[11]

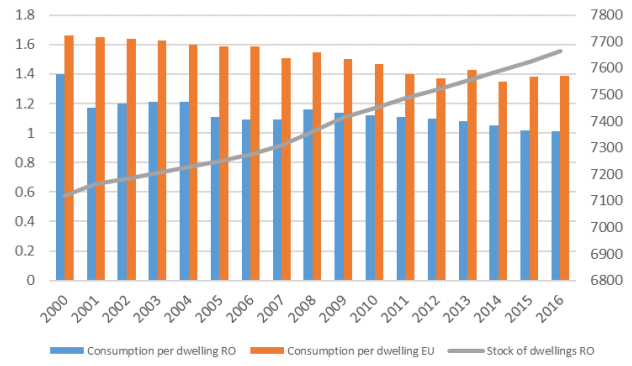
Building types	Main categories	Representative picture	Number of buildings	Total heated area [million m2]	Built <2000 floor area [million m2]	Renovated by 2020 [%]	Not renovated area [million m2]
Residential -SFH	Rural		3,810,737	247.80	217.840	3%	211.30
	Urban		1,354,263	124.46	102.012	8%	93.85
Residential - MAB	<=P+4 floors		92,332	94.51	77.50	7%	72.07
	>P+4 floors		61,554	115.51	94.72	7%	88.09
Educational	Schools		18,000	17.50	16.63	15%	14.13
Healthcare	Hospitals		547	5.47	5.42	1%	5.36
	Other		50,766	3.80	3.61	1%	3.58
Administrative/ office	Admistrative buildings		6,000	5.26	4.73	5%	4.50
	Glass & steel buildings		1,500	3.10	0.05	5%	0.05
Commercial	Hotels		7,642	4.23	0.85	5%	0.80
	Restaurants/ Coffee shops		36,000	1.82	1.28	5%	1.21
	Shopping		122,000	20.83	14.58	10%	13.12
Sub total residential			**5,318,886**	**582.27**	**492.06**	**5%**	**465.31**
Sub total commericial and public			**242,455**	**62.01**	**47.14**	**9%**	**42.75**
Total			**5,561,341**	**644.29**	**539.20**	**6%**	**508.07**

Energy **consumption in the residential sector**:

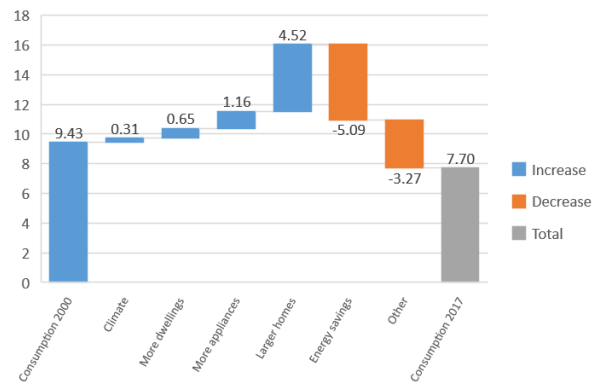
- In 2018 was 7.75Mtoe (circa 34% of the total national final energy consumption)[12] decreasing by 4.0% over the last 10 years, a value lower than the EU27 average decrease of 7%;
- In 2016 the per capita energy use in the household sector was only 0.375 toe, about 71.5% of the EU-28 average[13];
- In terms of heating fuel, in the residential sector, the highest share (3.11 Mtoe) is consumed by on-site energy generation using biomass heaters (these are mainly old heating stoves in rural areas using firewood) followed by natural gas consumption for heating (2.16 Mtoe) [14];
- Around 20% of dwellings were connected to district heating (DH) networks in 2014. The number is declining continuously, for two reasons: there is a continuous disconnection of flats from the DH, as individual heating sources are often cheaper and more reliable, this leads to municipalities closing town DH operators due to mounting losses. In average less than 50% of households are connected to DH where such connections exist. DH is concentrated in the major cities, with 42% of all flats connected to DH in the country[15].
- There is a significant difference in energy performance between multi-apartment buildings (MAB) and single family houses (SFH): the energy consumption per square meter of SFH built before 1994 was about 83% higher than for MAB. This gap has reduced to 12% for buildings constructed between 2014-and 2016[16].

Based on the Odyssee – Mure database, during the 2000-2017 period, circa 5.09 Mtoe energy savings were achieved in households (circa 54% of year 2000 consumption). The technical savings effect has been almost been fully eaten up the increase of the size of homes (4.52 Mtoe) but a reduction in consumption was achieved thanks to other reasons (mainly change in heating behaviours).

Dwellings (thou) and consumption (toe/dw)[17]



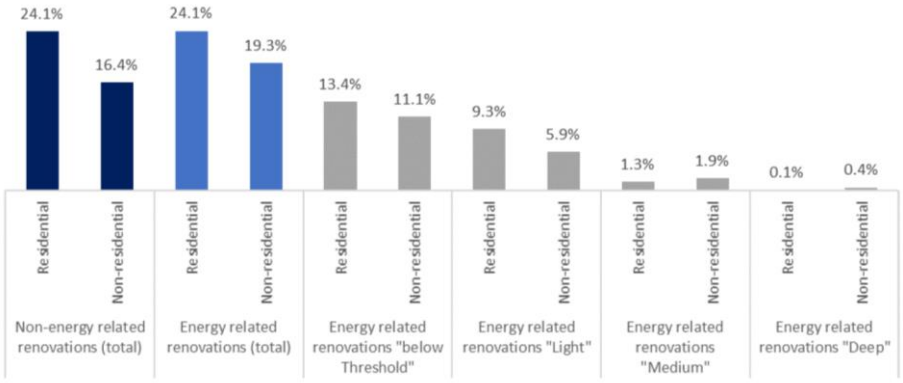
Households consumption between 2000-2017 (Mtoe)[18]



Based on ongoing programs supported by the government, EU funds and international finance organisations (IFIs), an estimated **6% of buildings will be renovated by 2020** (5% for residential buildings and 9% for public and commercial buildings, respectively). Thus, **about 77% of the overall building stock will need to be renovated or reconstructed by 2050**. The largest share (about **91%**) of buildings requiring renovation are in the **residential sector**, with SFHs representing about 65 percent[19].

Based on the study performed by DG ENER in 2019[20], the annual renovation rate of Romanian residential buildings is very high (almost double the EU28 average) and it is estimated to be circa 24.1%. It should however be considered that energy related deep renovation rate is much lower and equal to circa 0.1%.

Renovation rate [%/stock], average 2012-2016



In Romania new housing construction increased in the recent years: the number of issued residential building permits fell in the aftermath of the crisis but has been since then recovering, reaching 42 694 in 2018.

The number of **enterprises in the broad construction** sector in Romania totalled 90 726 in 2017 (+ 8.6% between 2010 and 2017).

With respect to employment in the construction sector, Romania is currently facing high **labour shortages**; according to the Federation of Owners of Building Companies, there will be a lack of more than 200 000 workers in the construction sector in coming years. 27% of the national construction workforce is unskilled. In total, by 2020, there will be the need for 50 000 qualified workers for the insulation and thermal rehabilitation of buildings. Although the COVID related economic crisis may have a negative impact on employment in the construction sector, training needs will remain remarkable.

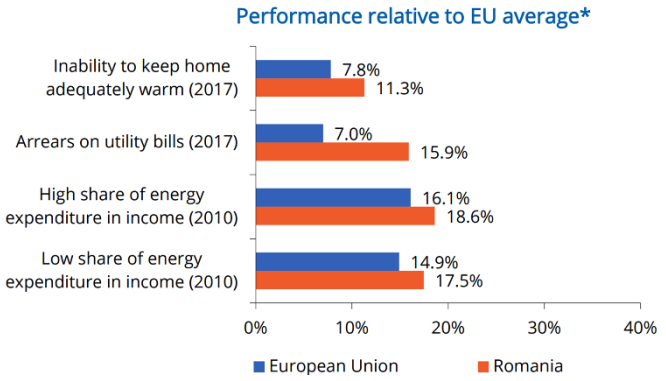
Housing loans to households have been growing steadily over the past years (despite population decline and negative migration). Total outstanding housing loans to households experienced a 90.6% surge since 2010, going from EUR 6.7bn to EUR 12.9bn in 2016. This is also the result of policy schemes such as the First Home Programme (This programme provides state guarantees of up to 50% of the value of the mortgage), to which almost 50% of total outstanding housing loans can be ascribed.

On the supply side, **construction of residential buildings has been picking up**, supported by the decline in construction costs and the recovering housing prices. Residential construction and the housing market suffered following the crisis. House prices decreased by 18.7% between 2010 and 2014, but subsequently recovered - picking up by 15.6% by 2017.

As presented in the previous section, the **homeownership rate in Romania is the highest in the EU**, with 96.8% of the population owning their own property in 2018 (compared to the EU-28 average of 69.0% in 2017). This share does not display major differences between the population income levels, however the **housing cost overburden rate**[21] was at 12.3% in 2017, above the EU-28 average of 10.4%, highlighting **housing affordability issues**.

ENERGY POVERTY[22]

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, despite the important national subsidies to support heating related expenditures, that are provided to circa 5% of the population[23].



As presented in the adjacent figure, all indicators typically used to study the energy poverty phenomenon are much higher than the EU average (the percentage of arrears on utility bills are more than double of the EU average).

As anticipated, the most important measure to tackle energy poverty are subsidies to support heating expenditures. An additional aspect in rural areas of Romania is the usage of firewood, discarded furniture and even plastic waste in solid fuel ovens. This has negative effect on ambient and in some cases also indoor air quality. Also due to this measure, electricity and gas prices are among the lowest in Europe (retail price is lower than wholesale price)[24]. The current COVID related economic crisis can have a severe impact on Romanian households, potentially leading (at least in the short run) to an increase of households living in in energy poverty conditions.

1.2. Overview of the public sector

Romania has 3 087 central government buildings, with a total floor area of 6 750m m^2

There are over 80 000 buildings owned by regional or local governments

Based on the draft Long Term Renovation Strategy (LTRS) of Romania, the public sector should have a demonstrative role and assume a leadership role by improving its EE by **renovating 8.25m m^2 (26%) of public buildings by 2030**, an achievement which would reduce energy consumption by 0.05Mtoe and achieve avoided CO_2 emissions of 0.25m ton for the period 2021-2030.

Most of the savings will be derived from deep or Near Zero Energy Buildings (NZEB) renovation of public buildings, lighting, renewable energy installations.

The draft LTRS identifies some measures:

- *Development of a **project pipeline and development assistance scheme** for prioritised public buildings projects to ensure renovation at least 26% by 2030, 52% by 2040 and 100% by 2050.*
- *Enhanced **support for schools and other public buildings** with reviews of their technical designs to ensure quality and adherence to best practices.*
- ***Aggregation of public buildings renovations in large procurement packages** to achieve better pricing, reduce the number of tenders and centralise oversight.*
- ***Centralised procurement and procurement frameworks** for services and EE renovation works to state-owned buildings and municipal buildings.*
- *Capturing part of the financial savings made from EE improvements to support the implementation of structured energy management in public buildings.*
- *Assessing the use of **PPP or energy performance contracts** as alternative delivery modes for public buildings renovation, where appropriate.*

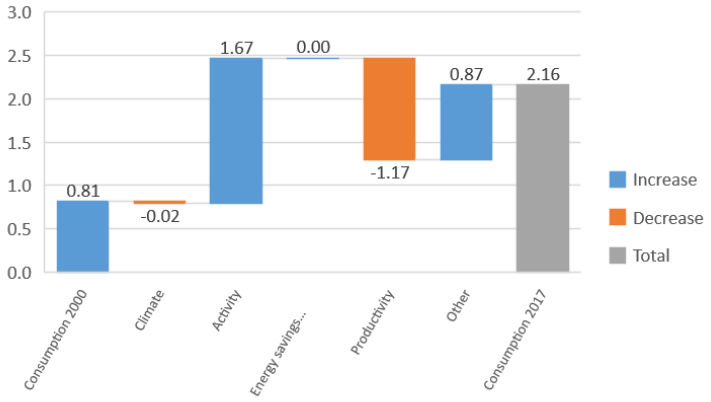
- *Implement **dedicated financing scheme** for central government and municipal buildings funded by budgetary grants, repayable grants, or other **financing instruments**.*
- *Interim evaluation of the implementation of this strategy and analytical expertise to support effective governance.*

1.3. Overview of services and industry sectors

The **services sector** account for 62.6% of the national GDP (in 2017)[25] and it employs 42.8% of the labour force. As presented in previous sections, in 2018 final energy consumption in the sector was 2.0 Mtoe (circa 1.5% of the EU27 overall consumption in the sector) and it increased by 10.3% in the last 5 years (while at the EU27 consumption - on average – was stable over the same period)[26].

As presented in the following figure, the Odyssee-Mure estimates that in the 2000–2017 period no technical energy savings were recorded.

Services consumption between 2000-2017 (Mtoe)[27]

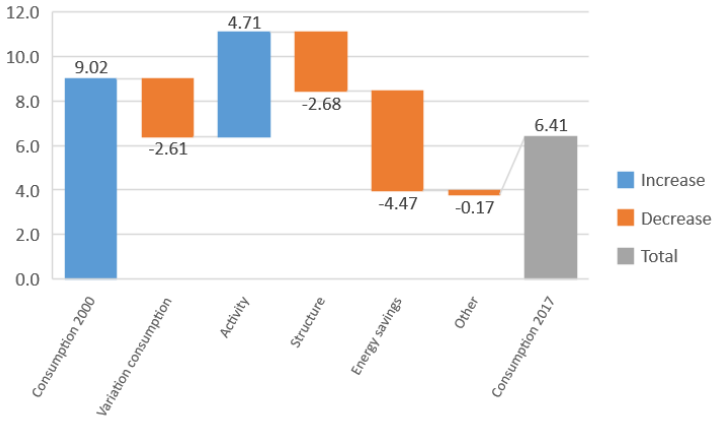


The Industrial sector accounts for 33.2% of real GDP (2017) [28] and it employs circa 28.9% of the labour force.

In 2018, industry consumed 6.6Mtoe (2.7% of EU27) with a decrease by 21% in the last 10 years (at the EU27 level it decreased on average of 9%).

As presented in the following figure, the Odyssee-Mure estimates that in the 2000 – 2017 period technical energy savings amounted to 4.47Mtoe (circa 50% of energy consumption of the sector in year 2000).

Industry consumption between 2000 and 2017 (Mtoe)[29]



2. EE targets, measures in place and proposed

Several policy measures are in place, relying both on **EU** (ERDF, Cohesion Fund) and national resources (thermal rehabilitation fund).

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.

Romania plans, according to its draft NECP, to keep its primary energy consumption on the level of 2017, despite expected continuous economic growth. It is planned to achieve cumulative energy savings of 10.12 Mtoe[30].

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

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
Cross-cutting	• Creation of a **National Fund for Energy Efficiency** as recommended by the World Bank[31]. 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[32]. <u>In 2021 – 2030 is expected:</u>	<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[33];

	• 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 $m^2$and 44,495 MAB with a floor space of 65.62m m^2. 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.	• **National Programme for Improvement of Energy Performance in Residential Blocks (thermal rehabilitation fund)**. The programme provides grants from national resources. An example is provided in section 3; • **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[34]. New planned measures/priority objectives (draft NECP): • 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**; • **Setting emission performance standards** for the renovation of building elements and HVAC (Heating, ventilation and Air Conditioning); • Installation of **smart meters and demand side** response systems; • Intensification of the use of **Green Mortgages** by banks (draft NECP does not contain any measures referring to new buildings).
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%	Existing measures: • **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;

	in public administration).	• **ESIF funded public building renovation and public lighting renovation (planned EUR 595 m)**; • **District Heating 2006-2020 heat and comfort Programme** funded by CF; • **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). <u>New planned measures/priorities in the NECP:</u> • 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.	<u>Existing measures:</u> • **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 (described in detail in section 5.1); • 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[35]. <u>New planned measures/priorities in the NECP:</u> • 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.

3. 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[36].

	Financial issues and gaps	Non-financial issues
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 waiting for grants to become available; • **Low awareness among financial institutions** to invest in energy efficiency[37].	• **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;** • 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[38].
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 HOA legislation** (collective decision-making, ability to sign contracts, borrow from banks, collect dues, maintain common spaces); ○ **poor-quality district heating services**; ○ lack of clarity on decision-making for mixed-use buildings (buildings with commercial tenants on the ground floor and apartment owners above); ○ lack of clear and credible delivery mechanisms; ○ absence of thermostatic valves prevents energy management by apartment owner; • 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 leading to air quality and CO_2 emissions; ○ limited access to gas and DH.
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[39].	• **No political incentives** to save energy/budget; • Lack of legislative framework for EPC[40]; • **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[41].
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.

The effect of the energy subsidy on energy efficiency projects is shown below on an EIB financed thermal renovation project of MAB.

Bucharest Sector 4 thermal rehabilitation programme [42]

The third phase of the renovation programme of MAB in Sector 4 of Bucharest is currently being realised and is expected to have investment cost of EUR 105.8m. The project will improve the energy efficiency of 181 homeowners associations by 45%.

The project targets 475 buildings and will focus on thermal energy efficiency improvements of the building envelope (wall, roofs and cellar insulation), window replacement, improvements in the heating and domestic hot water systems and replacement of indoor lighting located in common spaces.

The financing of the project is partly a loan from the EIB to the Municipality of Sector 4 (EUR 58m approved) and part of the Romania Municipal EE Programme Loan 25% from homeowners and the remaining part from subsidies.

With the subsidised heat cost of 0.04 Euro per kWh the p does not break even during its economic life-time of 31 years and does not appear to be financially viable. A calculation based on the full heat cost of district heating of EUR 0.095 Euro per kWh shows the project is financially viable and additionally it has positive externalities.

4. Investment needs, gaps and implications for financial instruments

The NECP includes estimates for investment needs of EUR 150 billion (74% of Romania's GDP in 2018) across the different sectors for the 2020-2030 period. The investment needed into the electricity infrastructure is estimated to be EUR 22.6 billion and on the energy demand side EUR 127.4 billion. It is not clear if these projections include estimations for the investment in district heating infrastructure or large scale renewable energy.

The table from the NECP provides an overview of building related investments into energy efficiency and small scale renewables and other expected output and result indicators.

Building types	Category	Mio m2 area	Buildings [number]	Investment [mEUR]	Savings of the Energy (tMoe]	Reduction CO 2 [mt)	Weighting increased energy from sources renewable (Mtoe]
Single family houses (SFH)	**Rural**	10.57	162 475	**1 736.87**	0.17	0.04	68.63
	Urban	9.39	102 12	**1 449.88**	0.14	0.11	39.77
Multi-apartment buildings (MAB)	**≤ 4 storeys**	21.62	21 124	**2 791.47**	0.11	0.47	24.96
	> 4 storeys	44.04	23 471	**4 877.24**	0.36	1.41	50.64
Education	**Educational Institutions**	4.24	4 361	**874.84**	0.03	0.14	14.81
Health	**Hospitals**	1.61	161	**318.33**	0.01	0.06	5.28
	Others	1.07	14 324	**192.52**	0.01	0.02	3.11
Offices Administrative		1.35	1 539	**236.55**	0.01	0.03	4.41
Trade	**Hotel**	0.04	73	**9.38**	—	0	0.18
	Restaurants/cafés	0.12	2 394	**27.05**	—	0	0.5
	Shops	1.31	7 686	**269.4**	0.01	0.6	5.03
Total		**95.36**	**339 728**	**12 783.53**	**0.83**	**2.34**	**217.31**

Building renovation related investments, require for the 2021-2030 period an investment of EUR 12.8 billion, of which the majority (EUR 10.9 billion) needs to be invested in the residential sector. The majority of this amount is required as investment in MAB, thus concentrated in urban areas and a smaller part in SFH, more than half of which is in rural areas. About EUR 1.4 billion investment is required in the public sector, mainly in schools. For the service sector, it is estimated that investments of EUR 305 million are required. From the data it becomes clear that there the majority of investment will go into small scale renewables, such as solar thermal or photovoltaic installations. The table does not provide any information on the necessary investment into industry buildings or into industrial processes.

Possible **implications for financial instruments** are summarised in the following table. The implications are partly based on the conclusions of the World Bank's gap analysis[43], which are used also in the LTRS and partly on conclusions drawn from stakeholder consultations.

Horizontal implications for financial instruments		
• Financial instruments need to include (or to be supported by) a **technical assistance component** (to promote EE benefits, to facilitate the decision making process, and to prepare/monitor EE projects). This is even more important as in Romania, there is very limited experience with financial instrument in general and financial instrument for EE specifically, The funding may come from the relevant OPs, future ELENA programme or national sources; • Pure grant schemes should be limited to specific areas**,** less suitable for financial instrument, such as energy poverty or public buildings that cannot be renovated by EPC such as historic buildings. **financial instruments combined with grants** should become the default option in the other areas and make use the new simplified rules under the Common Provision Regulation; • Loan instruments may be needed for banks that require access to longer-term financing for building renovation loans; • Increasing the **awareness on EE related financial instruments** among policy makers and financial institutions. Member State specific support via *fi-compass*, can play an important role. Commitment to financial instruments from a political level are essential to implement these schemes successfully.		
Residential sector	**Public sector**	**Industry**
• **Integrating financial instrument combined with investment grants and technical assistance** (energy audits, project preparation, supervision of project implementation and dispute settlement with builders) into a one-stop shop scheme for residential buildings; • **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, i.e., 5-10 years. Such a fund could be delivered by	• 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. This would simplify and centralise procurement of ESCO services and ensure quality of projects realised. The (majority of) financing of EPC projects would be provided by the super-ESCO. The super-ESCO could manage the financial instrument and attract additional financing from IFIs or large commercial banks[44]. (Such public-private super-ESCO EPC	*SMEs or larger enterprises are not mentioned in the NECP as a focus for ERDF and the Cohesion Fund. Nevertheless, 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 renewable energy; • **Allowing for TA for banks** to build up the experts internally or externally; • EE measures should **be integrated in mainstream SME financing**, with additional incentives for achieving EE savings or greenhouse gas reduction; • **Loan guarantees,** to facilitate commercial bank loans to private buildings; • Financial instruments could also **support the development of the**

commercial banks alongside the financial instrument.	would probably count into the public debt and deficit).	**EPC model in the industry sector** and in the business sector at large.

5. ESIF resource, existing financial instruments and main grant programmes

Romania benefits from **ESIF funding of EUR 30.8 billion** (circa EUR 1 577 per person) during the 2014 – 2020 period. For TO4, **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)[45]. The **EE related support** comes through 2 operational programmes managed at national level, Integrated Regional OP and Large Infrastructure OP from ERDF and CF and is estimated at **EUR 1 243.6m**[46]. Support is provided for EE measures in the residential sector (planned amount EUR 444.3m) and for public buildings and infrastructure (EUR 741.8m).

5.1. Financial Instruments

In the 2014 – 2020 period, Romania contributed **EUR 540m**[47] **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.

The largest financial instrument in Romania is the SME Initiative which has been very successful providing financing to SMEs in the 2014-2020 period.

SME Initiative in Romania[48]

The SME Initiative was launched in Romania in October 2016 and is co-financed by ERDF (EUR 250m), the EC and the EIB Group – the EIB and the EIF. The SME Initiative combines ESIF with EU central budget resources under the Horizon 2020 programme and EIB Group funds by providing uncapped guarantees. Through a risk-sharing mechanism, the EUR 250m of ESIF resources made available by Romania, leveraged with the EIB Group and EU resources together with commercial banks' lending, are expected to generate more than EUR 1.38bn of new SME loans.

Under the SME Initiative, seven financial intermediaries have been selected to improve access to finance of more than 5 000 SMEs and start-ups at favourable terms (i.e. the SME Initiative provides a 60% guarantee on each loan and by lowering the interest rates charged and/or lower collaterals required by banks). As of October 2019, more than 2 000 Romanian SMEs have benefited from the SME Initiative, with almost EUR 500m committed in their support.

Based on the success of the SME Initiative, Romania decided to increase the total budget of ESIF resources up to EUR 250m by allocating additional EUR 150m in 2018.

Currently there is one revolving debt fund without ESIF contributions in the energy efficiency sector.

Romanian Energy Efficiency Fund - FREE[49]

In 2002, the World Bank has set up the **Romanian Energy Efficiency Fund (FREE)** as proposed by the Global Environment Facility (GEF). The fund aims at enabling companies in the **industrial sector**, and other energy consumers, to adopt and utilise energy-efficient technologies, financed under commercial criteria.

The fund was accompanied by a **TA facility op**erated under FREE to partially cover initial transaction costs. The total cost of capital injection (USD 8m) and TA facility was USD 34m. The **fund has facilitated investments of USD 83m with USD 27m loans provided by FREE in 43 projects**. The co-financing of FREE lending is mainly from commercial banks and to a lesser degree from project sponsors and public sources. The minimum size of the loans is USD 1m and repayment time is 4-5 years. Investments supported must be in majority include EE measures, but also other associated cost are eligible. Investments include investments in industrial processes, district heating, equipment and ESCOs. It is planned to continue the fund and to **upscale it in the future**.

[1] EUROSTAT; Population on 1 January by age and sex [demo_pjan]; extracted on 13/02/2020
[2] EUROSTAT; Real GDP per capita [SDG_08_10]; extracted on 13/02/2020
[3] EUROSTAT; Final energy consumption (Europe 2020-2030); Energy efficiency [nrg_ind_eff]; extracted on 13/02/2020
[4] 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
[5] EUROSTAT; Energy productivity [T2020_RD310]; data in Euro per kilogram of oil equivalent (KGOE); extracted on 13/02/2020
[6] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020;
[7] Romania Long term renovation Strategy (November 2019 draft)
[8] This data refers to technical final energy savings
[9] Odyssee database, Technical Energy Savings, year 2016
[10] Information reported in this section is based on the Romania Long term renovation Strategy (November 2019 draft)
[11] Romania Long term renovation Strategy (November 2019 draft)
[12] EUROSTAT; Final consumption - other sectors - energy use; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[13] Romania Long term renovation Strategy (November 2019 draft)
[14] Romania Long term renovation Strategy (November 2019 draft)
[15] Ministry of Regional Development and Public Administration and Ministry of Energy, Report on the assessment of the national potential to implement high-efficiency cogeneration and efficient district heating and cooling, December 2015
[16] Romania Long term renovation Strategy (November 2019 draft)
[17] Odyssee database
[18] Odyssee database
[19] Romania Long term renovation Strategy (November 2019 draft)
[20] Directorate-General for Energy (European Commission), IPSOS, Navigant. Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU. 2019
[21] The housing cost overburden rate is the percentage of the population living in households where the total housing costs represent more than 40 % of disposable income
[22] EU Energy Poverty Observatory; Member State Report; Romania, 2019
[23] Romania Long term renovation Strategy (November 2019 draft)
[24] Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Households, 2018
[25] Central Intelligence Agency, the world fact book
[26] EUROSTAT; Final consumption commercial and public services; Complete energy balances [nrg_bal_c]; extracted on 13/02/2020
[27] Odyssee database
[28] Central Intelligence Agency, the world fact book
[29] Odyssee database
[30] National Energy and Climate Plan, January 2020
[31] World Bank, Gaps Analysis of the Current National Long-term Building Renovation Strategy and Action Plan – Final Report, August 2019
[32] Information reported in this section is based on the NECP (if not differently specified
[33] https://www.afm.ro
[34] 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
[35] https://www.eib.org/en/projects/pipelines/all/20190299
[36] Romania Long term renovation Strategy (November 2019 draft)
[37] Based on stakeholder interviews
[38] Romania Long term renovation Strategy (November 2019 draft)
[39] Based on stakeholder interviews
[40] National Energy and Climate Plan, January 2020
[41] Based on stakeholder consultations
[42] https://www.eib.org/de/projects/pipelines/all/20160766 and EIB internal calculations
[43] World Bank, Gaps Analysis of the Current National Long-term Building Renovation Strategy and Action Plan – Final Report, August 2019
[44] 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
[45] https://cohesiondata.ec.europa.eu/countries/RO
[46] The following intervention fields were selected: 014-Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures and 015-Energy efficiency renovation of public infrastructure, demonstration projects and supporting measures. Data were retrieved 05/07/2019 from the Open Data Platform, data sheet 'categories of intervention planned vs implemented'
[47] Data from www.fi-compass.eu/financial-instruments/Romania and for the SME initiative EUR 250m, which was not reported for the Annual Summary of Data 2019, https://www.eif.org/what_we_do/guarantees/sme_initiative/smei_romania/index.htm

[48] https://www.eif.org/what_we_do/guarantees/sme_initiative/smei_romania/index.htm
[49] Lending to Industrial Energy Efficiency Projects, Mihai-Marius Voronca, presentation at SEIF Conference 1st February 2018, Bucharest and www.free.org.ro

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