

NATIONAL LONG-TERM RENOVATION STRATEGY

TO SUPPORT THE RENOVATION OF THE NATIONAL STOCK OF RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS, BOTH PUBLIC AND PRIVATE, AND TO GRADUALLY TRANSFORM IT INTO A HIGHLY ENERGY EFFICIENT AND DECARBONISED BUILDING STOCK BY 2050

TABLE OF CONTENTS

Chapter I Introduction	5
Chapter II Relevant background information on the EPBD framework	6
Chapter III Existing policies and current legal framework	7
1. Trends in energy consumption in Romania	7
2. National strategies, policies and legislative framework	12
Chapter IV Problem definition.....	15
1. Overview of the national building stock	15
2. Overview of problems identified in the field of building energy efficiency.....	23
Chapter V Objectives	25
Chapter VI General principles	25
Chapter VII Directions for action.....	27
1. Ensuring cost-effective approaches to renovation	27
2. Stimulating cost-effective deep renovation of buildings.....	34
3. Identifying buildings with the lowest energy performance	38
4. Reducing energy poverty.....	39
5. Policies and actions addressing market failures	41
6. Split-incentive dilemmas.....	47
7. Safety issues	48
8. Renovation of public buildings	49
Chapter VIII Results of policies and actions	52
Scenario analysis	52
Chapter IX Indicators	79
1. Roadmap for implementation	79
Chapter X Budgetary implications	85
1. Financial mechanisms to support mobilisation of investments.....	85
This type of financing mechanism would be similar to schemes used in other Member States, such as:	86
(i) multi-family building modernisation funds in Lithuania;	86
(ii) a combination of loans, technical assistance and grants for the renovation of multi-family buildings in Estonia;	86
(iii) <i>Kreditanstalt für Wiederaufbau (KfW)</i> grants and loans for energy building renovation in Germany;	86

(iv) the financing facility for sustainable energy implemented by the EBRD in Slovakia, SlovSEFF;	86
(v) the financing facility for sustainable energy implemented by the EBRD in Romania, RoSEFF. At national level, the implementation of this financing facility (RoSEFF) has helped finance investments of nearly EUR 4 billion in energy efficiency and renewable energy in 24 countries. In Romania, three SEFF programmes have been developed to finance 473 investment projects with a total value of EUR 189 million.	87
2. Institutional framework for financial mechanisms	87
3. Financial options for building renovation	93
4. Financing scheme options for building renovation	95
5. Budget needed	104
Chapter XI Legal implications	107
Table 13 below shows the main changes to the regulatory framework underpinning the implementation of the key measures proposed in the LTRS. The mechanism described above, comprising financial intermediaries and implementing intermediaries, can only operate if the public finance legislation is amended.	107
Chapter XII Monitoring and evaluation procedures.....	108
1. Public consultation during the implementation of the Strategy.....	108
2. Governance.....	109
3. Monitoring, reporting and evaluation	114
4. Main implementation actions.....	115
Stakeholders involved in the preparation of the Strategy and summary of consultations ..	121

Abbreviations and acronyms

ANRE	Romanian Energy Regulatory Authority
AP	Action plan
BEM	Building energy management system
BPIE	Buildings Performance Institute Europe
BRP	Building renovation passport
CNSP	National Strategy and Prognosis Commission
DH	District heating
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy efficiency
EED	Directive 2012/27/EU on energy efficiency
EEF	Energy Efficiency Fund
EIB	European Investment Bank
EPBD	Directive 2010/31/EU on the energy performance of buildings
EPC	Energy performance certificate
EPCo	Energy performance contracting
ESCO	Energy service company
EU	European Union
F	'Fund'
FB	Financial beneficiary
FI	Financial intermediary
GEFF	EBRD Green Economy Financing Facility
GSGR	General Secretariat of the Government of Romania
IFI	International financial institution
II	Implementing intermediary
INCD	URBAN- National Institute for Research and Development in Construction, Urban Planning
INCERC	and Sustainable Territorial Development
INECP	Integrated National Energy and Climate Plan
LTRS	National Long-Term Renovation Strategy
MFB	Multi-family buildings
MLPDA	Ministry of Public Works, Development and Administration
Mtoe	million tonnes of oil equivalent
NACLR	National Agency for Cadastre and Land Registration
NEEAP	National Energy Efficiency Action Plan
NIS	National Institute for Statistics
NZEB	Nearly zero energy building
OA	Owners' association
PPL	Public procurement law
ROP	Regional Operational Programme
SFH	Single-family house
SFMIS	Structural funds management information system
SMEs	Small and medium-sized enterprises
TA	Technical assistance
TCS	Technical construction systems
toe	tonnes of oil equivalent
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

Chapter I Introduction

Romania has in place public policies and a well-developed legislative framework regulating the issue of building energy efficiency (EE), largely based on the relevant EU directives: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (EPBD), Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (EED), Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. This framework is supported by a number of national strategies and plans, the institutional responsibilities established and support programmes.

Over the last decade, Romania has managed to make some progress in reducing total energy consumption, but needs to quicken the pace of implementation of the measures. Although primary energy consumption decreased by 8.9 % between 2010 and 2016, final energy consumption decreased by only approximately 1.4 %. The commercial, public and residential sectors saw a 7.5 % drop in final energy consumption during this period. Achieving more ambitious future targets will be a significant challenge since energy consumption per capita in the residential sector was only 0.375 tonnes of oil equivalent (toe) in 2016, i.e. approximately 71.5 % of the EU-28 average. With an increase in revenues and energy use, energy consumption could increase by 25 to 30 % compared to the current level.

Directive (EU) 2018/844 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency is much more ambitious in terms of reducing energy consumption than its previous version. By Directive 2018/2002 revising the EED, the EU increased its overall energy savings target for 2030 to 32.5 %, which means a higher level of ambition for Romania compared to the efforts needed to reach the 20 % target for 2020. The new target is part of the so-called 'Clean Energy Package' of the European Commission (EC), which focuses on the building sector and in particular on existing buildings.

Directive 2010/31/EU (EPBD) on the energy performance of buildings sets out the general framework conditions under which each Member State, including Romania, must act. These framework conditions lay down minimum requirements and pay particular attention to the preparation of a set of concrete measures - with reference values set for 2030, 2040 and 2050, the implementation of which will be followed up.

As laid down in Directive (EU) 2018/844 (revised EPBD), each Member State must develop a Long-Term Renovation Strategy (LTRS) to support the transformation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050.

In order to substantiate this Strategy, the Ministry of Public Works, Development and Administration, as the competent authority in the field of construction and building energy efficiency, has conducted an analysis of the current situation under the project *Strengthening the MLPDA's strategic planning capacity in the renovation of the national building stock in terms of energy efficiency and seismic risk - SIPOCA 606*.

This analysis was carried out to underpin the preparation of a realistic and implementable strategy. The analysis report covered four thematic areas which are deemed central to successfully implementing the EPBD in Romania and to implementing the LTRS: (i) strategies and policies; (ii) legislation and regulations; (iii) institutions and market; and (iv) financing and implementation.

The preparation of this Strategy involved discussions, exchanges of professional views and three rounds of extensive consultations with broad groups of stakeholders (in March, June and September 2019). The Annex includes the list of stakeholders engaged in the process and the summary of public consultations.

Chapter II Relevant background information on the EPBD framework

The revised EPBD includes several changes, which could be summarised as follows:

- Each Member State must develop a long-term renovation strategy (LTRS) to support the renovation of the national stock of residential and non-residential buildings, both public and private, and its gradual transformation into a highly energy efficient and decarbonised building stock by 2050. The EPBD emphasises that the LTRS must facilitate the cost-effective transformation of existing buildings into nearly zero energy buildings (NZEB), a provision already included in Article 9(2) of the EPBD.
- The LTRS must be supported by measurable progress indicators, through indicative reference values for 2030 and 2040 and elaborate on how it contributes to achieving the 32.5 % energy efficiency target set by the European Union for 2030 (in Directive 2012/27/EU). This action expresses the European Commission's expectation that the LTRS will be implemented and that its impact will be monitored.
- Clear reference is also made to the possibility of using trigger points throughout the life-cycle of the building and building renovation passports (BRPs) to stimulate convenient cost-effective deep renovations, thus encouraging holistic approaches to energy renovation projects. Each Member State will have to identify these trigger points as part of the LTRS in accordance with national practices.
- The LTRS must include policies and actions targeting the worst performing segments of the national building stock and set out actions to alleviate energy poverty, while addressing market failures such as those related to multi-family buildings (MFB).
- LTRS must include policies and actions targeting all public buildings, and such measure should lead to better implementation of Article 5 of the EED to increase the public building renovation rate.
- Member States must now develop initiatives to promote smart technologies and well-connected buildings, such as to have a positive impact on energy savings. The revised EPBD also requires the LTRS to include wider benefits, such as those related to health, safety and air quality.
- The revised EPBD sets out more detailed requirements on how Member States can facilitate access to financial mechanisms to support the mobilisation of investments in energy renovation. The revised provisions also require the Commission to collect from Member States and to disseminate the best practices on successful financing and aggregation of energy efficiency projects. The revised EPBD also identifies the role of financial initiatives, market barriers and information campaigns in properly implementing the regulatory framework and achieving the revised EPBD's objectives. In addition, the revised EPBD sets out obligations with regard to databases of energy performance certificates and the provision of adequate information on the energy consumption of buildings.
- Member States must determine how they will carry out public consultations with stakeholders during the preparation (prior to submission to the Commission) and implementation of the LTRS.
- Reporting on the content and progress of the LTRS implementation has been transferred to the new governance regulation requiring Member States to revise and review the LTRS every 10 years (Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action).
- There are also other changes addressing barriers to electromobility: (i) for non-residential buildings undergoing major renovation (with more than 10 parking spaces), Member States shall ensure the deployment of at least one recharging point for electric vehicles or ducting infrastructure (i.e. conduits for electric cables) for at least five parking spaces; (ii) for residential buildings undergoing major renovation (with more than 10 parking spaces), ducting infrastructure for each parking space shall be installed to enable the deployment (at a later stage) of recharging points for electric vehicles.
- Article 2a(7) of the revised EPBD provides that each Member State may use its LTRS to address fire safety and risks related to intense seismic activity affecting energy efficiency renovations

and the lifetime of buildings. The new final paragraph of Article 7 adds two obligations in relation to buildings undergoing major renovation. Member States shall (i) encourage high-efficiency alternative systems, in so far as this is technically, functionally and economically feasible, and (ii) address the issues of healthy indoor climate conditions, fire safety and risks related to intense seismic activity.

- The LTRS shall address a combination of legislative requirements such as obligations under the revised EPBD, and non-legislative initiatives such as Smart Finance for Smart Buildings. Recital 9 of the revised Directive provides a clear indication of what is needed:

To achieve a highly energy efficient and decarbonised building stock and to ensure that the long-term renovation strategies deliver the necessary progress towards the transformation of existing buildings into nearly zero energy buildings, in particular by an increase in deep renovations, Member States should provide clear guidelines and outline measurable, targeted actions as well as promote equal access to financing, including for the worst performing segments of the national building stock, for energy-poor consumers, for social housing and for households subject to split-incentive dilemmas, while taking into consideration affordability. To further support the necessary improvements in their national rental stock, Member States should consider introducing or continuing to apply requirements for a certain level of energy performance for rental properties, in accordance with the energy performance certificates.

Box 1: Main requirements for Long-Term Renovation Strategies (Article 2a(7) of EPBD)

Each Member State must draw up a comprehensive long-term renovation strategy (LTRS) encompassing:

- intermediate (indicative) targets for 2030, 2040 and 2050;
- an explanation of the contribution to the overall EU energy efficiency target for 2030;
- an overview of the national building stock;
- expected share of renovated buildings in 2020;
- cost-effective approaches to renovation by building type and climatic zone, including potential relevant trigger points;
- policies and actions to stimulate cost-effective deep renovation of buildings, including staged deep renovation (for example by introducing an optional scheme for building renovation passports (BRPs));
- policies and actions to target the worst performing segments of the national building stock, split-incentive dilemmas and market failures;
- actions that contribute to the alleviation of energy poverty;
- policies and actions to target all public buildings;
- initiatives to promote smart technologies and well-connected buildings and communities;
- initiatives to promote skills and education in the construction and energy efficiency sectors;
- an evidence-based estimate of expected energy savings and wider benefits, such as those related to health, safety and air quality.

Chapter III Existing policies and current legal framework

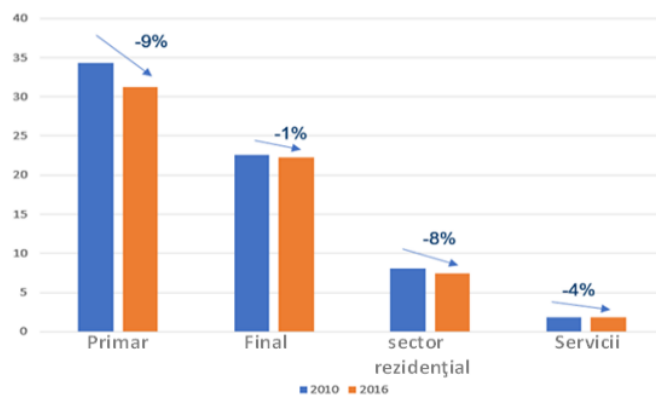
1. Trends in energy consumption in Romania

Over the last decade, EU countries have implemented energy efficiency (EE) measures in all economic sectors, which have contributed considerably to a decrease in energy consumption. However, after a gradual decrease between 2007 and 2014, energy consumption in the EU increased between 2014 and 2017 and the level of primary and final energy consumption is now slightly above the trajectory set in 2012 with a view to achieving the energy saving target of 20 % by 2020.

Although the growth of economic activity continues to drive the increase in energy consumption, energy savings have helped to offset the impact of these increases, leading to a gradual improvement in energy intensity. However, in recent years, energy savings have not been significant enough to offset the increase in consumption, possibly due to delays in the implementation of EE policies in some Member States.

Romania has made modest progress in reducing total energy consumption over the last decade. According to the report ‘EU Energy in Figures 2018’, published by the European Commission, primary energy consumption fell by 8.9 % between 2010 and 2016, i.e. from 34.33 Mtoe to 31.26 Mtoe (Figure 1). However, final energy consumption decreased by only approximately 1.4 % from 22.59 Mtoe to 22.28 Mtoe. Most energy end-use sectors decreased during that period, with the exception of the transport sector, which saw a significant increase. As for the residential sector, final energy consumption decreased by 8.4 %, i.e. from 8.10 Mtoe to 7.42 Mtoe. As regards the services sector, which comprises the public and commercial sectors, final energy consumption decreased by 3.7 %, i.e. from 1.88 Mtoe to 1.81 Mtoe. Although the residential and services sectors only include buildings, these values indicate a reduction in energy consumption in the building sector¹. The *2018 Report on the progress achieved towards the national energy efficiency targets of the Romanian Energy Regulatory Authority (ANRE) (Raportul privind progresul realizat în îndeplinirea obiectivelor naționale de eficiență energetică din 2018 al Autorității Naționale de Reglementare în Domeniul Energiei)* shows relatively similar progress².

Figure 1: Energy consumption, Mtoe



Primar	Primary
Final	Final
Sector rezidențial	Residential sector
Servicii	Services

Source: European Commission, *EU Energy in Figures 2018*

The draft Integrated National Energy and Climate Plan (INECP) of Romania, which was submitted to the European Commission (EC) in April 2020, outlines the trend in primary and final energy consumption since 2005, broken down by end-use sector³. The data (Figure 2) shows that, for the residential and tertiary (services) sectors, the shares in question remained relatively stable during that period⁴. An

¹ European Commission, *EU energy in figures*, Statistical Pocketbook 2018, pages 220 to 221.

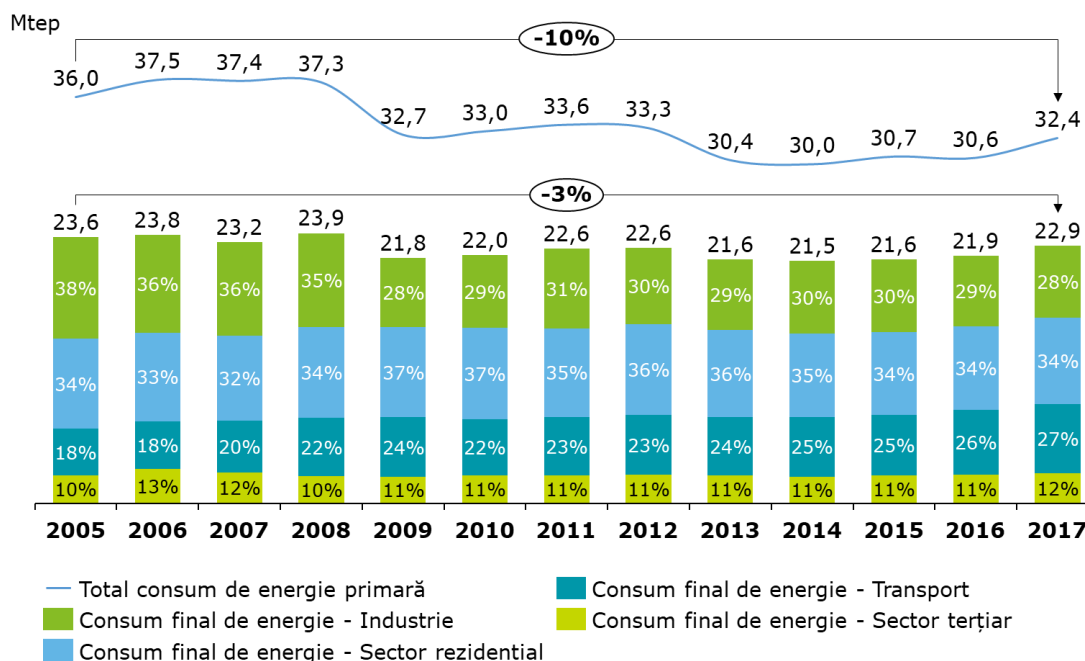
² ANRE, *Report on the progress achieved towards the national energy efficiency targets*, 26 April 2018, page 11.

³ Ministry of Economy, Energy and Business Environment, draft *2021-2030 Integrated National Energy and Climate Plan*, page 129 (2018).

⁴ There was an increase in final energy consumption between 2015 and 2016 which may be attributed to the periods of extreme cold in the winter of 2016. These presumably led to an increase in heating energy consumption, which has a significant share, in particular in the residential and services sectors. The ‘Heating Degree Days’ index for Romania, according to Eurostat, was 2.918 in 2016, compared to the previous year when it was 2.786.

interesting fact is, on the one hand, the significant decrease in consumption in the industry sector and, on the other hand, the significant increase in consumption in the transport sector. However, the residential sector remains the largest end-use sector, with approximately 33 % of total final energy consumption.

Figure 2: Primary and final energy consumption, Mtoe, including allocation by sector, from 2005 to 2017



Total consum de energie primară	Total primary energy consumption
Consum final de energie - Industrie	Final energy consumption - Industry
Consum final de energie - Sector rezidențial	Final energy consumption - Residential
Consum final de energie - Transport	Final energy consumption - Transport
Consum final de energie - Sector terțiar	Final energy consumption - Tertiary sector

Source: INECP, April 2020.

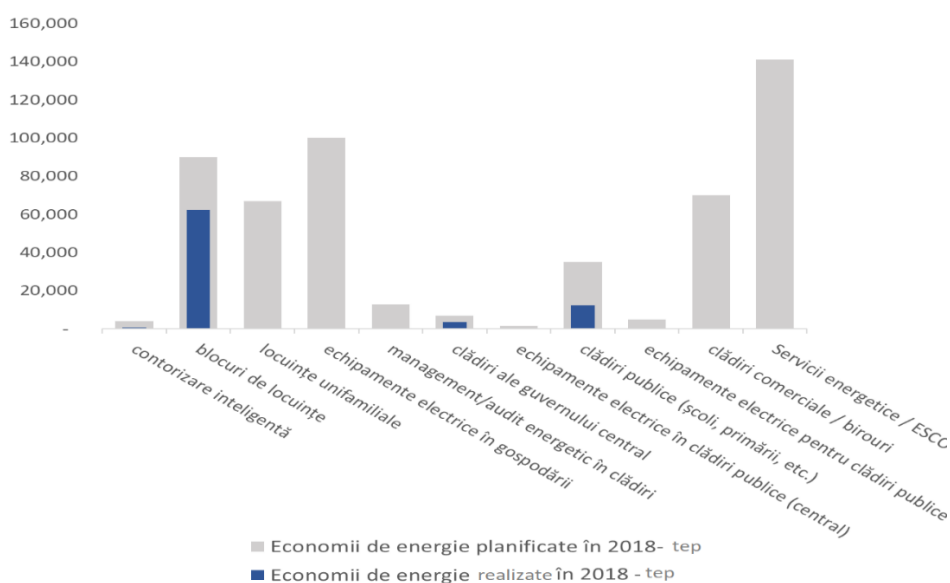
According to Progress Report on the ANRE's National Energy Efficiency Action Plan (NEEAP), Romania's energy consumption per capita in the building sector, as recorded in 2016, i.e. 0.375 toe/capita, amounted to 71.5 % compared to the EU-28 average. While starting from a very low benchmark in the 1990s in terms of energy consumption in the building sector, with development trends towards EU convergence, substantial efforts are needed to limit this trend in the future. The implications are significant; with rising income and Romanian households increasing energy consumption compared to other EU Member States, energy consumption could increase by 25 to 30 % compared to the current level.

The draft Integrated National Energy and Climate Plan (INECP) of Romania proposes a primary energy consumption target of 32.3 Mtoe by 2030 compared to the primary energy consumption of 32.1 Mtoe in 2020. This is a very ambitious scenario compared to the current situation. The National Strategy and Prognosis Commission estimates the country's final energy consumption for 2019 at 24.06 million Mtoe and a further increase of approximately 2.5 % a year. Romania has also made efforts to increase the energy efficiency of its stock of buildings - public and private, residential and non-residential - with and without public sector support. Until 2019, ANRE monitored the progress made under building renovation programmes as part of the wider monitoring process provided for in the National Energy

Efficiency Action Plans (NEEAPs) and, from 2020 onwards, this is the responsibility of the Ministry of Economy, Energy and Business Environment.

Whereas interventions to improve the energy efficiency of the building stock are made from both public and private funds and public funds are allocated either by central authorities under national or EU programmes or directly by local public authorities, through various mechanisms, there is no centralised information on the impact of all building renovation policies at central and local level, and data on energy improvements in the building stock achieved only by the private sector (residential, commercial, industrial) without State intervention is even scarcer. Figure 3 highlights the energy saving achievements reported for 2018. However, these achievements are likely to be underestimated due to the lack of reporting by municipalities and the private sector.

Figure 3: NEEAP monitoring results for 2018 - Indicators relevant to the building renovation sector



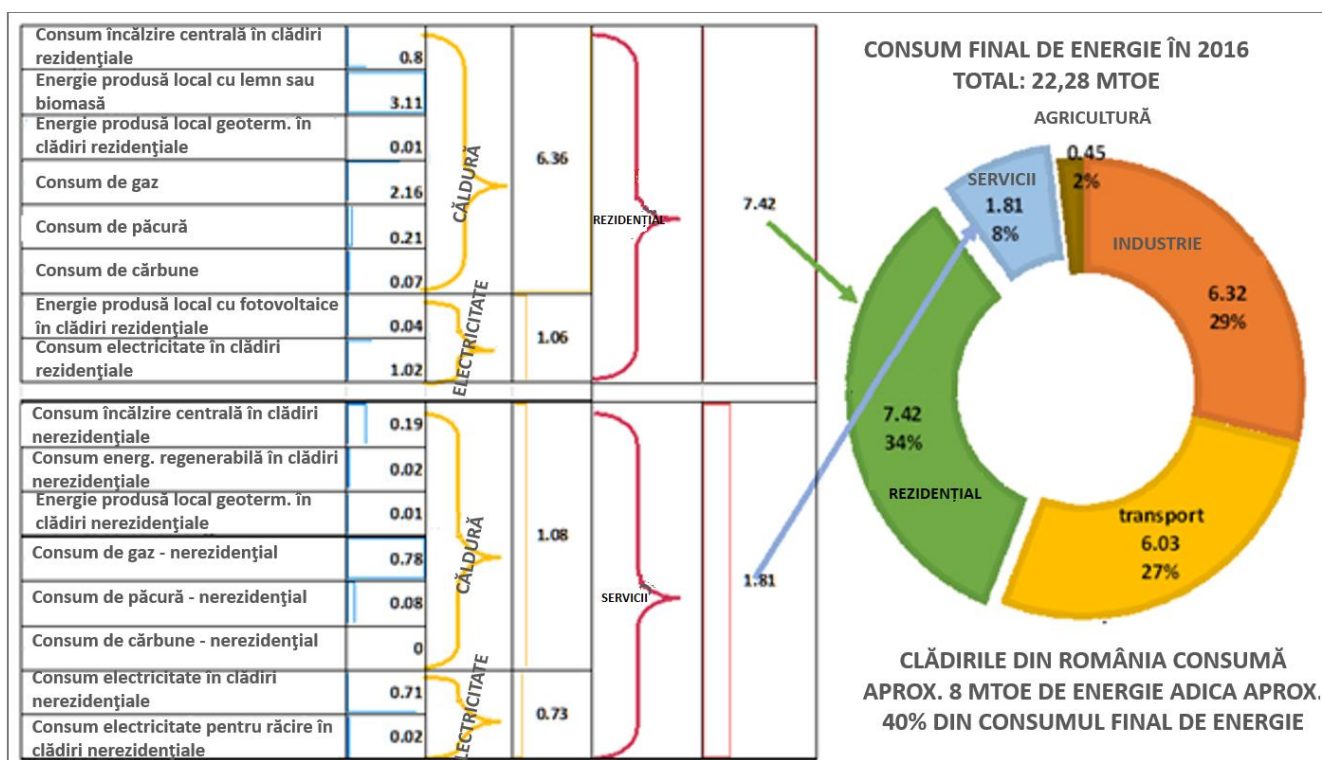
Source: ANRE's monitoring of NEEAP for 2018.⁵

Contorizare inteligentă	Smart metering
Blocuri de locuințe	Residential blocks
Locuințe unifamiliale	Single-family houses
Echipamente electrice în gospodării	Electrical appliances in households
Management/audit energetic în clădiri	Energy management/audit in buildings
Clădiri ale guvernului central	Central government buildings
Echipamente electrice în clădiri publice (central)	Electrical appliances in public buildings (central)
Clădiri publice (școli, primării, etc.)	Public buildings (schools, mayor's offices, etc.)
Echipamente electrice pentru clădiri publice	Electrical appliances for public buildings
Clădiri comerciale / birouri	Commercial buildings / offices
Servicii energetice / ESCO	Energy services / ESCO
Economii de energie planificate în 2018- tep	Energy savings planned in 2018 - toe
Economii de energie realizate în 2018 - tep	Energy savings achieved in 2018 - toe

⁵<https://www.anre.ro/ro/eficienta-energetica/rapoarte/rapoarte-de-monitorizare-a-implementarii-planului-national-de-actiune-in-domeniul-eficientei-energetice-pnae>.

Figure 4 shows a breakdown of heating energy consumption in buildings by fuel type. In the residential sector, the highest share (3.11 Mtoe) is consumed in on-site energy generation using wood- or biomass-based heating sources (mainly old firewood stoves used in rural areas). The consumption of natural gas for heating purposes has the second largest share (2.16 Mtoe). In the services sector, gas accounts for the highest share of energy use (0.78 Mtoe). These types of fuel are the main sources of energy consumption in the building sector, where the highest reductions can be achieved.

Figure 4: Energy consumption in buildings in Romania, from 2013 to 2016 (Mtoe)



Consum încălzire centrală în clădiri rezidențiale	Central heating consumption in residential buildings
Energie produsă local cu lemn sau biomasă	Locally produced wood or biomass energy
Energie produsă local geoterm. în clădiri rezidențiale	Locally produced geothermal energy in residential buildings
Consum de gaz	Gas consumption
Consum de păcură	Fuel oil consumption
Consum de cărbune	Coal consumption
Energie produsă local cu fotovoltaice în clădiri rezidențiale	Locally produced photovoltaic energy in residential buildings
Consum electricitate în clădiri rezidențiale	Electricity consumption in residential buildings
Consum încălzire centrală în clădiri nerezidențiale	Central heating consumption in non-residential buildings
Consum energ. regenerabilă în clădiri nerezidențiale	Renewable energy consumption in non-residential buildings
Energie produsă local geoterm. în clădiri rezidențiale	Locally produced geothermal energy in non-residential buildings
Consum de gaz - nerezidențial	Gas consumption - non-residential
Consum de păcură - nerezidențial	Fuel oil consumption - non-residential
Consum de cărbune - nerezidențial	Coal consumption - non-residential
Consum electricitate în clădiri nerezidențiale	Electricity consumption in non-residential buildings

Consum electricitate pentru răcire în clădiri nerezidențiale	Electricity consumption for cooling in non-residential buildings
CĂLDURĂ	HEAT
ELECTRICITATE	ELECTRICITY
CĂLDURĂ	HEAT
ELECTRICITATE	ELECTRICITY
REZIDENȚIAL	RESIDENTIAL
SERVICII	SERVICES
CONSUM FINAL DE ENERGIE ÎN 2016	FINAL ENERGY CONSUMPTION IN 2016
TOTAL: 22,28 MTOE	TOTAL: 22.28 MTOE
AGRICULTURĂ	AGRICULTURE
SERVICII	SERVICES
INDUSTRIE	INDUSTRY
Transport	Transport
REZIDENȚIAL	RESIDENTIAL
CLĂDIRILE DIN ROMÂNIA CONSUMĂ APROX. 8 MTOE DE ENERGIE ADICĂ APROX. 40% DIN CONSUMUL FINAL DE ENERGIE	ROMANIAN BUILDINGS CONSUME APPROX. 8 MTOE OF ENERGY, NAMELY APPROX. 40 % OF THE FINAL ENERGY CONSUMPTION

Source: World Bank building data review, EU, Eurostat data 2013-2016

2. National strategies, policies and legislative framework

The general policy framework for energy efficiency and buildings in Romania is guided by a number of national strategies and plans adopted or pending adoption by the Government. There are several national climate and energy strategies and policies in Romania, which generally provide a solid basis for the Government to commit to achieving energy efficiency in all sectors, including buildings. Box 2 lists the main documents.

Box 2: Main relevant strategies and policies

- *Romania's National Sustainable Development Strategy 2030.*
- *Draft Energy Strategy of Romania for 2019-2030, with outlook to 2050.*
- *National Strategy for Climate Change and Low-Carbon Economic Growth for 2013-2020.*
- *National Climate Action Plan 2016-2020.*
- *Seventh National Communication on Climate Change, December 2017.* The Communication was sent to the United Nations Framework Convention on Climate Change.
- *Draft Integrated National Energy and Climate Plan, December 2018.* The INECP is mandatory under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action⁶.
- *National Energy Efficiency Action Plan (2017, approved in 2019).* The National Energy Efficiency Action Plans (NEEAPs) must be updated every three years, as required by the EED⁷.

As regards energy renovation of the building stock, the latest strategy for mobilising investment in the renovation of the stock of residential and commercial buildings, both public and private, was developed by MLPDA in 2014 with the support of Buildings Performance Institute Europe (BPIE) and updated in 2017. It was adopted as a requirement under EED 2012/27/EU.

Romania has a comprehensive legislative framework on EE in building renovation, largely based on the relevant EU directives: Directive 2010/31/EU on the energy performance of buildings (EPBD), Directive

⁶ The European Commission provided comments on the draft INECP (see 'Commission Recommendation of 18 June 2019 on the draft integrated National Energy and Climate Plan of Romania covering the period 2021-2030', 2019)

⁷ The 2017 NEEAP was approved by Government Decision No 203/2019 in April 2019.

2012/27/EU on energy efficiency (EED), Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products⁸.

Romania also has a comprehensive legislative framework in place with regard to building architecture and quality in construction, environmental and architectural refurbishment of the building stock, protection of historical monuments, and housing quality, and the long-term renovation of the building stock should also take these into account in addition to increasing energy efficiency. In the long term, the energy renovation of buildings must be carried out not only on a case-by-case basis, but also as part of comprehensive urban regeneration actions to ensure not only the energy efficiency of buildings but also increased house quality. Energy efficiency will also need to be addressed at urban level by complementing actions in the six key areas contributing to energy consumption - buildings, technical heating and cooling systems, water and wastewater systems, transport, public lighting and waste management.

Table 1 lists the relevant areas and main applicable legislative acts on energy efficiency of buildings as well as part of the relevant related legislation (district heating, cogeneration, procurement).

Table 1. Thematic areas and applicable legislative acts

Thematic area	Legislative acts
Energy efficiency	<ul style="list-style-type: none"> • Law No 121/2014 on energy efficiency, as amended by Law No 160/2016 and by Government Emergency Order No 1 of 6 January 2020 transposing Directive 2012/27/EU on energy efficiency (EED). • Law No 372/2005 on the energy performance of buildings, as republished, transposing Directive 2010/31/EU on the energy performance of buildings (EPBD). • Law No 325/2006 on the public heat supply service, as subsequently amended and supplemented. • Government Decision No 1215/2009 establishing the criteria and requirements for implementing the support scheme to promote high-efficiency cogeneration based on useful heat demand, as subsequently amended and supplemented. • Secondary legislation is mainly drafted by ANRE.
Technical regulations on energy performance (buildings)	<ul style="list-style-type: none"> • Order No 2641/2017 amending and supplementing the technical regulation ‘Methodology for calculating the energy performance of buildings’, as approved by Order No 157/2007 of the Minister for Transport, Construction and Tourism. • Rules on the thermotechnical calculation of building construction elements (C107-2005), as approved by Order No 2055/2005 of MLPDA, as amended by Order No 2513/2010, Order No 1590/2012, Order No 386/2016. • Methodology for calculating the energy performance of buildings: Order No 157/2007 of the Minister for Transport, Construction and Tourism, as amended by Order No 1071/2009, Order No 1217/2010, Order No 2210/2013, Order No 2641/2017.
Energy performance certificates	<ul style="list-style-type: none"> • Law No 372/2005 on the energy performance of buildings, as republished. • Methodology for calculating the energy performance of buildings (code Mc 001-2006 of 1 February 2007), as subsequently amended

⁸ The Renewable Energy Directive is also of high relevance in the context of the EPBD’s nearly zero energy building provisions of the EPBD and the target for a low carbon building stock by 2050.

	and supplemented. Part III of the Methodology (Audit and Energy Performance Certificate) defines the content, calculation method, procedures and calculation models/examples.
Standards for facilities and labelling of household appliances	<ul style="list-style-type: none"> • Government Decision No 55/2011 setting ecodesign requirements for energy-related products. • Government Decision No 917/2012 laying down measures for implementing Commission Delegated Regulations (EU) No 1059/2010, No 1060/2010, No 1061/2010, No 1062/2010 and No 626/2011 supplementing Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products, and repealing certain legislative acts.
Legislation on housing and organisation of owners' associations	<ul style="list-style-type: none"> • Housing Law No 114/1996, as republished, as subsequently amended and supplemented, provides that owners' associations may be set up for each residential block where owners live, or tenants' associations to support their rights in relation to owners. The Housing Law lays down quality standards for dwellings (minimum areas and facilities) that must be complied with in the construction of new buildings or in the integrated refurbishment of the building stock, which do not only concern energy renovation. • Law No 196/2018 on the establishment, organisation and functioning of owners' associations and the management of condominiums, as subsequently amended and supplemented. For the purposes of managing and maintaining the condominium, the owners' association may, on behalf of owners, conclude contracts with natural persons, self-employed persons or legal persons whose business activity is the management of condominiums and which are set up in accordance with the law in force.
Thematic area	Rules and regulations
Energy efficiency	<ul style="list-style-type: none"> • A rate of 3 % of the total floor area of heated and/or cooled buildings owned and occupied by central government must be renovated each year to meet at least the minimum energy performance requirements (obligation laid down in the Energy Efficiency Directive). • The Energy Efficiency Directive lays down obligations regarding utilities. Romania has opted for the implementation of 'alternative measures'.
Pricing	<ul style="list-style-type: none"> • Energy prices for final consumers, with the exception of district heating, were liberalised after 2017. However, a temporary regulation was introduced in 2018 by Government Emergency Order No 114/2018, under which electricity and gas prices are again subject to regulation until 2022.
Energy service companies (ESCOs)	<ul style="list-style-type: none"> • Romania lacks a regulatory framework designed for energy service companies (ESCOs). ANRE organised a Working Group with the aim of preparing a draft energy service contract harmonised with market realities and the current legislative context. • Energy performance contracts are rarely used in Romania due to the high costs (they typically address energy supply systems and are not used for major energy renovation of buildings).
Energy auditing	<ul style="list-style-type: none"> • Law No 372/2005, as republished, requires owners to provide an energy performance certificate (EPC) when renting or selling the dwelling. At present energy auditing is not mandatory (sale/rental), however it is useful when building renovation is sought. Building energy auditors are certified by MLPDA on completion of an

	examination and successful completion of a specialised training course is a prerequisite. The building energy auditor is solely responsible for compliance with the certification requirements and for the correctness of the energy performance assessment. Each building energy auditor must set up a register of all energy performance certificates (EPCs) issued, indicating the date, the beneficiary, and the certified building address, and submit electronically the EPC and the summary of the energy audit report to MLPDA. The energy audit is required for energy renovation financed from national or EU public funds (National Programme and ROP). Renovation solutions must be developed by specialised designers.
Energy manager	<ul style="list-style-type: none"> Regulations are in place only for industrial energy consumers and SMEs (consumption over 1 000 toe/year).
Public procurement	<ul style="list-style-type: none"> The core of public procurement legislation consists of (i) Law No 98/2016 on public procurement, as subsequently amended and supplemented, (ii) Law No 99/2016 on sectoral procurement, as subsequently amended and supplemented, and (iii) Law No 100/2016 on works concessions and services concessions, as subsequently amended and supplemented. Government Decision No 901/2015 approved a national public procurement strategy.

Chapter IV Problem definition

1. Overview of the national building stock

The national building stock consists of public and private residential and non-residential buildings located in urban and rural areas, development zones, areas in economic balance and areas in economic and/or demographic decline.

Romania is currently facing a significant decline in its population, which is expected to exceed 15 % by 2050. According to the 2011 Population and Housing Census, the number of dwellings exceeds the number of families - approximately 8 million dwellings to 7.2 million families, with a dwelling vacancy rate of 16 % at that time. The extensive migration in recent years has led to massive depopulation of rural or even urban localities in areas fallen into economic decline. In this context, policies designed for energy renovation of the building stock will have to take into account a complex set of criteria which, in addition to the technical characteristics of buildings, cover all economic, social and spatial conditions as well.

In order to achieve the energy efficiency targets set out in the EU and national strategic documents, a substantial part of the existing national building stock will need to be renovated. In accordance with Article 2a(1)(a) of the EPBD, which provides that each long-term renovation strategy shall encompass an overview of the national building stock, based, as appropriate, on statistical sampling and the expected share of renovated buildings in 2020, with a view to setting the objectives and measures of this Strategy, statistical sampling of the current building stock has been achieved to determine the measures, the categories of buildings to be renovated and the estimated investment needs. As a national database has not been created to include all buildings and information on their technical and energy consumption characteristics, the building stock was statistically sampled to collect information for the LTRS and to develop scenarios, as with the *Strategy for mobilising investment in the renovation*

*of the national stock of residential and commercial buildings, both public and private*⁹. Below is an overview of the national building stock, which was obtained from sampling.

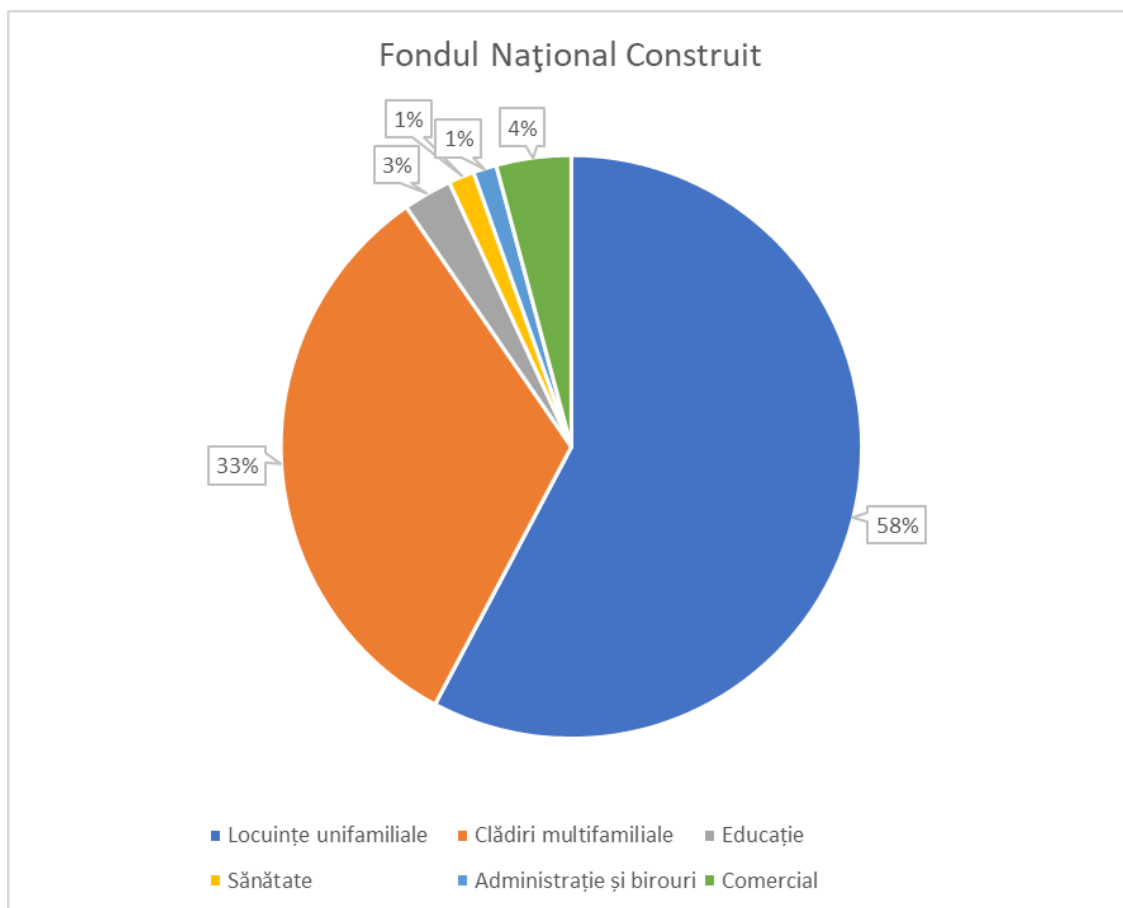
Most Romanians live in small dwellings, either in single-family houses or in apartments in multi-family buildings. More than 63 % of these dwellings have a useful floor area of less than 50 m², which is much smaller than in most EU countries; less than 5 % of dwellings in the Netherlands, Spain, Denmark and Luxembourg are of similar size. Almost half of all dwellings (47.5 %) are located in rural areas, where 95 % of the housing spaces are individual houses, and in urban areas 72 % of the housing spaces are located in multi-family buildings. Multi-family buildings have an average heated area of 48 m² compared to 73 m² for single-family houses.

A noteworthy detail in the implementation of energy renovation policies is that, following the large-scale privatisation after the fall of the Communist regime, the vast majority of people in Romania live in owner-occupied dwellings (94.7 %), which is one of the highest rates in Europe. Some of these dwellings are well below EU standards on the minimum conditions for provision of public utilities (sewage connection and access to drinking water from public networks).

Table 2 summarises the estimated size of the public and private residential and non-residential building stock and the main features, the data being collected for the Strategy. There are approximately **5.6 million buildings** in Romania, covering **644 million m² of heated useful floor area**. Residential buildings make up 90 % of the whole building stock (Figure 5), representing 582 million m², and non-residential buildings make up the remaining rate (approximately 62 million m², or 10 %). In residential buildings, single-family houses account for the highest share, representing approximately 58 % of the total, followed by multi-family buildings with approximately 33 %.

⁹ Sampling is based on a data collection exercise launched by MLPDA as part of the preparation of the draft LTRS. The competent ministries and other local public authorities submitted information on their building stock (year of construction, renovation, use, area, etc.). Other data sources include the EU Building Stock Observatory and the EU-funded Odyssee project.












Figure 5: Building stock - share of buildings by category





Fondul Național Construit	National Building Stock
Locuințe unifamiliale	Single-family houses
Clădiri multifamiliale	Multi-family buildings
Educație	Education
Sănătate	Health
Administrație și birouri	Administration and offices
Comercial	Commercial

Source: World Bank Assessment, 2019.

Table 2: Building stock - main characteristics and shares of the renovation pace, estimated until 2020

Tipuri de clădiri	Principalele categorii posibile	Imagine reprezentativă	Numărul de clădiri [-]	Suprafața totală încălzită [Mm ²]	Suprafață construită <2000 [Mm ²]	Renovată până în 2020 [%]	Zona nerenovată [Mm ²]
Locuințe unifamiliale	Rurale		3810737	247.80	217.840	3%	211.30
	Urbane		1354263	124.46	102.012	8%	93.85
Condominiu rezidențial	<=P+4 etaje		92332	94.51	77.50	7%	72.07
	>P+4 etaje		61554	115.51	94.72	7%	88.09
Educație	Instituții de învățământ		18000	17.50	16.63	15%	14.13
Sănătate și asistență socială	Spitale		547	5.47	5.42	1%	5.36
	Alte servicii de asistență medicală și asistență socială		50766	3.80	3.61	1%	3.58
Administrație/birouri	Clădiri administrative		6000	5.26	4.73	5%	4.50
	Clădiri din sticlă și oțel		1500	3.10	0.05	5%	0.05
Clădiri comerciale	Hoteluri		7642	4.23	0.85	5%	0.80
	Restaurante/cafenele		36000	1.82	1.28	5%	1.21
	Magazine		122000	20.83	14.58	10%	13.12
Subtotal rezidențial		90%	5,318,886	582.27	492.06	5%	465.31
Subtotal comercial și public		10%	242,455	62.01	47.14	9%	42.75
Total		100.0%	5,561,341	644.29	539.20	6%	508.07

Building types	Main possible categories	Representative image	Number of buildings [-]	Total heated area [m m ²]	Built area <2000 [m m ²]	Renovated by 2020 [%]	Non-renovated area [m m ²]
<i>Single-family houses</i>	Rural		3 810 737	247.80	217.840	3 %	211.30
	Urban		1 354 263	124.46	102.012	8 %	93.85
<i>Residential condominium</i>	<=GF+4 floors		92 332	94.51	77.50	7 %	72.07
	>GF+4 floors		61 554	115.51	94.72	7 %	88.09
<i>Education</i>	Educational establishments		18 000	17.50	16.63	15 %	14.13
<i>Health and social assistance</i>	Hospitals		547	5.47	5.42	1 %	5.36
	Other health care and social assistance services		50 766	3.80	3.61	1 %	3.58
<i>Administration/offices</i>	Administrative buildings		6 000	5.26	4.73	5 %	4.50
	Glass and steel buildings		1 500	3.10	0.05	5 %	0.05
<i>Commercial buildings</i>	Hotels		7 642	4.23	0.85	5 %	0.80
	Restaurants/cafes		36 000	1.82	1.28	5 %	1.21

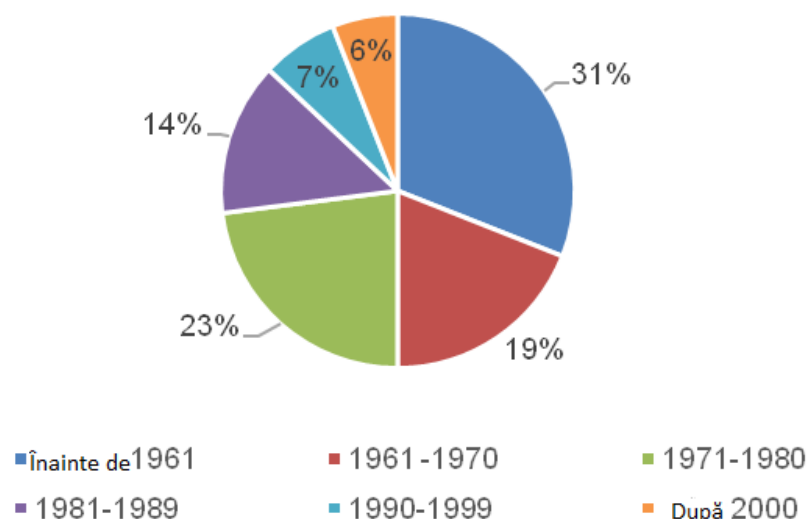
	Shops		122 000	20.83	14.58	10 %	13.12
Subtotal residential		90 %	5 318 886	582.27	492.06	5 %	465.31
Subtotal commercial and public		10 %	242 455	62.01	47.14	9 %	42.75
Total		100.0 %	5 561 341	644.29	539.20	6 %	508.07

Source: World Bank Assessment, 2019.

If the current pace continues, based on programmes supported by State and local budgets, EU funds and international financial institutions (IFIs), approximately 6 % of buildings will undergo energy renovation by the end of 2020 (5 % of residential buildings and 9 % of public and commercial buildings, respectively). Thus, the remaining rate of approximately 77 % of the total floor area of the building stock will have to be renovated by 2050. The largest share (approximately 91 %) of the buildings requiring renovation is in the residential sector, of which single-family houses in both rural and urban areas (hence also in depopulated villages) account for approximately 65 %.

Furthermore, Romania has an important building stock constructed between 1960 and 1990 (Figure 6), with few energy efficiency measures (no thermal insulation or minimum thermal insulation, adapted to the thermal insulation requirements in force between 1960 and 1985), some of which have structural deficiencies, partly undergoing few (or zero) maintenance works after decades of use.

Figure 6: Breakdown of building stock by year of construction

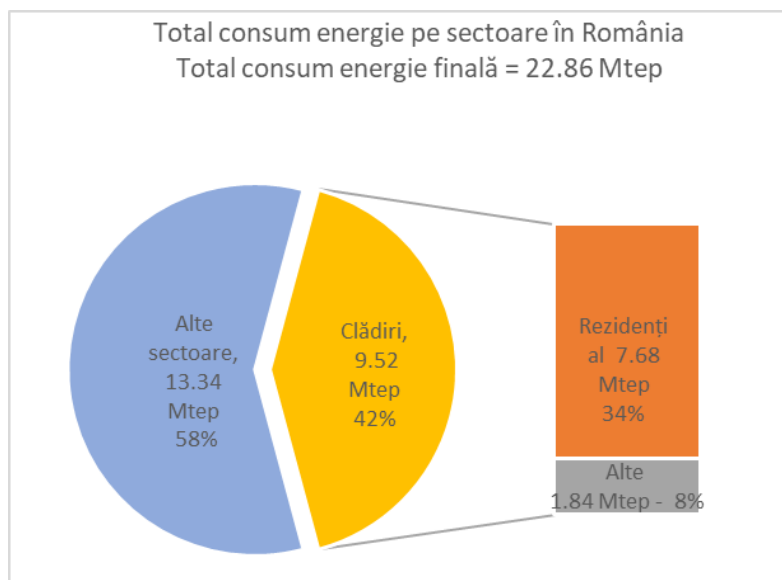


Înainte de 1961	Before 1961
După 2000	After 2000

Source: MLPDA, *Strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private* (2017).

At national level, final energy consumption in the building sector accounts for 42 % of total final energy consumption, of which 34 % are residential buildings, with the remaining rate (approximately 8 %) being commercial and public buildings (Figure 7). Final energy consumption by building category is outlined in Figure 8. The residential sector has the highest share of energy consumption (approximately 81 %), while all other buildings (offices, schools, hospitals, commercial premises and other non-residential buildings) account for the remaining 19 % of total final energy consumption.

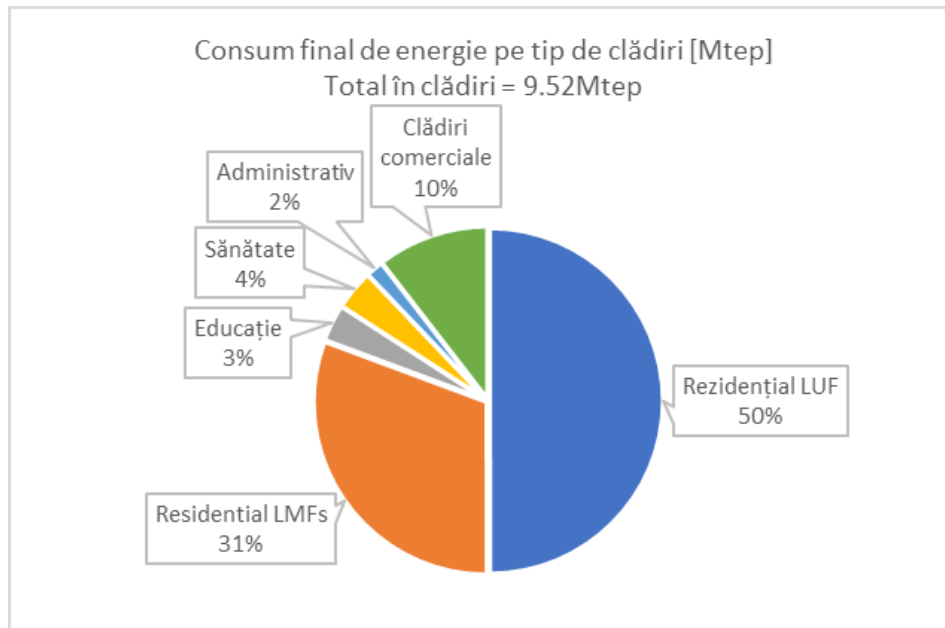
Figure 7: Final energy consumption by sector in Romania



Total consum de energie pe sectoare în România	Total energy consumption by sector in Romania
Total consum energie finală = 22.86 Mtep	Total final energy consumption = 22.86 Mtoe
Alte sectoare, 13.34 Mtep 58%	Other sectors, 13.34 Mtoe 58 %
Clădiri 9.52 Mtep 42%	Buildings 9.52 Mtoe 42 %
Rezidențial 7.68 Mtep 34%	Residential 7.68 Mtoe 34 %
Alte 1.84 Mtep - 8%	Other 1.84 Mtoe - 8 %

Source: World Bank Assessment, 2019.

Figure 8: Final energy consumption by building category



Consum final de energie pe tip de clădiri [Mtep]	Final energy consumption by building type [Mtoe]
Total în clădiri = 9.52 Mtep	Total in buildings = 9.52 Mtoe
Clădiri comerciale 10%	Commercial buildings 10 %
Administrativ 2%	Administrative 2 %
Sănătate 4%	Health 4 %
Educație 3%	Education 3 %
Rezidențial LUF 50%	Residential SFH 50 %

Source: World Bank Assessment, 2019.

2. Overview of problems identified in the field of building energy efficiency

Despite the high energy efficiency potential, there are a number of policy, technical, financial, institutional and informational barriers that have limited the systematic implementation and widespread deployment of energy efficiency in the building sector in Romania. Some of them are generally valid in most EU Member States, but others are specific to Romania, in particular those associated with the obsolete and insufficiently maintained building stock, most of which is privately owned, with the district heating systems with low actual efficiency, with the establishment of owners' associations and with the low creditworthiness of owners of dwellings or buildings. Table 3 summarises these barriers. While overall confidence in market mechanisms for building stock renovation remains high, government intervention is needed to overcome and

remove barriers in a sustainable manner so that markets can function properly. In this context, the EU has developed the revised EPBD and specific LTRS provisions, along with financial instruments and programmes, to help reach the significant EE growth potential in the building sector.

Table 3. Main problems in achieving energy efficiency in the buildings in Romania

For all types of buildings	<ul style="list-style-type: none"> • <u>Public policies</u>: low energy prices (especially for heating), absence of a cost-optimisation methodology framework. • <u>Technical</u>: low reference values (poor heating), part of the building stock has old structural and safety deficiencies, requiring reinforcement interventions prior to EE interventions; different quality of the documents prepared by building energy auditors (including inconsistency in data reporting, the fact that the accuracy of the data written in EPC/audit reports/inspection reports is uncontrollable or unverifiable). • <u>Financial</u>: high commercial interest rates, lack of guarantees or over-guaranteeing, small projects leading to high transaction and development costs, lack of creditworthy borrowers and of specialised credit products (dedicated to major energy renovation of buildings). • <u>Institutional and informational</u>: lack of adequate data on buildings and energy use, limited capacity for monitoring implementation/contractors or insufficient monitoring tools, lack of knowledge on the opportunities and benefits of energy efficiency, which is due to a deficient information/training system in terms of quantity and quality and which drives certain behavioural inertia.
Specific barriers for public buildings (at central and municipal level)	<ul style="list-style-type: none"> • <u>Public policies</u>: restrictive budgeting (lack of multi-annual budgeting, inability to carry over energy savings in local budgets to future years, use of savings from operating costs to pay for capital expenditure), limitation on public borrowing, procurement regulations (providing for the lowest price and limiting the contracting of energy service companies). • <u>Financial</u>: high commercial interest rates, lack of guarantees or over-guaranteeing, small projects leading to high transaction and project development costs, lack of creditworthiness on the part of municipalities. • <u>Institutional or informational</u>: lack of adequate data on buildings and energy use, low administrative capacity of public institutions, insufficient correlation between government actions, taking energy efficiency leadership in Romania at government level, fragmentation of energy efficiency policies, communication on energy efficiency.
Specific barriers in the residential sector Multi-family buildings	<ul style="list-style-type: none"> • <u>Public policies</u>: billing not based on actual apartment consumption, legislation on owners' associations providing for collective decision-making, lack of interest on the part of owners' associations or poor ability to borrow from banks, to pay debts, low quality district heating services. • <u>Financial</u>: low income/low disposable income of homeowners, owners' associations that are not creditworthy, generating dependency on public grants. • <u>Institutional and informational</u>: lack of clear and reliable mechanisms for renovation works, mistrust towards payment of instalments by neighbours, lack of control possibility (thermostatic valves in radiators), lack of information on costs incurred with poor air quality.
Specific barriers in the	<ul style="list-style-type: none"> • <u>Public policies</u>: low prices/non-regulated solid fuels, lack of standards for existing heating equipment/boilers and buildings, lack of legislation

residential sector	on non-clean fuels that influence air quality and generate CO2 emissions. <u>Financial</u> : low income/low disposable income of property owners, high immediate costs and long repayment periods, higher costs for clean fuels, insufficient access to existing programmes (Government Order No 69/2010).
Single-family houses	<ul style="list-style-type: none"> • <u>Institutional and informational</u>: lack of clear and reliable mechanisms for energy renovation, lack of information on costs incurred with poor indoor air quality.
Specific barriers for commercial buildings	<ul style="list-style-type: none"> • <u>Financial</u>: other investment priorities, the perception that investments in energy efficiency are risky. • <u>Institutional and informational</u>: insufficiently perceived impact of the importance of energy efficiency on customers; multinational companies may have centralised decision-making processes (outside Romania). • The ownership regime requires the development of State aid schemes.

Chapter V Objectives

The Strategy sets out the public and private investment needs, identifies a specific set of policy measures and actions and proposes options for national financing schemes and programmes that should be implemented with the **purpose of supporting the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings.**

The National Long-Term Renovation Strategy's main objectives are as follows:

- to improve the energy performance of the existing building stock by reducing energy consumption, carbon emissions, and extending the use of renewable energy sources to buildings;
- to improve the quality of life for all users by improving thermal comfort, hygiene, safety and air quality;
- to reduce energy poverty and to ensure affordable heating for low-income families;
- to render more efficient financing schemes for building stock renovation;
- to develop professional skills on energy efficiency in buildings and to support innovation;
- to enhance building stock quality by improving the safety of buildings and to ensure the architectural and urban integration quality of renovation interventions.

Chapter VI General principles

Beyond observance of the revised EPBD requirements, the LTRS ensures compliance with the following general principles:

- In the LTRS substantiation phase, several scenarios (in terms of depth and pace of building renovation) were considered to support the Government decision-making process. The scenario selected in the Strategy reflects the level of national ambition in terms of energy

savings in the building sector and shows the buildings' contribution to the energy saving targets for 2030 and beyond.

- The Strategy shall be applicable subject to observance of the following principles:
 - it is fully underpinned by adequate review and planning and is accompanied by a detailed set of programme plans for implementation in each sub-sector in order to overcome identified market and other barriers;
 - other policy and regulatory improvements that would allow for and foster investment, including financing and support measures, are also adopted;
 - the necessary level of budget support is ensured over time;
 - indicators and targets are set;
 - adequate communication and information tools are provided;
 - progress is reported and evaluations and monitoring actions are carried out.
- EU structural funds, national opportunities and other funding opportunities need to be addressed in a coordinated manner, in the case of building renovation investments, in order to limit the fiscal implications of the implementation of the LTRS, with a clear strategy for increasing co-financing and commercial financing over time so as to reduce the burden on the limited public funds.
- The key actors involved in the Strategy implementation must have well-defined roles and ideally have responsibilities for clearly defined actions and results.
- Building renovations need to be prioritised, based on cumulative technical, economic and social criteria, starting with the lowest performing buildings (those consuming the highest amount of energy), high occupancy rates (and expectations that these buildings will be occupied for the next decade or next two decades) and those requiring relatively low investment for structural and safety improvements. This prioritisation entails planning and interdisciplinary analysis on the part of local authorities.
- Education and communication actions need to be organised. The benefits and costs of participation in renovation programmes (including potential consequences in case of non-participation) must be presented to owners together with the procedures, contact details and websites (or 'one-stop-shops') with all the information needed to submit projects, to participate in programmes and to report.
- The authorities and bodies responsible for programme implementation and application must have adequate staffing and budgets to fulfil their responsibilities and be given powers to apply sanctions and penalties where appropriate. Periodic ex-post random checks must be conducted for energy audits, technical designs, building renovation works and energy performance certificates, and the deficiencies found and penalties imposed on contractors and other persons who did not comply with the applicable regulations should be revealed. The results of the random checks must be made public. The deficiencies observed in design or execution shall be collected and integrated into training programmes.
- The possibilities of switching to revolving loan mechanisms for public buildings (with a small share of the costs subsidised) and of introducing decreasing subsidies for residential buildings (i.e. 80 % or less) must be identified. Vulnerable groups need to be protected by dedicated schemes to cover their co-financing and repayment obligations.
- The existing programmes designed to improve energy performance need to be amended and consolidated in order to harmonise financing terms and subsidies so as to avoid confusion and competing programmes, to ensure the complementarity of funding and to introduce performance indicators to achieve energy saving targets. Ideally, a national programme should be in place with application documentation that all eligible

participants can fill in, after which the national programme manager can direct the submitted projects to the corresponding sub-programmes/funding axes.

- A national system for planning and monitoring building renovation, which is managed by the competent ministry, should be developed to integrate national and local energy efficiency plans, building stock data, priority buildings, indicators for deeper renovations and available funding, for the purpose of developing a national multi-annual renovation programme plan.

Chapter VII Directions for action

1. Ensuring cost-effective approaches to renovation¹⁰

For the purpose of analysing and identifying cost-effective renovation measures and packages, reference buildings considered to be representative of the existing national building stock were selected on the basis of statistical sampling. The selection took into account the most common architectural characteristics, types and climatic zones in Romania. Box 3 summarises the **selected reference building types**. The analysis was conducted in accordance with the methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, established at EU level¹¹.

The analysis considered the following **three renovation packages**:

- minimum package - P1 Package** (in order to meet the national technical regulations on the energy performance of buildings, namely close to EPC rating of 'C' under the technical regulations in force);
- average package - P2 Package** (deep renovation to avoid works that will need to be subsequently redone or replaced to meet future NZEB requirements, and with minimal use of renewable energy solutions); and
- maximum renovation package - P3 Package** (deep renovation or NZEB standard, including all renewable energy options such as rooftop photovoltaic panels, solar domestic hot water preparation or geothermal heat pumps).

Box 3: Reference buildings selected as representative of the building stock

A. Existing multi-apartment residential buildings:

- A.1. Existing multi-family buildings connected to district heating systems - basement + ground floor + 10 floors
- A.2. Existing multi-family residential buildings not connected to central heating systems, with individual gas boilers per apartment - basement + ground floor + four floors

B. Existing (individual) single-family buildings:

¹⁰ The packages of measures relate exclusively to energy efficiency. For an integrated approach to renovation, actions other than those for energy renovation will also need to be considered, such as those to be developed in the framework of the Seismic Risk Mitigation Strategy and the National Housing Strategy or those stemming from the application of Law No 153/2011 improving the architectural and environmental quality of buildings.

¹¹ ANNEX I to Commission Delegated Regulation (EU) No 244/2012 and Law No 372/2005, as revised and republished in Official Gazette No 451/23.7.2013 on the energy performance of buildings.

- B.1. Buildings with individual gas boilers
 - B.2. Buildings with solid biomass (wood) stoves
- C. Social housing, health and educational establishments:**
- C.1. Buildings connected to central heating systems
 - C.2. Buildings with individual gas boilers
- D. Office and other commercial buildings:**
- D.1. Buildings connected to central heating systems
 - D.2. Buildings with individual gas boilers

The cost-optimal packages were then detailed and assessed on the basis of a multi-parametric analysis in order to ensure that the respective final energy consumption would correspond to an EPC rating of ‘A’ for all types of buildings, except for single-family houses for which an EPC rating of ‘B’ would also be considered acceptable. Overall costs for reducing final energy consumption and the overall cost for reducing CO₂ emissions were also used as the main selection parameter, along with others (e.g. investment costs, repayment period and the like). The estimated investment costs were compared to the actual renovation costs in Romania, to the calculated overall costs and to the effects on energy performance and CO₂ emissions¹². The methodology and cost comparisons correspond to those defined in Commission Delegated Regulation (EU) No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, and the guidelines accompanying the Regulation. The calculation took into account the recommendations set out in standard SR EN 15459 - parts 1 and 2 on the economic evaluation procedure for energy systems in buildings. The selection for the type and categories of cost items was linked to their influence on the energy performance of the building and calculations were made for three climatic zones in Romania (I, II and III)¹³.

For each building category, **trigger points for renovations** were also defined in order to identify the opportune moments in the life cycle of a building for carrying out energy efficiency renovations¹⁴.

Recital 12 of Directive (EU) 2018/844 clarifies that a ‘trigger point’ is ‘an opportune moment in the life cycle of a building, for example from a cost-effectiveness or disruption perspective, for carrying out energy efficiency renovations’. Linking renovation with trigger points will ensure that energy-related measures are not neglected or omitted at later stages in the life cycle of the building.

Focusing on energy efficiency at the identified trigger points limits the risk of missing opportunities that may arise in a staged renovation and increases possible synergies with other action. Trigger points may lead to cost-effective renovation due to the relative economies that

¹² Overall costs are calculated as the net present value of all costs incurred over a given period, i.e. 30 years, taking into account replacement costs and residual values of equipment with longer lifetimes.

¹³ There are a total of five climatic zones in Romania (I to V). However, given that three zones accommodate the highest share of buildings, only the first three zones were taken into account for this analysis.

¹⁴ A trigger point could be: (a) a transaction (e.g. the sale, conclusion of a real estate finance lease or rental of a building, refinancing of a credit or a change in its use); (b) renovation (e.g. an already planned wider non-energy-related renovation); or (c) a disaster event (e.g. fire, earthquake, flood). Certain buildings may not be subject to trigger points, hence the qualification ‘where applicable’.

can be achieved if energy-related renovation is carried out at the same time as other necessary work or planned renovation.

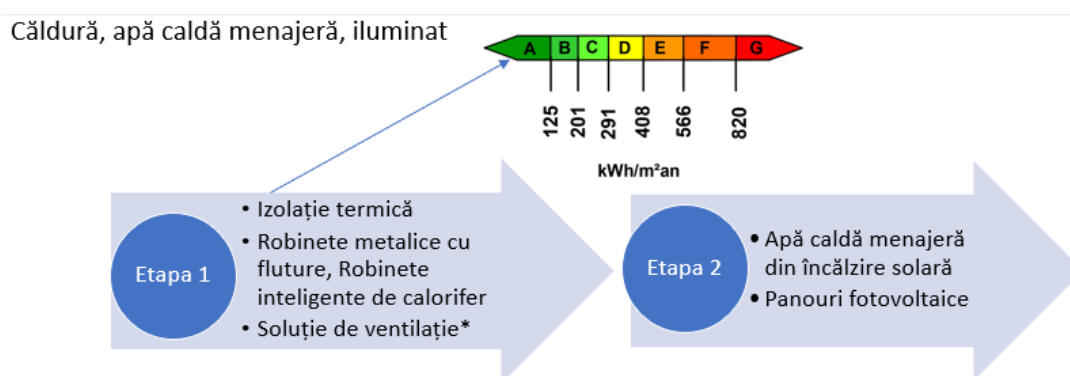
Multi-family buildings

The approach to the cost-effective renovation of multi-family buildings includes measures similar to those considered in P2 Package with or without installation of solar panels for domestic hot water at the first renovation stage, with the possibility of installing solar panels for domestic hot water preparation and photovoltaic panels at the next renovation stage.

In order to avoid the risk of performing works that need to be redone in the future, adequate thermal insulation for multi-family buildings must be provided from the outset in order to avoid the need to subsequently increase the level of thermal insulation or to replace thermal insulation at a later renovation stage; thus, a minimum thermal resistance level (or 'R-value'), as set out in the P2 Package, is required.

The recommended approach enables renovated buildings to achieve an energy performance level specific to an EPC rating of 'A' or specific heating energy consumption of less than 70 kWh/m² per year.

Figure 9: Cost-effective approaches for multi-family buildings



Căldură, apă caldă menajeră, iluminat	Heat, domestic hot water, lighting
kWh/m ² an	kWh/m ² per year
Etapa 1	Stage 1
Izolație termică	Thermal insulation
Robinete metalice cu fluture, Robinete inteligente de calorifer	Metallic butterfly valves, smart radiator valves
Soluție de ventilație*	Ventilation solution*
Etapa 2	Stage 2
Apă caldă menajeră din încălzire solară	Solar domestic hot water
Panouri fotovoltaice	Photovoltaic panels

* Changes to natural ventilation ducts inside the building and apartments need to be properly assessed and a relevant ventilation strategy solution will be proposed.

Trigger points for renovation of multi-family buildings could include the following:

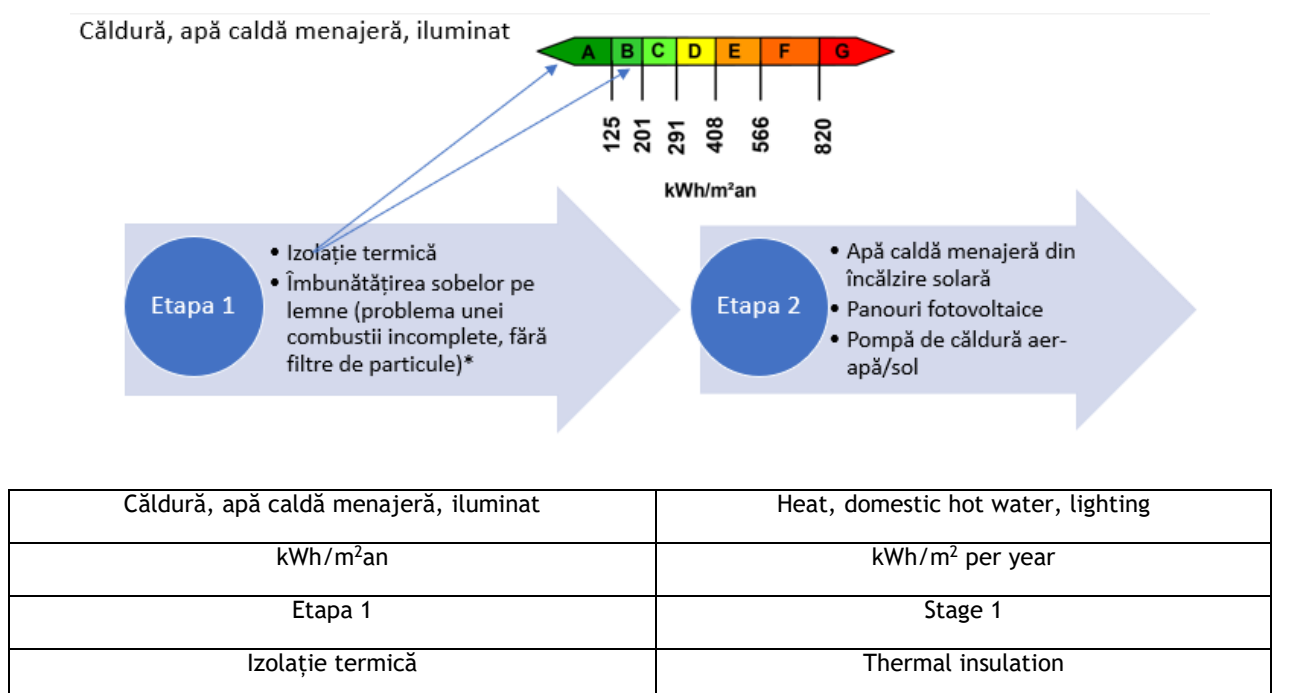
- The preparation of a planning or priority list(s) in the renovation of multi-family buildings by the local authority with proposals from apartment owners and owners' associations for the renovation of their buildings, providing financial support from public funds. If apartment owners refuse to accept the renovation proposal, they risk losing access to financial support from public funds in the future.
- A disaster event (such as fire, earthquake, flood, partial building collapse), after which the building needs to be rebuilt or renovated with improved energy performance characteristics as defined in Stage 1.
- Planned major overhaul of the building, including measures to address structural or seismic safety deficiencies, measures to ensure compliance with functional requirements, for which the building manager or apartment owners apply for authorisation to carry out the renovation works and other related endorsements and approvals from the local authorities.

Single-family houses

Cost-effective renovation for single-family houses includes measures similar to those of the P1 Package, with the possibility of installing a gas heat pump (GHP) or an air to water heat pump (HP) with solar panels for domestic hot water preparation (DHW) and photovoltaic panels (PV) at the same stage or after renovation, depending on the cost-effectiveness analysis and affordability, on a case-by-case basis.

For buildings heated with wood-burning stoves, separate programmes should be implemented for the efficient use of firewood in parallel with thermal renovation programmes. The recommended approach would enable renovated houses to achieve consumption corresponding to an EPC rating of 'A' or 'B' or specific heating energy consumption of less than 120 kWh/m² per year.

Figure 10: Cost-effective approaches for single-family houses



Îmbunătățirea sobelor pe lemne (problema unei combustii incomplete, fără filtre de particule)*	Improvement of wood-burning stoves (issue of incomplete combustion, without particulate filters)*
Etapa 2	Stage 2
Apă caldă menajeră din încălzire solară	Solar domestic hot water
Panouri fotovoltaice	Photovoltaic panels
Pompă de căldură aer-apă/sol	Air to water / ground source heat pump

* A specific programme is needed for the efficient use of firewood, biomass, modern heat production systems, in particular for heating in rural areas (INECP)

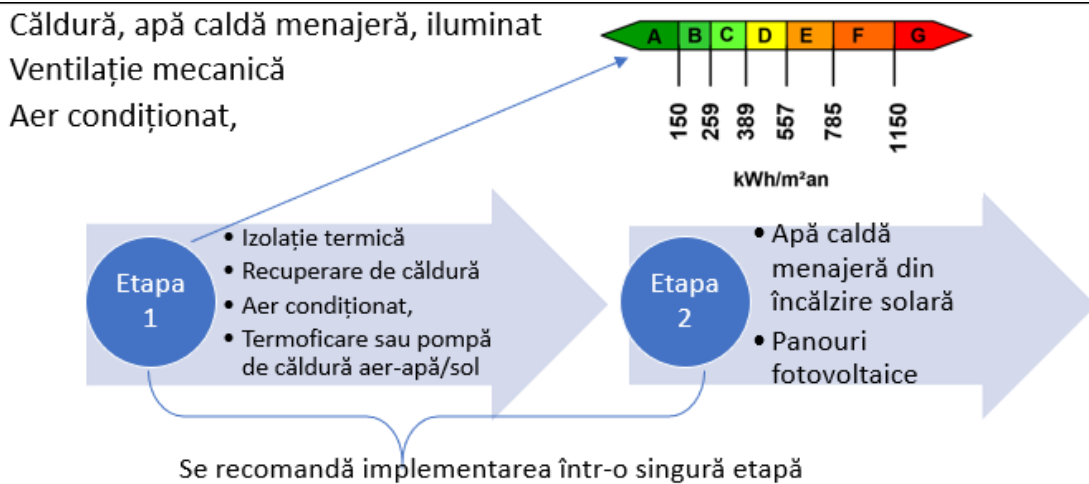
Trigger points for renovation of single-family houses could envisage the following:

- a) A planning or priority list in the renovation of single-family housing, drawn up by local authorities, proposing to building owners to renovate their buildings with financial support from public funds. If owners refuse the offer, they may lose access to public financial support in the future.
- b) Mandatory publication of the building EPC/BRP by the building owner during a transaction (sale or rental) to ensure that the new owner is aware of the existing conditions (as already required by law). New owners may also be incentivised to renovate the building within a specific timeframe, such renovation corresponding to a cost-effective approach specified at Stage 1. These requirements must be monitored using information from the building register managed by the NACLRL through the integrated IT system of cadastre and land registration under the National Cadastre and Land Registration Programme, which must be connected to the EPC/BRP database to monitor post-transaction implementation requirements.
- c) The planned major overhaul of the building, including measures to increase the seismic or structural deficiency-safety for their structures, will require building permits for renovation works and related endorsements and approvals from local authorities.

Social housing, educational and health establishments

The cost-effective renovation of educational and health establishments and of social housing includes measures from the P3 Package, which could reduce the energy consumption of the building to the lowest levels, with a high share of use of renewable energy sources (from solar domestic hot water and from PV). The recommended approach would enable renovated buildings to achieve a performance level corresponding to an EPC rating of 'A' or specific heating energy consumption below 70 kWh/m² per year.

Figure 11: Cost-effective approaches for social housing, educational and health establishments



Căldură, apă caldă menajeră, iluminat	Heat, domestic hot water, lighting
Ventilație mecanică	Mechanical ventilation
Aer condiționat,	Air conditioning,
kWh/m ² an	kWh/m ² per year
Etapa 1	Stage 1
Izolație termică	Thermal insulation
Recuperare de căldură	Heat recovery
Aer condiționat,	Air conditioning,
Termoficare sau pompă de căldură aer-apă/sol	District heating or air to water / ground source heat pump
Etapa 2	Stage 2
Apă caldă menajeră din încălzire solară	Solar domestic hot water
Panouri fotovoltaice	Photovoltaic panels
Se recomandă implementarea într-o singură etapă	Single-stage implementation is recommended

Trigger points for the renovation of social housing, educational and health establishments can be as follows:

- Programmes to optimise educational, health, social and administrative establishments, which are managed by central or local authorities, streamline establishments based on capacity utilisation and service demand in some areas. Some establishments may be closed down, while others may be extended, which may allow for parallel renovations for EE.
- A disaster event (e.g. fire, explosion, earthquake, flood, partial building collapse), after which the building needs to be rebuilt/renovated with improved energy performance characteristics as defined at Stage 1 or Stage 2 above¹⁵.

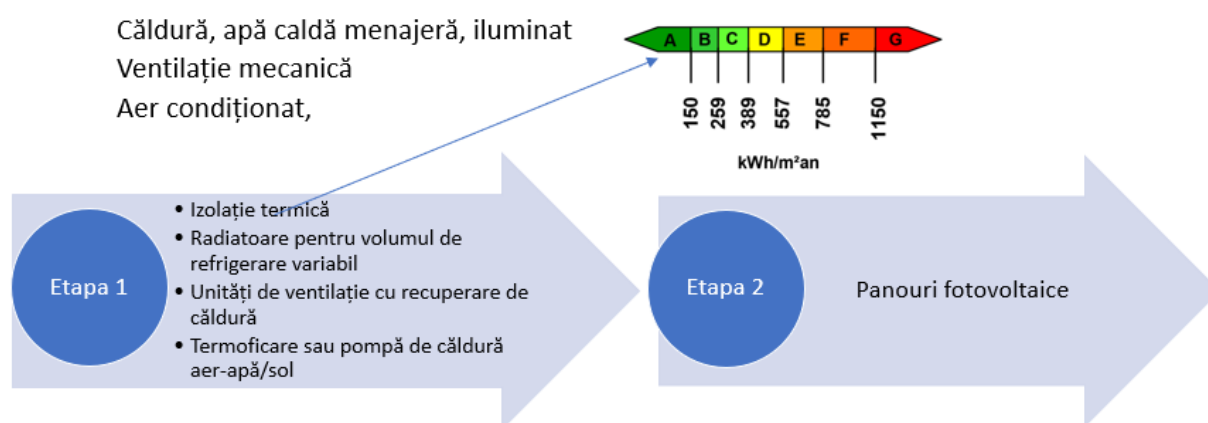
¹⁵ It is important to note that educational, health and social establishments should be considered a priority for seismic assessment and reinforcement well ahead of disaster events.

- c) The planned major overhaul of social, educational, health and administrative establishments, for which building managers will need authorisations to carry out the renovation works and related endorsements and approvals from local authorities.

Office and other commercial buildings

The cost-effective renovation of office and other commercial buildings includes measures similar to those considered in the P3 Package, which could bring the energy consumption of buildings to the lowest levels, with a high share of use of renewable energy sources. The recommended approach would enable renovated buildings to achieve an energy consumption level corresponding to an EPC rating of 'A' or specific heating energy consumption below 70 kWh/m² per year.

Figure 12: Cost-effective approaches for office and other commercial buildings



Căldură, apă caldă menajeră, iluminat	Heat, domestic hot water, lighting
Ventilație mecanică	Mechanical ventilation
Aer condiționat,	Air conditioning,
kWh/m ² an	kWh/m ² per year
Etapa 1	Stage 1
Izolație termică	Thermal insulation
Radiatoare pentru volumul de refrigerare variabil	Variable refrigerant volume heaters
Unități de ventilație cu recuperare de căldură	Heat recovery ventilation systems
Termoficare sau pompă de căldură aer-apă/sol	District heating or air to water / ground source heat pump
Etapa 2	Stage 2
Panouri fotovoltaice	Photovoltaic panels

Trigger points for renovation of office / commercial buildings can include:

- a) A transaction (sale or rental/lease) of the building for which the owner may be required to renovate the building according to the cost-efficient approach specified above.
- b) A disaster event (e.g. fire, explosion, earthquake, flood, partial collapse), after which the building needs to be rebuilt/renovated with improved energy performance characteristics as defined at Stage 1 above.
- c) The planned major overhaul of the building for which the building owner will need authorisations to carry out the renovation works and related endorsements and approvals from local authorities.

An additional trigger point for the renovation of public office buildings could also include programmes to optimise administrative establishments managed by the State or by local authorities, which streamline establishments based on capacity utilisation and service demand in some areas. Some establishments may be closed, while others may be extended, which may allow for parallel renovation works for energy efficiency.

2. Stimulating cost-effective deep renovation of buildings

Deep renovation is characterised by **renovations that reduce both the delivered and final energy consumption of a building by a significant percentage compared to pre-renovation levels, leading to very high energy performance** (a reduction of more than 60 % in the specific energy consumption). A clear legal framework with technical regulations is needed to determine the level of deep renovation and the measures eligible for public funding.

For most building categories, the analysis of the above P2 and P3 Packages shows that both packages could be considered deep renovations as their implementation can lead to a reduction of more than 60 % in the energy consumption.

For single-family houses, the P1 Package is recommended as being cost-optimal, as P2 and P3 Packages may still be too costly for owners and require long payback periods. Some complementary measures could still be included in the design of renovation support instruments for single-family houses to bridge the gap between P1 and P2/P3 (such as installing a heat recovery mechanical ventilation system and/or fitting RES installations, if applicable, or other complementary measures). In other words, all renovated buildings could achieve energy performance levels corresponding to the current requirements for rating 'A', except for single-family houses, for which rating 'B' is suitable.

An integrated and staged approach to energy saving and enhancement of energy performance is recommended, including by defining subsequent renovation phases to achieve the level of deep renovation over time. For example, in order to reduce energy consumption and carbon emissions from heating systems, the first step would be to renovate the building envelope to ensure the thermal insulation of the building (and thus reduce heat loss) as far as possible. Such an approach could be combined with the installation of more efficient heating or cooling systems and solutions that would reuse energy such as heat recovery / cooling mechanical ventilation or other passive/active measures for energy reuse. The next step would be the installation of renewable heating systems (e.g. geothermal / ground source heat pumps, solar domestic hot water, VP, biomass boilers or combined heat and power production (cogeneration) systems, as appropriate). This approach of reducing and reusing energy in the first phase optimises the amount of energy

needed for heating or cooling while in the second phase the remaining heating/cooling energy needs are supplemented by renewable sources, as far as possible.

In this context, consideration should be given to whether it is appropriate to implement the building energy renovation passport in national legislation. The passport promotes a **step-by-step approach (staged renovation) throughout the lifetime of a building, which** enables users to better assess the positive impact of renovation over time, including the positive impact on its tenants' comfort and well-being. The building renovation passport is a document that contains a long-term, step-by-step renovation roadmap (with as few steps as possible for 15 to 20 years) for a specific building, which may result from an on-site energy audit, meets specific quality criteria and highlights relevant measures and renovations that could improve its energy performance.

The building renovation passport is part of the Technical Construction Book drawn up in accordance with the construction quality legislation, more specifically of Chapter D: Documentation on building operation, maintenance, repair, behaviour monitoring in time and post-use. In the context of digitalisation, the building renovation passport may be issued electronically and also include other sets of information related to each building, such as the financing options available in the area for renovation projects (e.g. green loans, incentives, tax credits), as well as energy bills, recommendations for equipment maintenance, and insurance and ownership obligations. All this information could be inventoried and centralised in a digital register which is available to owners. The Ministry of Public Works, Development and Administration, as the central public authority responsible for buildings, may centralise and integrate energy renovation passports with various national specific IT systems in place.

Technical building regulations need to be revised in order to stimulate deep renovation of existing buildings, including periodic revisions and updates of energy performance standards, based on the total cost optimisation methodology. In this respect, a deadline will be set for meeting the requirements of the deep renovation standards, accompanied by staged renovation plans that can be outlined in the EPC/BRP report.

Financing schemes are also essential for the successful implementation of deep renovation. Grants (subsidies) and soft loans (or repayable grants) are the most common financing instruments and, according to data, are also the most successful and cost-effective. Section 10 sets out financial mechanisms to support deep renovations.

It has been taken into account that, in the next programming period, the Regional Operational Programme will be based on an integrated territorial investment mechanism in certain sectors and cities. Under this programme, deep renovations of buildings could be carried out independently or included in urban regeneration projects based on an integrated approach to architectural, economic, social and environmental issues.

Depending on each specific case or source of funding, specific complementary measures may be included as additional eligible requirements to the packages proposed during implementation:

- installation of new heating systems in buildings (where the existing capacity is inefficient and can be reduced following the improvement of the building envelope performance), mostly in public buildings and some multi-family buildings¹⁶;

¹⁶ However, if individual apartments have been disconnected from district heating systems, they should be required to connect to district heating networks as a requisite to be eligible for public funds for building renovation, where district heating systems are efficient and financially viable.

- installation of heat recovery mechanical ventilation systems, as a measure to improve indoor air quality and reduce the energy needs for heating/cooling, especially in public buildings (e.g. schools where indoor air quality is essential);
- installation of efficient cooling systems, mostly in public buildings (where the existing system is inefficient and can be reduced following the improvement of the building envelope performance or when cooling is insufficient or missing, however these services are considered necessary for the proper use of the building);
- provision of smart shading systems for the warm season, adjustable external blinds or high-incidence reflective glazing;
- installation of self-regulating heating and cooling devices, artificial lighting with saving scenario, presence sensor and supply of low energy LEDs;
- use of low-energy desktop computers (for public buildings);
- organisation of information campaigns for building users on the adequate comfort temperature, avoiding room overheating/overcooling, the negative impact of window opening when the air-conditioning system is in operation and the like;
- adoption of a 'registry' where building users can provide comments on thermal comfort and indoor air quality;
- air-balancing (air flow balancing) of the input air distribution network, if the air flows from the input grids do not correspond to those in the technical design of the air-conditioning installation (by sampling, on a sample of 10 % of the total number of grids);
- implementation of building regulation and automation systems / building energy management (BEM) systems, including cooling systems, enabling efficient energy management for end-users;
- where possible, installation of solar panels for the preparation of domestic hot water / PV in addition to the P1 Package measures¹⁷;
- where possible, proceeding to replace lifts, electrical and water, drainage and sewerage installations with more modern and efficient systems;
- for non-residential buildings with more than 10 parking spaces, the installation of at least one recharging point for electric vehicles or ducting infrastructure for at least five parking spaces;
- for residential buildings undergoing major renovation, with more than 10 parking spaces, installation of a ducting infrastructure, i.e. conduits for electric cables, for each parking space to enable the installation of recharging points for electric vehicles at a later stage; and
- renovation of balconies and loggie (with the potential benefit of increasing the useful dwelling space).

Box 4. Importance of cooling systems in Romania

¹⁷ Even when the installation of photovoltaic panels is recommended, it is important to calculate the additional loads for the building's terraces, roofs or external walls in order to avoid damage or excessive load on building structures. Therefore, on a case-by-case basis, the structure has to be technically assessed and verified before further installation. In addition, in order to benefit from the electricity production from photovoltaic systems, buildings must be authorised to supply/sell surplus electricity, which is currently not easy.

While cooling accounts for a relatively small share in global energy consumption, cooling demand has tripled since 1990 (mostly in developing countries) and is expected to triple again by 2050 as household income increases and global temperatures rise due to climate change. Romania is likely to follow this trend. Therefore, while representative packages are based on the state of play with regard to building typologies and energy consumption, the LTRS has to take into account the likely increase in energy needs for air conditioning in the coming decades. Building renovation programmes implemented under the LTRS should not aim to provide cooling to private buildings that did not benefit from it before, but must take into account that cooling will probably be added to renovation projects. The addition of cooling for public buildings has to be assessed given that many public buildings, such as schools and hospitals, serve the general public.

Therefore, the implementation of the LTRS must consider several critical actions to help manage this cooling demand:

- The measure to improve the building envelope, such as thermal insulation of the roof/wall/floor/floor slab, together with the provision of performing windows and doors, will reduce the load of heating and cooling of buildings and must be a first step. As the sector switches to passive house and NZEB-oriented building designs, cooling loads will be further reduced.
- In parallel, the EE standards for cooling equipment - air conditioners, chillers, (reversible) heat pumps and others alike - need to be updated and optimised to ensure that only the most efficient systems are installed in those renovated buildings.
- Efforts must also be put in to explore alternative cooling systems in buildings, in particular multi-family and public buildings. This can be achieved by using district heating systems to provide cooling in summer months (using cooling equipment with absorption or with steam turbines), thermal storage (off-peak cooling to provide daytime cooling), natural ventilation, fans and the like.
- Additional information will most likely be required by means of labelling and public campaigns, as well as targeted incentive schemes to encourage households to install the most efficient systems, as many systems can have a lifetime ranging between 15 and 20 years.

In order to implement deep renovation actions and to achieve the objective of developing skills for energy efficiency in buildings and supporting innovation, a complementary but essential action is the development of specific educational programmes.

It is necessary to develop graduate and postgraduate programmes, continuing vocational training programmes on deep renovation / NZEB to train stakeholders such as architects, engineers, building energy auditors, technical execution managers, and site managers on how to correctly plan, design, develop and implement deep renovation packages.

Continuing vocational training programmes should include lessons learned from ex-post controls and evaluations of previous programmes to enable to properly address deficiencies and errors and to integrate and best practices.

The implementation of NZEB / deep renovation specialised programmes must be financially supported from public funds and carefully monitored to ensure the quality of training programmes and the accreditation of a minimum number of graduates with new skills.

3. Identifying buildings with the lowest energy performance

First, based on estimates on the reference buildings, the lowest performing segment in the national building stock includes buildings constructed before 2000, when technical building regulations with lower energy performance requirements were applicable.

The year 2000 was considered to be the reference year, because in 2020 buildings constructed before this year will be older than 20 years and could require certain interventions, especially if other high energy consumption criteria are also met.

Furthermore, most buildings with the highest energy consumption (specific final energy consumption above 400 kWh/m² per year and specific final heating energy consumption above 250 kWh/m² per year) are single-family houses with gas- and wood-based heating sources, which are located in all climatic zones.

Most buildings with the second highest energy consumption (specific final consumption of total energy between 300 kWh/m² per year and 400 kWh/m² per year and specific final heating energy consumption between 200 kWh/m² per year and 250 kWh/m² per year) are public/private office buildings with gas and district heating sources, which are located in climatic zones II to V.

Finally, most buildings with the third highest energy consumption (specific final energy consumption between 200 kWh/m² per year and 300 kWh/m² per year and specific final heating energy consumption between 150 kWh/m² per year and 100 kWh/m² per year) are multi-family buildings and educational establishments, with gas and district heating sources, which are located in climatic zones I to V, as well as office buildings located in climatic zone I. It should be borne in mind that some of these buildings may be located in areas experiencing demographic decline, in an advanced state of decay and no longer justify the financing of renovation works in terms of energy efficiency.

Based on the above information, in order to determine the lowest performing segments in the building stock, the following criteria were considered for the assessment:

- construction year before 2000 (lifetime of more than 20 years from the construction date);
- specific final energy consumption above 300 kWh/m² per year;
- specific final heating energy consumption above 200 kWh/m² per year;
- for multi-family buildings, more than 30 % of apartment owners fall into the category of most vulnerable people and receive various forms of State aid;
- for single-family houses, owners in the category of most vulnerable people receive various forms of State aid;
- buildings well connected to transport and communication systems (including internet access) and to core public services (health, education, social protection) in order to avoid investments in isolated buildings that are more likely to be abandoned.

For the renovation of the worst energy performing segment of the building stock, approximately EUR 3 billion is needed to finance investments from 2021 to 2030. The sale or rental of the worst energy performing buildings could be considered trigger points to encourage renovations in the worst performing buildings. In addition to the criteria relating to consumption and habitation by vulnerable social groups, when prioritising investments, the urban planning and economic context must also be taken into account so as not to invest in areas undergoing depopulation or which are expected to be depopulated due to economic or accessibility problems.

4. Reducing energy poverty

Energy poverty can be defined as ‘a situation where a household or an individual is unable to afford basic energy services (heating, cooling, lighting, mobility and power) to guarantee a decent standard of living due to a combination of low income, high energy expenditure and low energy efficiency of their homes’ (European Commission, Citizens’ Energy Forum 2016).

The awareness of energy poverty has been identified as a policy priority by a number of EU institutions, notably in the European Commission’s ‘Clean energy for all Europeans’ legislative package. As part of the European Commission’s efforts to tackle energy poverty in EU countries, the EU Observatory on Energy Poverty (EPOV) was set up in 2018 to improve the measurement, monitoring and sharing of knowledge and best practices on energy poverty.

Energy poverty is a key issue that needs to be carefully included in public policies to improve energy efficiency in the residential sector, while avoiding the need to regulate or subsidise end-user energy prices.

Box 5 outlines current good practices in Europe.

Box 5: Good practices for integrated approach to energy poverty and energy efficiency

Many EU countries have included measures to address energy poverty and to foster energy efficiency in residential buildings in their renovation strategies. For example, France uses the energy savings certificates scheme to support measures targeted at households experiencing energy poverty. They are identified as households below a certain income threshold, or experiencing ‘fuel poverty’, monitored by a fuel poverty observatory. Austria implements an energy efficiency obligation scheme, where savings achieved in poorer households are weighted with a factor of 1.5 and energy suppliers are obliged to provide advice on energy saving and energy poverty.¹⁸

In South East Europe, a very successful initiative in identifying ways to tackle energy poverty and improve household energy efficiency is the REACH project (<http://reach-energy.eu>). The REACH project covered several areas in four countries (Bulgaria, the former Yugoslav Republic of Macedonia, Croatia and Slovenia). The project’s objectives were to empower energy-poor households to take actions to save energy and change their habits, and to establish energy poverty as an issue that demands locally, nationally and EU tailored policies and measures.

In the project, the partners compiled data and analysed the specific aspects of energy poverty, engaged local actors in tackling energy poverty and empowered households experiencing energy poverty to reduce their energy and water consumption. Approximately 200 energy advisors were trained in vocational schools under the project, who engaged with households and provided them with energy saving advice, offered free energy saving devices and shared information on good practices in other EU countries. In cooperation with local authorities and the local community, project partners identified households experiencing energy poverty and developed specific solutions (energy audits, installation of energy saving devices, post-visit assistance to households, including recommendations to apply for thermal insulation funds).

¹⁸Commission Recommendation (EU) 2019/786 of 8 May 2019 on building renovation – Good practice, Section 2.7.

Based on the approximately 1 500 households, project partners prepared extensive solutions that contributed to sustainability strategies. The impact of the measures was monitored and the results were used to make recommendations for higher (national and EU) level policies.

Energy poverty is the result of a mixture of various factors such as low income, high energy expenditure, limited access to less expensive energy services (e.g. district heating) and poor energy performance of a building. Although there is no internationally recognised definition, a household is usually defined as energy poor if it spends more than 10 % of household income on energy services. Efficient action to combat energy poverty must therefore include EE measures, along with social policy measures.

At present, energy poverty issues are only partially integrated into the existing Romanian legislation. The support for vulnerable consumers, as defined in Order No 27/2013 amending and supplementing Government Emergency Order No 70/2011 on social protection measures, as approved by Law No 304/2013, as subsequently amended, during the cold season (to be replaced in 2021 by Law No 196/2016), provides only partial financing and largely concerns heating affordability. Poverty is defined on the basis of income thresholds and criteria of assets held, without taking into account disposable income, more specifically it does not take into account whether energy bills account for a substantial share in disposable income in the winter months. This order provides for exclusively financial support, without complementary measures to stimulate energy efficiency in order to reduce the energy bill, which could bring savings to both household and public budgets. While approximately 5 % of the population receives heating aid, the estimated share of households experiencing ‘energy poverty’, as defined in other EU countries (based on disposable income, access to energy), could be up to 19 %¹⁹. Although legislation should be further refined to increase coverage and improve the focus on social protection, its implementation mechanisms and existing institutions provide a good starting point to allocate additional financial support for energy efficiency measures. In many cases, the category of socially vulnerable users also overlaps with the worst performing building category.

Actions to improve social protection for vulnerable categories experiencing energy poverty must include:

- (i) broadening the definition of vulnerable groups on the basis of the above-mentioned criteria (income, share of energy expenditure in disposable income, access to energy, as well as energy performance of a building) to better address energy poverty;
- (ii) preparing an action plan for energy poverty, as required by Law No 123/2012 on electricity and natural gas;
- (iii) defining responsibilities for specific programmes targeting vulnerable users) and resource requirements;
- (iv) improving the efficiency of the existing heating aid to ensure fairness among beneficiaries and a level playing field in terms of heating sources, while extending social support for energy poverty beyond heating; and
- (v) developing and implementing building renovation programmes that will include measures to combat energy poverty in order to ensure access to financing for socially vulnerable groups. These measures must be accompanied by other relevant policy actions, such as the future district heating strategy and the phasing out of heat price subsidies. The

¹⁹ http://democracycenter.ro/application/files/4515/1152/3672/raport_tehno.pdf.

support for energy efficiency measures must follow the focus of social support and be included in the energy poverty action plan.

Additional support for the implementation of renovation measures for socially vulnerable people in the worst energy performing buildings consists in reducing the burden of energy costs by offsetting all or part of the investment costs for vulnerable owners in multi-family buildings and single-family houses. Such intervention would require a budget from approximately EUR 40 to 200 million annually for the next 10 years (the annual heating aid amount is currently approximately EUR 30 million). This budgetary estimate was determined considering that 40 % of the investments would be paid back by residential owners and approximately 30 % of building owners would be socially vulnerable groups who will need additional support to pay back investments²⁰. Such interventions are expected to improve living conditions for the most vulnerable people, who have very limited access to financing and repayment capacity, and can reduce the number of vulnerable people and relevant subsidies by more than 30 %.

5. Policies and actions addressing market failures

The term ‘market failures’ refers to a range of problems that tend to delay the transformation of the building stock and the tapping of cost-effective energy savings potential such as:

- (a) limited information on the existing building stock and a lack of understanding of energy consumption and potential savings;
- (b) insufficient market development: construction, materials, limited workforce;
- (c) a lack of attractive financing products; and
- (d) limited uptake of efficient and smart technologies²¹.

Limited information about the building stock and the lack of understanding of energy consumption and potential savings are the main barriers in Romania.

To monitor the Strategy and the impact of investment programmes in building renovation, after its approval, the MLPDA will identify the resources needed to develop, manage and maintain a building database integrating the results of the various renovation programmes throughout the LTRS implementation. The database must include the whole building stock, building typologies and construction periods, data on energy performance certificates, energy consumption and type of fuels for heating buildings, seismic consolidation oriented interventions and the like. Such database is essential to carry out appropriate policy analyses and develop programmes and evaluations, to identify target buildings for different programmes, to identify poorly/highly performing contractors, to prioritise investments, to track overall progress and the like. The database should take into account the availability of relevant data on the building stock at local level from the already existing central or local data - such as that available under the ENERFUND tool.

The process of drafting and collecting energy performance certificates (EPCs) needs to be digitalised; it must be accessible online and energy auditors must have electronic signatures/secure access, ensuring better quality and accountability for low quality energy performance certificates. For the EPC database, the existing database (of the National Institute

²⁰ More buildings with more vulnerable people are expected to be covered in the first 10 years. See the criteria for the worst performing buildings in Section 7.3.

²¹See Commission Recommendation (EU) 2019/786 of 8 May 2019 on building renovation, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019H0786&from=PT>.

for Research and Development in Construction, Urban Planning and Sustainable Territorial Development 'URBAN-INCERC', INSEE and others) could be initially consolidated into a single model. The model shall contain not only information on energy efficiency renovation but also data on building characteristics, fuel consumption and the like. Transition towards a national system for calculation, preparation and online submission of EPC must be achieved. The database should support online submission with the possibility of implementing compliance checks on submission. For renovation and energy consumption reduction programmes, the database shall include mandatory reporting requirements on the renovation works carried out, for energy savings data and other useful energy performance data. Box 6 shows good practices in establishing a national building stock database and monitoring energy performance.

Box 6: Best practices in establishing a national building stock database and monitoring energy performance

As regards building stock data, in the evaluation by the Joint Research Centre of Member States' renovation strategies, the only country that fully met the requirement was France, while Belgium (Wallonia Region), Malta and Finland provided almost all required data.

In France, statistics for five main construction periods are used for the residential sector, separately for single-family houses and multi-family buildings. Data includes the share of main dwellings, type of occupant (owner or tenant), most common energy supply systems and recorded energy performance (energy performance analysis labels and consumption level). Non-residential building stock data detail large categories of buildings (schools, office buildings), estimated energy performance and renovation needs. Data sources include population and housing censuses, research results and technical databases.

EU-funded projects EPISCOPE and TABULA for 2014 provided detailed data on the building stock in several countries, including France, which is available online (<http://episcope.eu>). The data contains country-specific building typologies, typical interventions to achieve energy savings and a complex monitoring of the building stock since 2016, including scenarios and projections.

With regard to energy consumption and EPCs, Ireland provides relevant examples of best practices. In Ireland, EPCs were introduced in 2007 for all buildings. The Sustainable Energy Authority of Ireland (SEAI) hosts a large database of EPCs. As part of an EU-funded project (EPISCOPE), in 2015 Irish Energy Action developed an EPCs mapping tool implemented as a pilot project in the northern part of Dublin (available at <http://energyaction-static.s3-website-eu-west-1.amazonaws.com/index.html>). This is an interactive map where layers of building characteristics (mainly walls, windows, roofs and floors, as well as indicators of energy poverty, energy supply, metering and the like) can be overlapped in different Dublin neighbourhoods. The data is aggregated by small area and administrative units; the average of indicators (not per building) was calculated for each area, which allows for a targeted but more comprehensive intervention. The map provides relevant data for local policy making and preparation of strategies to alleviate energy poverty or to invest in infrastructure.²² Based on the past experience of EPISCOPE (Energy Action) and ENERMAP, the ENERFUND tool was developed under the EU's HORIZON 2020 programme and can also be used as an online tool to facilitate the financing decision for deep energy efficiency renovations.

As regards energy performance monitoring, Ireland collects information on the energy performance of all public bodies and schools using an online reporting tool (<https://www.seai.ie/energy-in-business/monitoring-and-reporting>). The webpage provides users with details of what and how to report and offers a wide range of training courses, tutorials,

²² More details on the pilot project and its uses can be found at <http://bpie.eu/wp-content/uploads/2015/10/A-case-study-of-an-EPC-mapping-application-Michael-Hanratty-Energy-Action.pdf>.

step-by-step videos and the like about how to complete the monitoring reports. More than 94 % of public bodies and 62 % of schools used the online system for national energy monitoring and reporting in 2018, which represents approximately 96 % of total energy consumption in the public sector. This includes primary energy consumption in a wide range of sub-sectors such as buildings, transport, with detailed values for each sub-sector. The data for each public institution is made public and summary results are presented to outline achievements and contribution to the 33 % energy savings target by 2020. The webpage is also used to promote good practices and outline successful projects (e.g. the top of the first page presents the Dublin City University's energy savings project and the annual report illustrates typical best practice projects that have achieved significant energy savings and performance in GHG). A detailed analytical report is published annually.

It is also essential that energy savings and benefits for indoor comfort are visible to and understandable by owners. It is equally important for building energy auditors to be aware of the tool and to feel confident about its use and effectiveness. Moreover, designers - architects and engineers - who carry out both renovation projects and other works on existing buildings must have access to this data.

There are currently no large-scale awareness-raising campaigns or information programmes on building energy efficiency. ANRE has a limited information service that provides basic information, not necessarily to motivate energy consumers to take action. Energy information centres are often financed only under externally funded projects and experience is not widely disseminated. In order to overcome this obstacle, awareness-raising campaigns need to be developed, while allowing for an energy price that reflects costs that ensure the financial sustainability of energy supply and provide energy efficiency incentives.

Communication campaigns must promote the benefits of deep renovation, with relevant guidance on appropriate construction strategies to carry out deep renovations, taking into account best practices and access to public financial instruments. Communication campaigns should also promote behavioural change as part of the effort to set energy prices that reflect actual costs. This is particularly relevant for setting heat prices for MFBs connected to district heating, where end-user prices are generally subsidised. Further price reforms should include the implementation of the binomial tariff (in two parts) and the improvement of the heat cost allocation methodology, which would increase energy efficiency incentives.

The implementation of the LTRS requires substantial speeding up of renovation works compared to the status quo scenario. This will exert further pressure on the existing capacity of the construction (both products and services) and labour markets, especially in the first years of implementation. To overcome this challenge, efforts need to be deployed to train and strengthen the capacity of market players. In order to ensure the ongoing development of the market, regular training and maintenance of professional skills for building energy auditors, design firms and architects, verifiers, experts, ESCOs, construction companies, project supervisors, etc. are essential. It is also necessary to introduce training and qualification programmes for construction workers.

Vocational training programmes should include materials from ex-post controls and programme evaluations so that deficiencies and errors may be properly addressed and good practices integrated. The training may also include case studies on deep renovations, NZEB pilot projects, newer technologies so that the market develops in line with long-term objectives and LTRS directions.

Box 7: Illustrative presentation of national programmes for promoting skills and education in the field of building energy efficiency

Technical training on energy efficiency is essential to create the set of skills needed to implement the LTRS. There are currently several initiatives *available for the Romanian specialists and workers to improve energy efficiency skills*:

Master's degrees on energy efficiency at Politehnica University of Bucharest; Building energy efficiency at the Technical University of Civil Engineering Bucharest; Green buildings and NZEB (Technical University of Cluj-Napoca);

'Efficient Romania' (România eficientă) - a project sponsored by OMV Petrom, including refurbishment of several schools, deep renovation of public buildings, information campaigns on energy efficiency, development of a practical guide on energy efficiency and specialised energy efficiency training for public administration representatives;

'Green Building Professional' - a paid programme for the certification and training of green construction professionals, organised by RoGBC; and

EU-funded programmes BUILD UP Skills Romania with the Roadmap for building workforce qualification in EE and RES, BUS Qualishell with the development of two qualification schemes for high-performance building envelopes, Train-to NZEB for the development and implementation of training courses for building workers, specialists (architects, designers, experts, energy auditors) and decision makers for NZEB, and Fit-to-NZEB for the development and implementation of various training programmes for energy efficiency deep renovation (in NZEBs).

The development of a well-functioning ESCO market is also essential for the implementation of the LTRS. In addition to addressing legal barriers for ESCOs, efforts are needed to develop and implement simplified contracts with ESCOs in the form of pilot projects using public financing mechanisms, which may underpin the adjustment of the current legislation and policies. Many countries have overcome such regulatory barriers by setting up intermediaries (e.g. public or super-ESCOs, public funds for energy efficiency, utilities based ESCOs) working with government agencies to organise tenders for local ESCO for the purpose of developing energy efficiency projects.

As independent entities, these intermediaries can take on procurement functions (because they can use alternative procurement methods, for example based on the highest net present value, instead of lowest-priced and deliverable-based contracts focused on the energy saved), use public finance for projects (as a solution to the low harnessing of local ESCOs), be a 'neutral intermediary' between the public agency and local ESCOs, resolve potential disputes over energy savings achieved. When a critical mass of ESCOs is reached in the market and the Government and customers have a better understanding of how the ESCOs work (including various benefits and risks), these contracting mechanisms can be institutionalised by amending the legislation - based on the experience gained and the proper accounting of lessons learnt. The implementation of the ESCO concept in the existing (top) construction companies (upgrading of the existing business model) should also be discussed. This requires adapting the existing legal framework for construction companies, as well as including tax incentives for the ESCO model applied.

The financing of the LTRS is currently limited by the lack of attractive and efficient private sector financial products using public finance. The typical commercial banking product used for renovation by consumers consists of consumer credits of approximately EUR 25 000, repayable within 5 years without guarantees. There are only a few examples of 'green mortgages', such as the Romania Green Building Council (RoGBC) programme for new buildings.

The lack of financial products tailored to EE renovation needs is due to a combination of factors such as: prices regulated below costs (in particular for heating); low willingness to borrow through mortgage credits to improve energy efficiency; bureaucratic procedures to prove energy efficiency gains; the deterrent effect of public funding of up to 100 % of the costs of renovation measures undertaken so far; and the need for additional safety/structural measures. However, the funds from the State, local and EU budgets are limited and cannot be used to cover national renovation needs, and they are not sustainable either, and the existing financial mechanisms will not reach renovation depth and targets imposed by the draft LTRS. Thus, the exclusive use of subsidies cannot continue and, in the future, EU funds will have to be used to secure ever lower subsidy funding percentages over time.

The financing of the implementation of objectives and measures set out in the LTRS should provide for financial mechanisms to use existing public finance, which is described in detail in Section 10 of this Report. The LTRS financing should also include loans from commercial banks (credit lines, guarantees), in particular for private buildings. This requires efforts to improve the share of solvent borrowers (i.e. owners' associations, maintenance companies, municipalities, ESCOs, utilities companies and the like). Banks and financial institutions should also be encouraged to innovate financial products tailored to market needs.

The adoption of standards for construction equipment and materials, as well as of optimal packages of technical measures, also helps to address market barriers by ensuring minimum energy performance levels in building renovation. Improvements in energy performance, comfort levels, safety and other issues largely depend on the proposed technical solutions, technical designs, the quality of materials and renovation works.

Case studies from other countries have shown that the saving potential can vary by up to 50 % between the various technical options, models and renovation quality. It is therefore important to ensure that standards are regularly updated, that catalogues with up-to-date technical design solutions, good practices are in place to provide reference guides and eventually to increase the quality of technical and economic documentations prepared by building energy auditors and designers, as well as the quality of works carried out by construction companies.

The deployment of smart and efficient energy efficiency technologies is further deficient in Romania²³. Several large cities (e.g. Bucharest, Cluj-Napoca) are developing local development strategies for 'smart cities', which include projects on electricity and heat production from renewable energy sources, such as photovoltaic solar panels, district heating and hot water using solar energy, geothermal heat pumps or biomass, although their deployment will most likely be a challenge. Other cities, such as Alba Iulia, are more advanced and should be taken as a model for best practices (see Box 8).

Box 8: Initiative of Alba Iulia Smart City

There were various local initiatives to promote the concept of smart city, which were merged into the Group of Smart Cities in Romania. The leader is Alba Iulia - which made full use of its visibility at the 100th anniversary of Romania in 2018 to launch various pilot projects. The city has brought together 29 high-tech partners and the city is currently testing 62 smart solutions. Cluj-Napoca, Iași, Beclean, Zalău, Brăila, Târgoviște and Tulcea are also cities which promote 'smart city' components, especially in the transport/mobility sector.

²³ The only measure under implementation is the roll-out of smart metering of electricity (initially foreseen for 2020, the current target is 2028. Few pilot projects have been implemented, and they cover less than 10 % of consumers).

In Alba Iulia, the key success factor was cooperation between stakeholders - the Ministry of Communications and Information Society, local government, research institutes, universities, companies, associations, citizens. The pilot projects are based on well-designed local strategies and plans, with the intention of scaling up based on results. Key energy and energy efficiency projects include:

- smart electricity grids and integration of renewables plus storage;
- an 'Internet of Things' (IoT) system for utility suppliers, which monitors in real time the consumption and quality of energy at two points of the public lighting system;
- a software tool to monitor energy consumption and costs of the university buildings which also benefit from another pilot project for integrating access monitoring and control, emergency lighting and heating/cooling;
- three municipal buildings are included in a pilot project for integrated smart metering of utilities (electricity, water, gas), which collects information to optimise the use of utilities, a solution that can be further extended to residential, administrative and office buildings;
- in a nursery, another pilot project introduces a solar thermodynamic system that produces water at all times, including overnight.

The current version of the INECP contains several priorities on smart technologies. INECP refers to (i) encouraging prosumer development along with the development of electricity grids and smart meters; (ii) medium and low voltage smart distribution; general objectives for the development of smart meters and smart grids, the step-by-step implementation of the smart city concept and the roll-out of IoT in the residential sector; (iii) developing regional clusters for sustainable energy planning, smart energy use in SMEs, the use of renewables and the promotion of energy efficiency measures, and links the measures proposed to other existing or planned strategies. In this context, priority should be given to the following actions:

- Developing active consumers (prosumers) and smart metering systems and smart grids, for which a clear timetable and proper regulations should be put in place. Regulations must include the tariff recognition of smart metering investments and their introduction in the distribution system operators' investment plans. The implementation of the recent prosumer legislation, too recent to assess its impact, should be monitored and adapted if necessary.
- Implementing Building Energy Management (BEM) Systems for non-residential buildings (public, commercial). BEMs are systems that monitor and control the energy consumption of a building, supporting energy conservation, recovery and substitution by collecting detailed information on consumption, non-recoverable energy, technical failures, benchmarking with similar buildings and allowing remote control.
- Using renewable energy systems in public building renovation activities and, where they are cost-effective, in residential building renovation activities. One of the challenges is the difficulty for the owners' associations, in particular, to become electricity prosumers. Legislation on renewable energy prosumers should enable MFBs and their OAs to produce and sell surplus solar and wind energy in more flexible forms, by creating net metering schemes, simplifying connection agreements and introducing incentives and financial support.

- Supporting the development of local operators - service, material and equipment providers - for building renovation (included in the INECP).
- Supporting RDI and demonstration projects, promoting new technologies and new deep renovation techniques (included in the INECP).
- The smart city concept should be implemented step by step, integrating state-of-the-art infrastructure; step-by-step implementation of the Internet of Things at residential level.

The uptake of efficient and smart technologies could be accelerated through broader actions:

- enriching existing design guides and technical regulations and developing guides on NZEB (design and execution of works)²⁴;
- preparing standard procurement documents, guidance and centralised procurement, using electronic tools on electronic platforms;
- specialisation and training programmes for professions and key disciplines for the refurbishment of buildings (included in the INECP):
 - Master's degree training in civil engineering and architecture;
 - continuing vocational training - credit-based system for building energy auditors and for the various specialists in the building sector (Law No 10/1995 on quality in construction, as republished, as subsequently amended and supplemented);
 - training programmes for training and qualification in the area of supervision of construction works;
 - training programmes for the training and qualification of builders and workers and of building management specialists.

6. Split-incentive dilemmas

Split-incentive dilemmas refer to split incentives, to transactions where the benefits do not accrue to the person paying for the transaction. In the context of energy efficiency in buildings, they refer to the situation where the building owner pays for energy efficiency upgrades but cannot recover savings that accrue to the person living there (e.g. tenant)²⁵. In this context, newer buildings incur such losses, as developers often select the cheapest building equipment and materials, but the new owner has to pay the electricity bills. Public institutions may also be discouraged if they have to make use of a loan for the renovation of their buildings. Their future budgets approved for energy bills are reduced accordingly, rendering them unable to repay investment costs.

In Romania, approximately 90 % of apartments in residential buildings are owner-occupied, which makes the problems arising from the split-incentive dilemmas not significant in the medium term. Therefore, there is no need to address these issues with the immediate measures in the 2021-2030 period of implementation of the Strategy. However, appropriate financing mechanisms, which enable the owner or tenant to use the resulting energy cost savings to pay part of the investment, could be developed to overcome this split incentive issue (see Section 10).

²⁴ Ongoing action at MLPDA through the SIPOCA 731 project.

²⁵ 2014 Report by the Joint Research Centre (JRC) *Overcoming the split-incentive barrier in the building sector*.

For newer buildings, the current legislation requiring minimum energy performance levels helps address barriers to split incentives. However, for public buildings, this deterrent persists. Therefore, either budgetary rules will be revised to allow for keeping the budgetary savings from EE improvements until the renovation debt has been repaid, or the central government should provide budget support for renovation.

7. Safety issues

Addressing seismic risk and safety issues, in particular fire safety, remains a high priority in Romania. At EU level, Romania is one of the countries most exposed to seismic risk. In each of the last five centuries, there have been, on average, two earthquakes with magnitude higher than 7 on the Richter scale, with three earthquakes of more than 7.5 moment magnitude (M_w) occurring since 1802. The vulnerability of the Romanian economy to earthquakes is worsened by the fact that more than 75 % of the population (65 % of the urban population) are in high seismic risk areas.

Fire safety is another major concern. According to the Building Fire Safety Coalition, the General Emergency Inspectorate [*Inspectoratul General pentru Situații de Urgență*] reports 6 000 fires per year in the residential sector and approximately 70 000 people injured in building fires (smoke asphyxiation being among the major causes of death). Apart from the investment issue, the regulatory requirements (technical rules and regulations in construction) also need to be updated.

The fire risk issue should be carefully taken into account in the building energy renovation, in particular in the thermal envelope improvement works carried out with readily flammable materials, in which case technical regulations on heating renovation need to be updated and supplemented with enhanced fire-fighting measures.

The MLPDA is making a major effort to address the building seismic risk. Ongoing activities include: (i) analysing deficiencies in previous seismic risk reduction programmes; (ii) setting out the roadmap in the implementation of the required local and national legislative, regulatory and institutional reforms to speed up actions to reduce seismic risk; (iii) developing a national seismic risk reduction strategy aimed at achieving a systematic and accelerated reduction of the seismic risk for buildings exposed to seismic risk (public buildings and multi-family buildings); (iv) investment programme to implement the seismic risk reduction strategy; (v) monitoring programme to assess progress in the implementation of the risk reduction strategy and investment programme; and (vi) capacity building of key stakeholders and citizen engagement.

While the above-mentioned activities are ongoing, the following series of complementary measures have been identified to ensure that safety issues - in particular those related to seismic risk and fire safety - are taken into account in the implementation of the LTRS.

Complementary seismic risk measures, to be detailed after the Seismic Risk Reduction Strategy has been completed:

- Technical surveys on seismic actions and technical inspections to be carried out for buildings, including determination of relevant measures to establish the susceptibility to damage from severe seismic actions, the need for intervention works, as well as their type and extent, prior to major energy efficiency renovations. This is particularly relevant for certain categories of buildings considered as priorities (such as educational establishments, health and social establishments).
- The cost-benefit analysis (CBA) for buildings assigned to seismic risk classes by comparing at least two mandatory alternative options:

- 1) renovation of the building at NZEB level, together with intervention measures to reduce seismic risk;
- 2) demolition and construction of new buildings which comply with NZEB requirements.²⁶
- Mandatory requirement to reduce the buildings' seismic risk based on the CBA results above. Additional support for intervention measures to reduce the seismic risk, granted to vulnerable consumers.

Supplementary fire safety measures:

- Periodic inspections (in particular prior to renovation) to check the fire safety of buildings, leading to mandatory requirements for upgrading obsolete gas, electrical, firewood or other unsafe installations in the event of fire.
- Improvements during renovation to bring obsolete electrical installations, including power cables, in line with current safety standards, together with the implementation of safe renovation measures in the event of fire. The renovation measures will ensure equivalent or higher fire safety performance and increase the safety level above the planned/initial fire safety level for the building.
- Ensuring safe evacuation through the building renovation project. Preventing the spread of smoke along escape routes and the spread of fire to other buildings.
- Ensuring measures to limit the spread of fire by means of appropriate details in the technical detailed design of the energy renovation architectural design.
- Achieving the structural strength of the building to ensure a safe evacuation of tenants and better access for first respondents.
- Adequate fire safety properties for all building components used in renovation works;
- Operating, maintenance and verification procedures for active and passive fire protection systems.
- Mandatory requirement for the fitting of smoke detectors in residential premises, which will serve as fire mitigation measures.
- Training on the correct installation of appropriate ventilation systems and sprinklers and the safe and correct installation of equipment that could have an impact on fire safety, such as photovoltaic panels and recharging points for electric vehicles.
- Transposing the common methods developed in accordance with EU law into national legislation and applying national legislation providing for such methods to assess and classify the reaction of building materials to fire, the fire-resistance of components and their performance when used on roofs, and the reasons for fire spread and access to escape routes in the event of fire.

8. Renovation of public buildings

Pursuant to Article 2a(1)(e) of the revised EPBD, each LTRS must encompass policies and actions to target all public buildings. This should include ongoing and planned renovations, as required

²⁶ This is usually achieved by comparing the renovation costs with the typical construction costs for a new building. Construction costs for a new building are generally around EUR 500/m², but actual construction costs must be used, taking into account the locality and type of building.

by the revised EPBD and the EED, in order to renovate at least 3 % of central government buildings each year.

Both the EED and the EPBD require public authorities to set an example by swiftly adopting EE improvements, in particular Articles 5 and 6 of the EED, which apply to ‘public bodies’ buildings’. However, Article 2a(1)(e) of the EPBD has a broader scope than Articles 5 and 6 of the EED, as it refers to all public buildings, not only to ‘public bodies’ buildings’ which are owned and occupied by central government. The policies and actions referred to in Article 2a(1)(e) should cover, for example, buildings which are occupied (e.g. rented or leased) by local or regional authorities and buildings owned but not necessarily occupied by central government and regional or local authorities.

The public sector must play a demonstrative role and take the lead by improving energy efficiency by renovating 8.25 million m² (26%) of public buildings by 2030, an achievement that would reduce energy consumption by 0.05 million toe and avoid 0.25 million tonnes of CO₂ emissions between 2021 and 2030. The renovation of public buildings must also be a model of good practice in terms of architectural quality of interventions.

To achieve such an ambitious target, two dedicated programmes need to be developed (supported by specific financing instruments described in Section 10): a long-term national programme for State-owned public buildings and a long-term national programme for municipal public buildings. Most of the savings will come from deep or NZEB-level renovation of public buildings, lighting, and renewable energy installations. The renovation packages proposed for public buildings will lead to at least one EPC rating of ‘A’ classification, which would reduce the specific energy consumption below 150 kWh/m² per year for heating, domestic hot water, lighting, mechanical ventilation and air-conditioning. The design solution and the implementation strategy for specific public buildings must comply with all the ‘A’ rating requirements for energy consumption defined in the national legal acts that will be in force on the date of implementation.

However, part of the savings could also be achieved through cost-saving measures such as behavioural change campaigns, awareness-raising/education, smart energy use and some equipment improvements in order to identify and cease the inefficient use of energy. The behavioural change campaign must involve three key elements: (i) the availability and feedback of reliable and up-to-date energy consumption data for each building; (ii) the assignment of an energy coordinator for each public building who assesses the reference energy performance, sets energy saving targets and measures progress towards these targets and works with the energy manager at municipal level; and (iii) strong engagement with the staff involved to raise awareness and change employees’ behaviours.

The following measures must be introduced in order to ensure adequate focus on public buildings during the implementation of the LTRS and to realise the energy saving potential:

- Development of a project pipeline and development assistance system for priority public building projects to ensure renovation of at least 26 % by 2030, 52 % by 2040 and 100 % by 2050.
- Technical and procedural support to local authorities for the preparation of project documentation and access to funding.
- Increased support for schools and other public buildings, with evaluation of technical designs to ensure technical and architectural quality and compliance with best practices.
- Aggregation of public building renovations into large procurement packages to achieve better prices, reduce the number of offers and centralise supervision.

- Development of standard tender documentation with performance indicators and specific requirements and technical and economic evaluation procedures. Frameworks for centralised procurement and procurement for energy efficiency renovation services and works for central government-owned buildings and municipal buildings.
- Capturing part of the financial savings from energy efficiency improvements to support the implementation of structured energy management in public buildings.
- Assessment of the use of energy performance contracts or reliance on public-private partnerships (PPPs) as alternative delivery modes for the renovation of public buildings, if applicable²⁷.
- Implementation of a dedicated financing scheme for central governments and municipal buildings funded through budget grants, repayable grants or other financing instruments.
- Mid-term evaluation of the implementation of this Strategy and analytical expertise to support effective governance.

Successful implementation of the LTRS will require the efficient sharing of experience and technical and management skills for energy efficiency renovations, which already exist in public agencies, as well as the use of existing skills in building renovation, including energy audits and technical designs, procurement procedures for design and construction works, contract management and building acceptance.

Annual dissemination and consultation events will also be organised and implemented by the MLPDA (in partnership with or via delegation to a representative organisation in the field) to disseminate knowledge to building energy coordinators and energy managers. These workshops should take the form of a forum to facilitate the exchange of information on best practices, identify emerging problems and challenges and discuss and agree on appropriate solutions.

As mentioned in Section 1 of Chapter VII, the main proposed trigger points for public buildings could include the following: (i) programmes for further sector optimisation and strengthening; (ii) disasters giving rise to the need for refurbishment or renovation and (iii) planned major overhaul or renovation. The approach to renovation of public buildings should take into account the long-term prospects of buildings that need to be renovated. Planned reinforcements and closures, privatisation, and expansion should be carefully examined, as well as the expected changes in the provision of public supply services (e.g. growth of e-government services, telecommunications, online education and the like). In addition, energy audits should consider both shorter term repayment measures (e.g. behaviour change, optimisation of existing regulation, usual improvements in mechanical and electrical installations, improved operating and maintenance practices) and measures with longer payback periods (to achieve high energy performance indicators). Audits should seek to identify synergies between measures with short and long payback periods.

As part of the governance mechanism proposed for the implementation of the LTRS (see Section 2 of Chapter XII), the MLPDA will coordinate renovation programmes on the basis of selection criteria. The MLPDA will also develop an integrated database of central and local public buildings, tracking the number of renovated buildings and their results in terms of energy savings with potential integration / interconnection with BRP/EPC registration systems in order to avoid duplication of data in different systems. This database should be part of the overall building renovation monitoring system under the consolidated national programme. Competent ministries with significant building portfolios, such as the Ministry of Education, the Ministry of Health,

²⁷ Consideration will be given to harmonising the legislative framework applicable to these types of contracts with the EU methodology on statistical treatment of energy performance contracts.

local authorities and other relevant bodies of the other ministries, should prepare the priority lists for the renovation of buildings, as part of their infrastructure and energy efficiency planning by 2030, to include the worst performing buildings, expected energy savings, investment needs and estimated repayment periods.

Under the national programme, these priority lists will be included in the consolidated project base and the manager will provide public institutions with access to project development assistance for energy audits, technical design development, procurement, management and financing. Public procurement and, in particular, centralised public procurement make a key contribution to helping public sector bodies meet their energy efficiency targets. In order to ensure best value for money under conditions of high transparency, consideration will be given to the appropriateness of procurement for standard renovation services and works in a centralised system, under the framework agreements via e-catalogue, aiming at energy efficiency for buildings, while minimising the risk of contracting works/services of questionable quality by the responsible ATUs due to the shortage of qualified staff in the specialised procurement body. Central government units and their agencies will then be able to procure, at an appropriate time and in a simplified manner, relevant services for building renovation projects and lighting and equipment upgrading. Specifications developed for this centralised public procurement process will also be available for the public sector as a whole and may also be extended to the private sector, municipalities, owners' associations and other intermediaries in order to simplify building renovation. The solution of a centralised e-catalogue for the renovation of single-family houses based on the example of public buildings can also be further explored. This procurement approach will be an important tool for smaller scale projects as well as for larger renovation projects.

Finally, as mentioned above, repayable financial mechanisms and incentives must encourage public authorities to invest in an energy-efficient building stock. Incentives and activities should also be initiated to encourage the use of public-private partnerships (PPPs) or off-balance sheet financing energy performance contracts, in line with Eurostat's accounting rules and guidelines. Public-private partnership or energy performance contracting can also be an alternative financing model, but should have access to similar financing mechanisms. These models would enable to repay the building renovation activities through guaranteed time-bound energy cost savings, providing public establishments with a cost-effective and simplified framework within which they can improve their energy systems.

Chapter VIII Results of policies and actions

Scenario analysis

The policies and measures listed in the previous sections should be implemented in order to help increase the pace of renovation of the Romanian building stock and to deliver important results in terms of energy savings, reduction of CO₂ emissions and reduction of operating and maintenance costs. Other indirect or less tangible benefits may also include higher indoor comfort, increased market value of dwellings, deferred or avoided energy generation capacity investments and environmental improvements. For many owners, these indirect benefits are essential for implementing energy efficiency renovation projects and improving the overall satisfaction of tenants with their homes.

A scenario analysis was carried out to plan the LTRS investments and to assess investment needs and anticipated benefits on the basis of different levels of renovation rates between 2020 and 2050. As a basis for the analysis, Table 4 below summarises the package considered to be cost-optimal for each building category and fuel type. The estimated investment costs and













corresponding benefits, such as estimated energy savings and CO₂ emission reductions, are also included for each type of building and package.²⁸






Three scenarios based on different renovation paces for each decade, as well as alternative approaches by building type, were developed:

- **Scenario 1** takes into account renovations with staggered increase by 0.53 to 1.56 % per year (above the reference value of approximately 0.5 % per year). This scenario initially projects only a modest increase in the renovation pace, but may be attractive in the first decade due to the need to design and introduce new financial mechanisms, to develop a consolidated national programme, to assign new responsibilities to various public authorities and to develop market capacities. However, a slower implementation rate in the first decade will require more substantial increase in the coming decades (i.e. from 2030 to 2050) to achieve the 2050 target.
- **Scenario 2** corresponds to a more ambitious increase in the renovation pace for the first decade compared to Scenario 1 to achieve more savings by 2030, aiming at a higher share of the worst performing buildings. This scenario focuses more on multi-family buildings (approximately 40 % of them) as it offers the highest potential for energy savings and CO₂ emission reductions.
- **Scenario 3** reflects renovation rates equally apportioned per year for each decade. Such a scenario would be very difficult to implement in the first decade, as the market might not be ready for such a high renovation pace. Funding would also be much more difficult to mobilise. However, this would reflect more accurately the pace needed to achieve the 2050 target and interim targets.

²⁸ For the selected renovation packages, a 70 % coefficient was applied to energy and carbon savings to take into account conservative projections in the savings estimates. However, the estimated investment costs were not changed in the scenario analysis.

Table 4. Renovation packages per building type and fuel type and estimated costs and benefits for the scenario analysis (World Bank Assessment, 2019)

Tipuri de clădiri	Principalele categorii posibile	Imagine reprezentativă	Numărul de clădiri [-]	Suprafața totală încălzită [M m2]	Suprafață construită <2000 [Mm2]	Renovată până în 2020 [%]	Zona nerenovată [Mm2]	Clădiri încălzite cu gaz				Clădiri încălzite prin lemne și termoficare				
								Pachet renovare	Costul investiției [Lei/m2]	Reducerea energiei finale [kWh/m2 an]	Reducerea CO2 [kg CO2/kWh m2]	Pachet renovare	Costul investiției [Lei/m2]	Reducerea energiei finale [kWh/m2 an]	Reducerea CO2 [kg CO2/kWh m2]	Tipul de combustibil
Locuințe unifamiliale	Rurale		3810737	247.80	217.840	3%	211.30	P1	951	195	40	P1	932	240	1	lemn
	Urbane		1354263	124.46	102.012	8%	93.85	P1	951	195	40	P1	932	240	1	lemn
Condominiu rezidențial	<=P+4 etaje		92332	94.51	77.50	7%	72.07	P2	694	68	19	P2	694	68	19	Termoficare
	>P+4 etaje		61554	115.51	94.72	7%	88.09	P2	597	111	28	P2	597	111	28	Termoficare
Educație	Instituții de învățământ		18000	17.50	16.63	15%	14.13	P3	1,664	126	40	P3	1,664	107	41	Termoficare
Sănătate și asistență socială	Spitale		547	5.47	5.42	1%	5.36	P3	1,664	126	40	P3	1,664	107	41	Termoficare
	Alte servicii de asistență medicală și asistență socială		50766	3.80	3.61	1%	3.58	P3	1,664	126	40	-	-	-	-	Termoficare
Administrație/birouri	Clădiri administrative		6000	5.26	4.73	5%	4.50	P3	1,807	150	48	P3	1,807	134	48	Termoficare
	Clădiri din sticlă și oțel		1500	3.10	0.05	5%	0.05	P3	1,807	150	48	-	-	-	-	Termoficare
Clădiri comerciale	Hoteluri		7642	4.23	0.85	5%	0.80	P3	1,807	150	48	-	-	-	-	Termoficare
	Restaurante/cafele		36000	1.82	1.28	5%	1.21	P3	1,807	150	48	-	-	-	-	Termoficare
	Magazine		122000	20.83	14.58	10%	13.12	P3	1,807	150	48	P3	1,807	134	48	Termoficare
Subtotal rezidențial		90%	5,318,886	582.27	492.06	5%	465.31									
Subtotal comercial și public		10%	242,455	62.01	47.14	9%	42.75									
Total		100.0%	5,561,341	644.29	539.20	6%	508.07									

Building types	Main possible categories	Representative image	Number of buildings [-]	Total heated area [m ²]	Built area <2000 [m ²]	Renovated by 2020 [%]	Non-renovated area [m ²]	Gas-heated buildings				Buildings heated with wood and district heating				
								Renovation package	Investment cost [RON/m ²]	Reduction in final energy [kWh/m ² per year]	Reduction in CO ₂ [kg CO ₂ /kWh m ²]	Renovation package	Investment cost [RON/m ²]	Reduction in final energy [kWh/m ² per year]	Reduction in CO ₂ [kg CO ₂ /kWh m ²]	Fuel type
<i>Single-family houses</i>	Rural		3 810 737	247.80	217.840	3 %	211.30	P1	951	195	40	P1	932	240	1	wood
	Urban		1 354 263	124.46	102.012	8 %	93.85	P1	951	195	40	P1	932	240	1	wood
<i>Residential condominium</i>	<=GF+4 floors		92 332	94.51	77.50	7 %	72.07	P2	694	68	19	P2	694	68	19	District heating
	>GF+4 floors		61 554	115.51	94.72	7 %	88.09	P2	597	111	28	P2	597	111	28	District heating
<i>Education</i>	Educational establishments		18 000	17.50	16.63	15 %	14.13	P3	1 664	126	40	P3	1 664	107	41	District heating
<i>Health and social assistance</i>	Hospitals		547	5.47	5.42	1 %	5.36	P3	1 664	126	40	P3	1 664	107	41	District heating
	Other health care and social assistance services		50 766	3.80	3.61	1 %	3.58	P3	1 664	126	40					District heating
<i>Administration/offices</i>	Administrative buildings		6 000	5.26	4.73	5 %	4.50	P3	1 807	150	48	P3	1 807	134	48	District heating





	Glass and steel buildings		1 500	3.10	0.05	5 %	0.05	P3	1 807	150	48						District heating
<i>Commercial buildings</i>	Hotels		7 642	4.23	0.85	5 %	0.80	P3	1 807	150	48						District heating
	Restaurants/cafes		36 000	1.82	1.28	5 %	1.21	P3	1 807	150	48						District heating
	Shops		122 000	20.83	14.58	10 %	13.12	P3	1 807	150	48	P3	1 807	134	48		District heating
Subtotal residential		90 %	5 318 886	582.27	492.06	5 %	465.31										
Subtotal commercial and public		10 %	242 455	62.01	47.14	9 %	42.75										
Total		100.0 %	5 561 341	644.29	539.20	6 %	508.07										

Table 5 and Figures 13 and 14 respectively show the annual renovation rates for each 10-year period, annual increases in renovation rates and cumulated building renovations of each scenario until 2050.

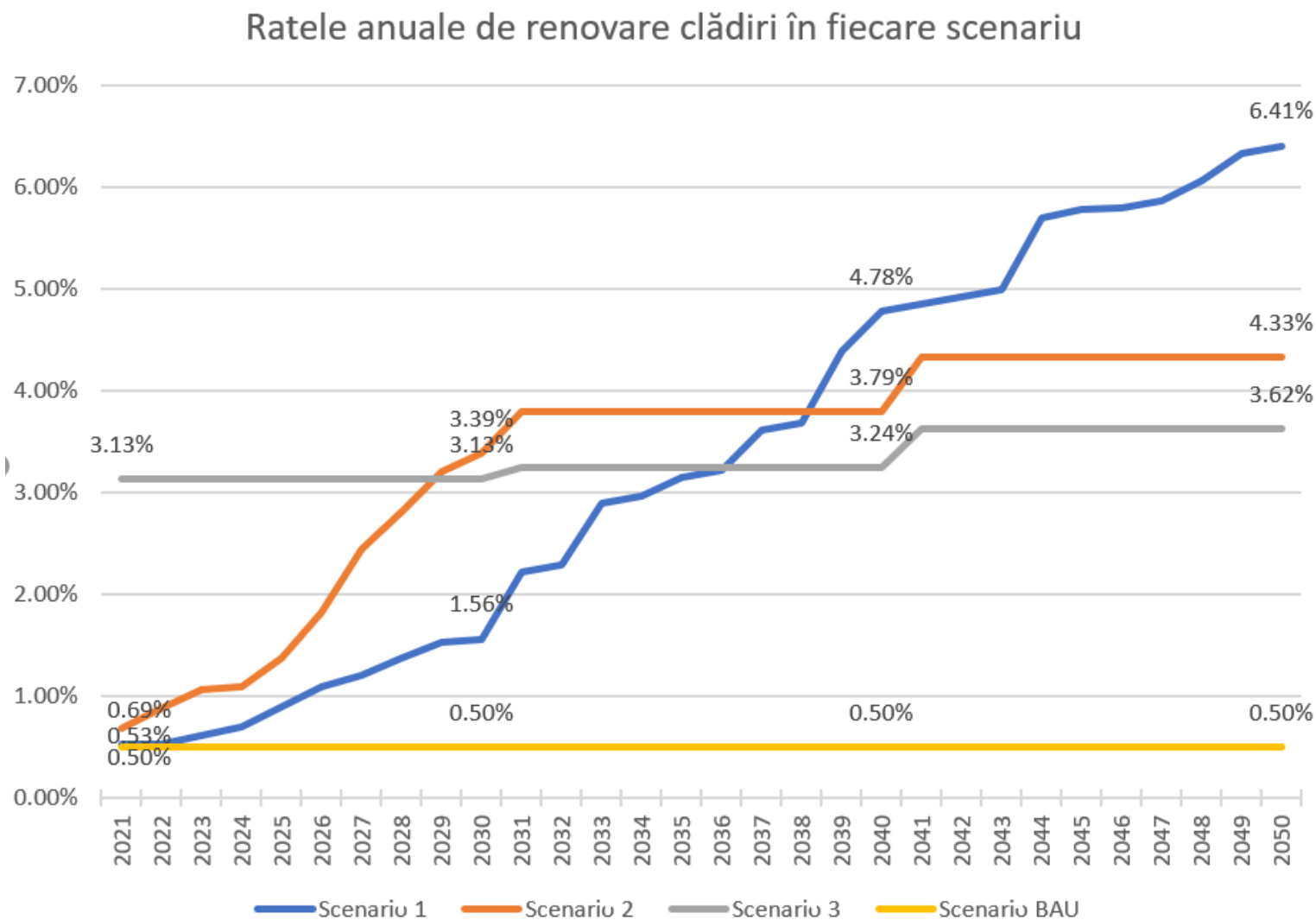
Table 5. Annual building renovation rates per scenario

	Annual renovation rates from 2021 to 2030	Annual renovation rates from 2031 to 2040	Annual renovation rates from 2041 to 2050
State of play - current 'Business as usual' scenario	0.5 %	0.5 %	0.5 %
Scenario 1	Gradual increase from 0.53 % to 1.56 %	Gradual increase from 2.22 % to 4.78 %	Gradual increase from 4.85 % to 6.41 %
Scenario 2	Gradual increase from 0.69 % to 3.39 %	3.79 %	4.33 %
Scenario 3	3.13 %	3.24 %	3.62 %

(World Bank Assessment, 2019)

The current scenario assumes that the current building renovation pace, i.e. approximately 0.5 % of the total building stock, is maintained over the three decades. Such a scenario will enable Romania to renovate approximately 15 % of the buildings still to be renovated. The other three scenarios, on the other hand, have been designed to ensure that the entire building stock that needs to be energy renovated will be completed by 2050, as required by the revised EPBD.

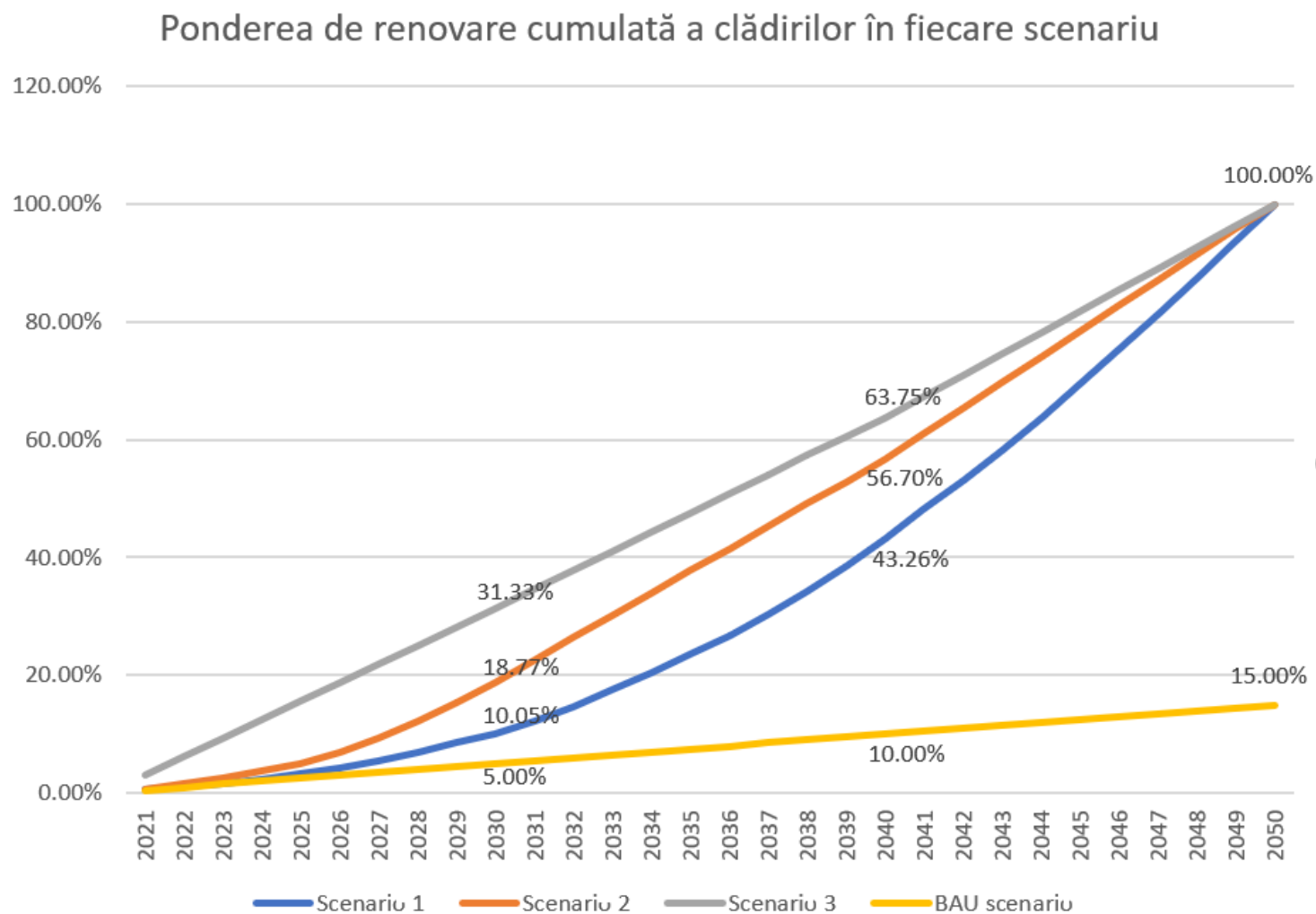
Figure 13. Annual building renovation rates per scenario (World Bank Assessment, 2019)



Ratele anuale de renovare clădiri în fiecare scenariu	Annual building renovation rates in each scenario
---	---

World Bank Assessment, 2019

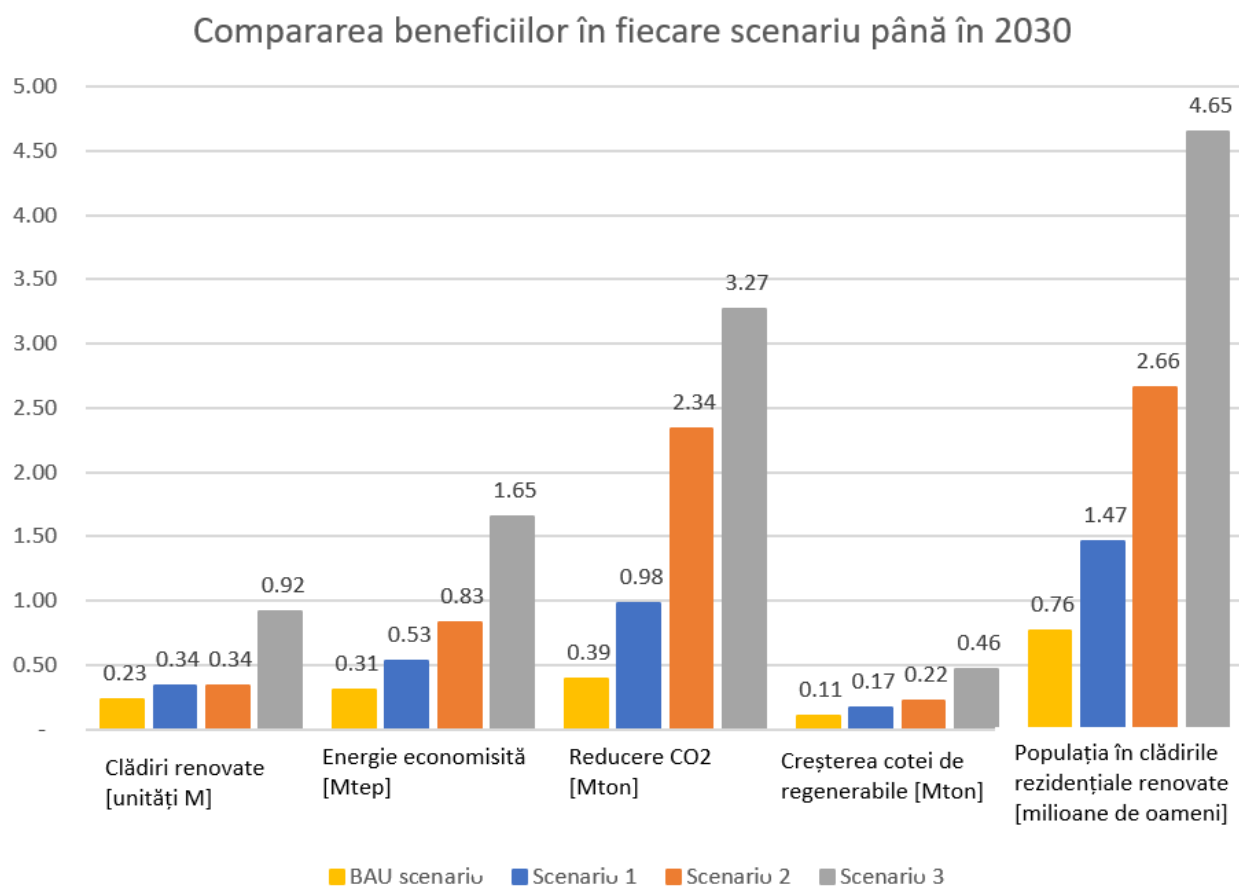
Figure 14. Building renovation rates per scenario



Pondere de renovare cumulată a clădirilor în fiecare scenariu	Cumulated building renovation share in each scenario
---	--

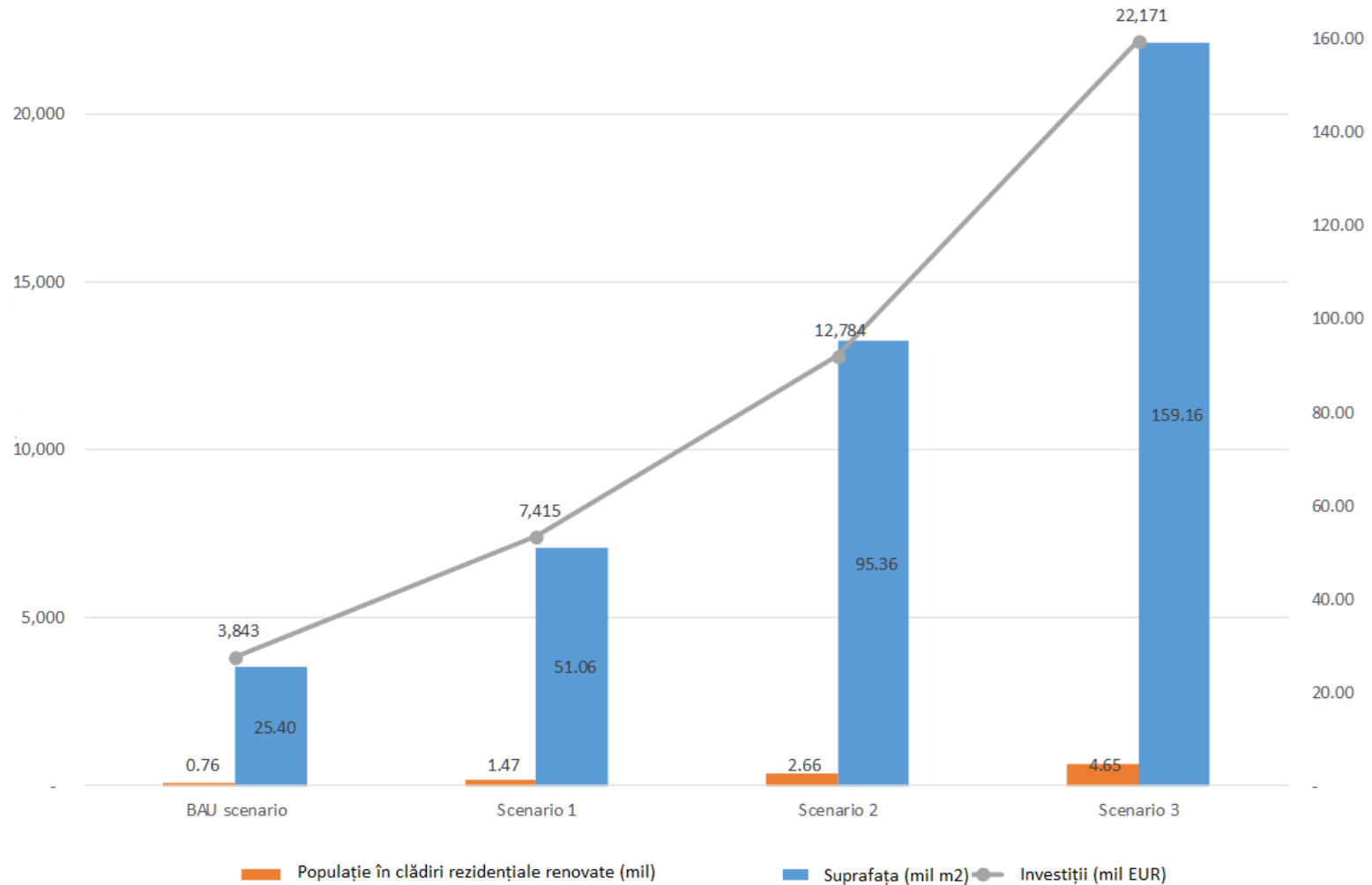
Figure 15 presents a comparison between scenarios in terms of renovated buildings and key benefits such as energy savings, reduction of CO₂ emissions, increased share of renewable energy and number of beneficiaries. Scenarios 1 and 2 have the same number of renovated buildings, although the number of beneficiaries will be higher in Scenario 2, as several multi-family buildings are targeted between 2020 and 2030. Figure 16 provides further details on the useful area of renovated buildings, the number of beneficiaries and the related investment requirements for each scenario.

Figure 15. Comparison of renovation benefits per scenario by 2030



Compararea beneficiilor în fiecare scenariu până în 2030	Comparison of benefits per scenario by 2030
Clădiri renovate [unități M]	Renovated buildings [M units]
Energie economisită [Mtep]	Saved energy [Mtoe]
Reducere CO2 [Mton]	CO2 reduction [Mton]
Creșterea cotei de regenerabile [Mton]	Increase in renewables share [Mton]
Populația în clădirile rezidențiale renovate [milioane de oameni]	Population in renovated residential buildings [million people]

Figure 16. Renovated building area, number of beneficiaries (left axis) and value of investments per scenario (right axis)

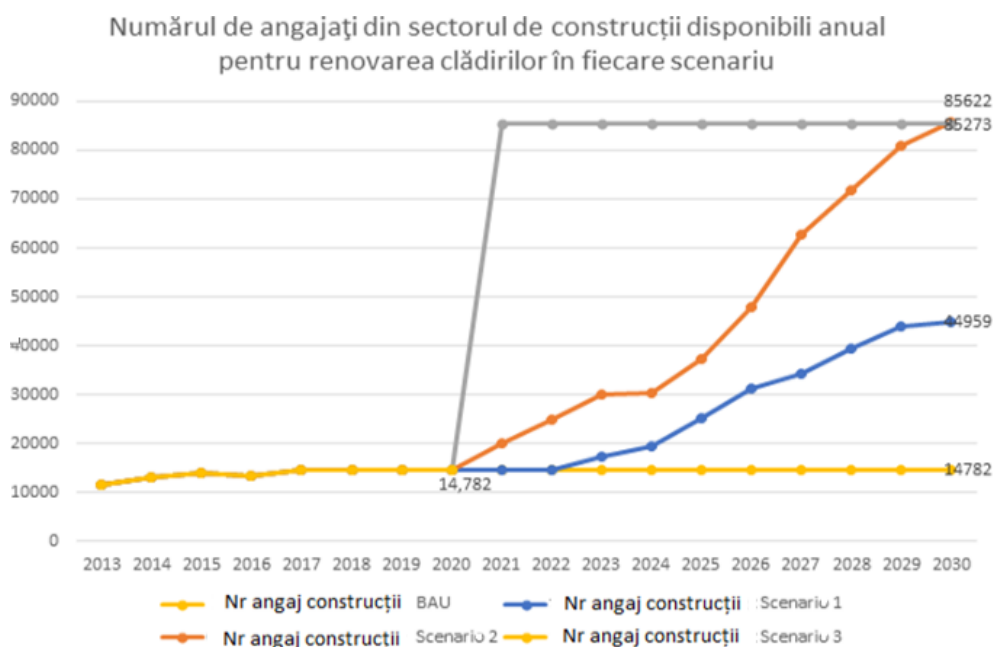


Populație în clădiri rezidențiale renovate (mil)	Population in renovated residential buildings (million)
Suprafața (mil m2)	Area (m m2)

Investiții (mil EUR)	Investments (EUR million)
----------------------	---------------------------

Each scenario was also assessed with regard to the potential impact on the building renovation market. Figure 17 shows annual estimates of the number of workers needed in the building sector to carry out the planned building renovation under each scenario, while Figure 18 shows annual estimates of the number of employees in architectural and engineering services (building energy audits, technical designs, construction supervision) for buildings projected to be renovated under each scenario. Scenario 3 would require the highest demand in the building sector, entailing an increase in employment of approximately five times the existing situation (from approximately 14 782 to approximately 85 622 workers). This can be challenging without adequate support activities for market preparation: first, informing the market of the Government’s intentions to renovate buildings and invest public funds, by providing clear data to foster supply; second, creating support measures for market participants, such as training, implementation of standard procedures, fair procurement rules. Scenarios 1 and 2 would have a smaller impact on the construction market, at least during the initial period of 4 to 5 years. However, Scenario 1 will not reach the necessary market capacity by 2030 and therefore further measures will be needed between 2030 and 2040 to support the recruitment of additional workers to ensure that renovation can be carried out at the required pace. Scenario 2 would instead allow for a better initial development of the construction market, in line with the targeted renovation pace. Similar considerations apply to the consultancy and engineering staff. In Scenario 2, approximately 4 000 new architecture and engineering employees will be needed to ensure the achievement of renovation targets. This seems more realistic than the higher requirements of Scenario 3, although more engineering staff will be needed eventually to continue the required increase in the renovation pace beyond 2030.

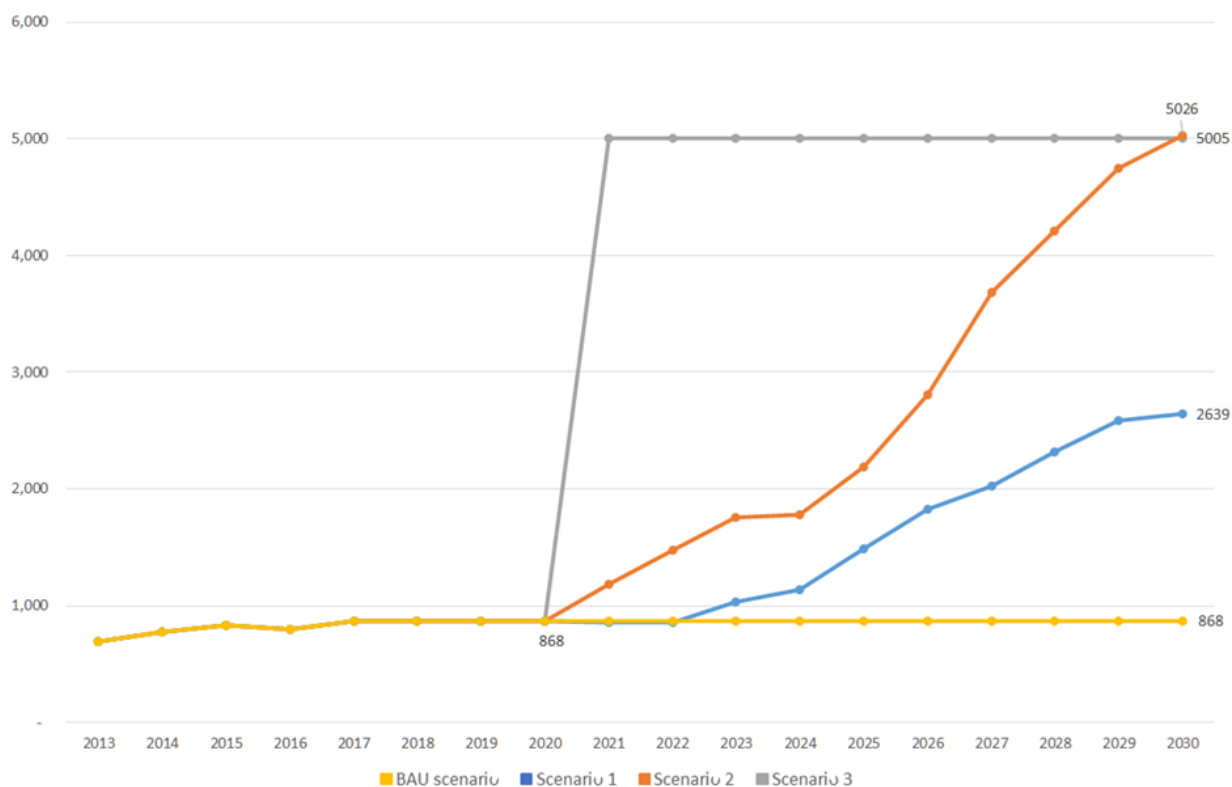
Figure 17. Number of workers needed in the building sector for building renovation per scenario



Numărul de angajați din sectorul de construcții disponibili anual pentru renovarea clădirilor în fiecare scenariu	Number of employees in the building sector available each year for building renovation in each scenario
Nr. angaj construcții	No of building employees

Nr. angaj construcții	No of building employees
Nr. angaj construcții	No of building employees
Nr. angaj construcții	No of building employees

Figure 18. Number of engineering employees needed for building renovation per scenario



Potential health benefits were also estimated for each proposed scenario²⁹ and summarised in Table 6.

The annual direct savings related to health service provision due to building renovation were estimated at approximately EUR 69 million for Scenario 2, while the total annual amount of social health benefits is estimated at EUR 1 480 million, which accounts for approximately 11.5 % of total investment costs.

The estimated payback period for investments of approximately EUR 12 784 million, taking into account health benefits alone, would be approximately 8.6 years.

²⁹ Calculations of health benefits are derived from the results of the model for Romania in the research report *The cost of poor housing in the European Union*, Simon Nicol, Mike Roys, David Ormandy and Veronique Ezratty, BRE 2016.

Table 6. Estimated health benefits per scenario

Scenario	Population in renovated buildings [M people]	Renovated buildings [units]	Area [m m2]	Total cost of repair [EUR million]	Direct annual savings in health services [EUR million]	Indirect annual health benefits (savings) [EUR million]	Total annual social health benefits [EUR million]
Current scenario	0.76	227.914	25.40	3.843	20	406	426
Scenario 1	1.47	336.423	51.06	7.415	38	779	817
Scenario 2	2.66	339 726	95.36	12.784	69	1.411	1.480
Scenario 3	4.65	917.714	159.16	22.171	121	2.471	2.953

Energy efficiency measures, such as thermal insulation, heating (and temperature control), ventilation, humidity control, fuel use, floor area and orientation of windows, are key factors that contribute to reducing the risk of too cold or hot environment, of air pollution and of associated health risks. The greatest economic and social benefits of building renovation will be derived from improved heating, ventilation and thermal insulation. Such improvements are known to prevent or alleviate respiratory and circulatory disorders on the long term and reduce winter deaths caused by low temperatures, while reducing risks related to dampness and mould, which brings significant benefits in terms of alleviation of respiratory diseases, allergic symptoms (such as asthma, rhinitis) and infections (mainly fungal). Building renovations also contribute to reducing exposure to low indoor temperatures causing cardiovascular conditions, respiratory diseases, rheumatoid arthritis and faulty thermoregulation (hypothermia).

Selected scenario and associated benefits

Considering the renovation pace, the useful floor area of renovated buildings, the number of beneficiaries, the model-based energy savings estimates, CO₂ emission reductions and impact on the building sector, Scenario 2 appears to be the most appropriate for the LTRS and is therefore recommended. This equates to an investment need estimate of approximately **EUR 12.8 billion between 2020 and 2030, to be provided from both private and public funds.**

As stated above, the actual number of buildings to be renovated will be determined by local analyses, in addition to the technical condition of the buildings, taking into account a set of economic, social, demographic, geographical factors, depopulation trends in certain areas, and functional reconversion needs. This investment does not include intervention costs to reduce the seismic risk, which will be estimated through the National Seismic Risk Reduction Strategy. Nor does this value include the estimated amount to finance the programme's administrative costs and the necessary support activities, training and technical assistance concerning market development, capacity building, information/awareness-raising campaigns, institutional support and programme implementation.

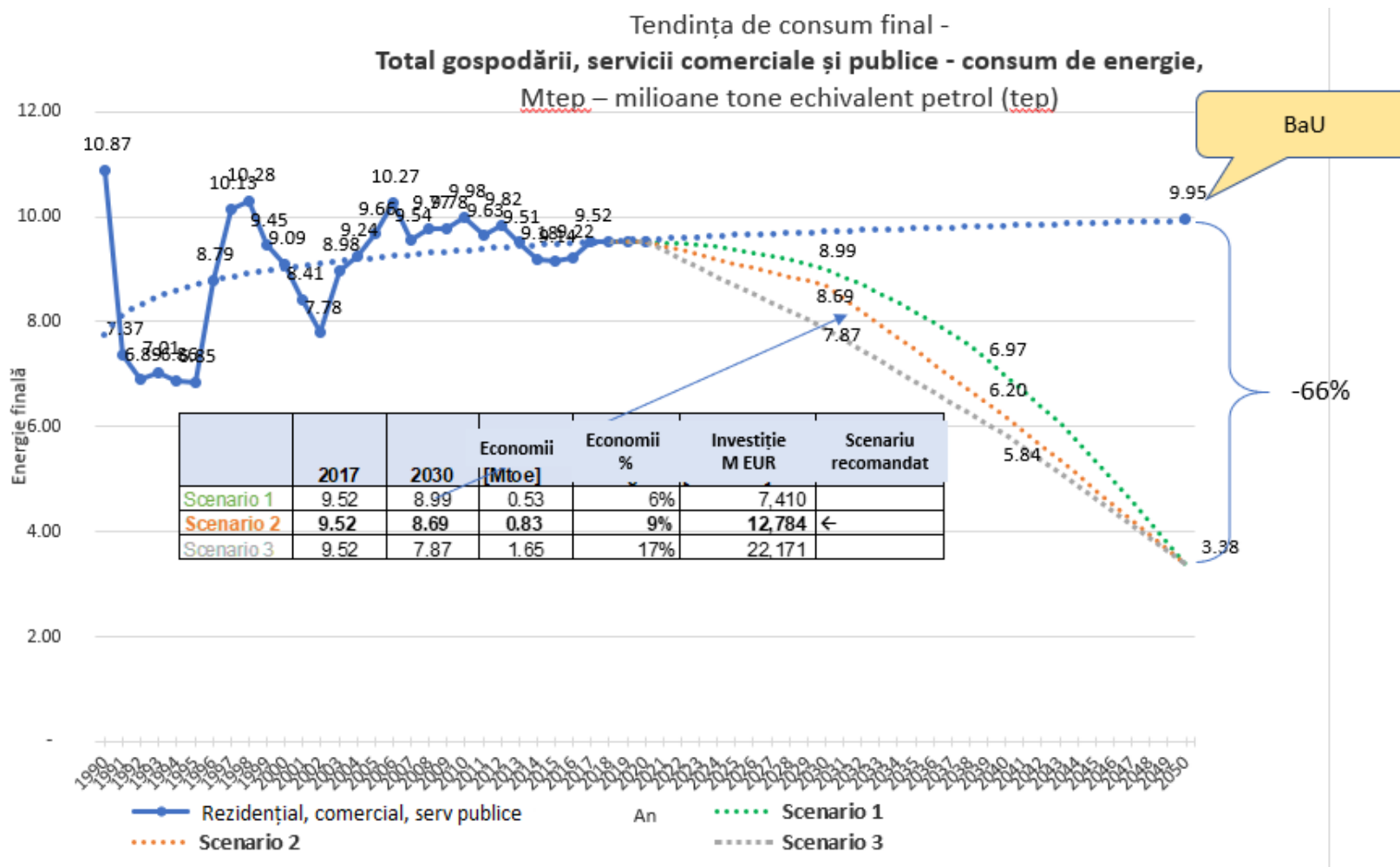
Table 7 shows the key outputs of Scenario 2, for which options and financing mechanisms are proposed in Section 10.

Table 7. Recommended costs for the scenario (Scenario 2) and key outputs

Building type	Category	Area [m m2]	Buildings [number]	Investmen t [EUR million]	Energy savings [Mtoe]	CO2 reduction [Mtonne]	Increased share of renewable energies [Mtoe]
Residential Single-family houses	Rural	10.57	162 475	1 736.87	0.17	0.04	68.63
	Urban	9.39	102 120	1 449.88	0.14	0.11	39.77
Residential Multi-family buildings	<=GF + 4 floors	21.62	21 124	2 791.47	0.11	0.47	24.96
	>GF+ 4 floors	44.04	23 471	4 877.24	0.36	1.41	50.64
Education	Schools	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
	Other	1.07	14 324	192.52	0.01	0.02	3.11
Administrative offices		1.35	1 539	236.55	0.01	0.03	4.41
Commercial	Hotels	0.04	73	9.38	0	0	0.18
	Restaurants and cafes	0.12	2 394	27.05	0	0	0.5
	Shops	1.31	7 686	269.40	0.01	0.06	5.03
Total		95.36	339 726	12 783.53	0.83	2.34	217.31

Figures 19, 20 and 21 show the impact of the implementation on energy savings, reduction of CO₂ emissions and renewable energy installations per scenario, compared to the Business as usual (BaU) scenario.

Figure 19. Energy savings

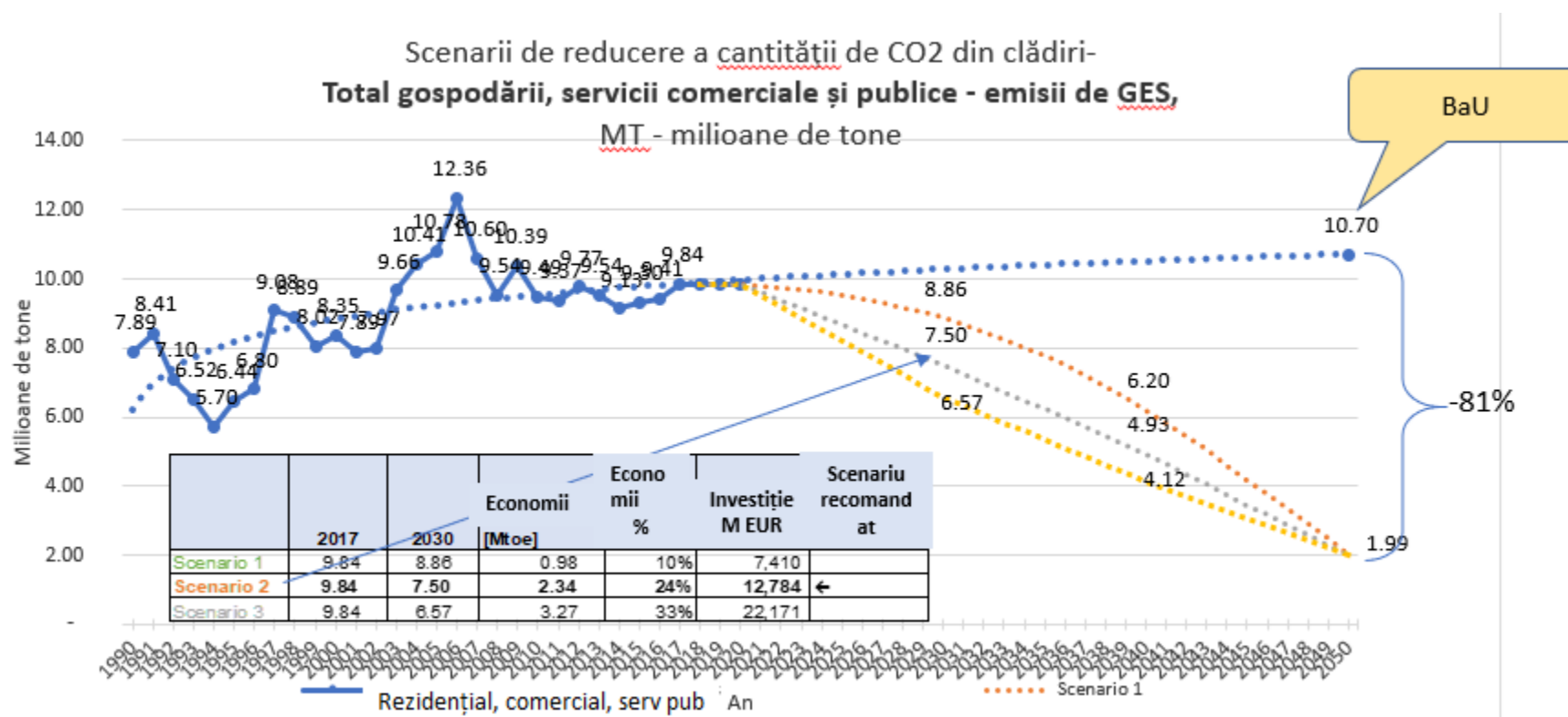


Tendința de consum final - Total gospodării, servicii comerciale și publice - consum de energie, Mtep - milioane tone echivalent petrol (tep)	Final consumption trend - Total households, commercial and public services - energy consumption, Mtoe - million tonnes of oil equivalent (toe)
Energie finală	Final energy

Economii (Mtoe)	Savings (Mtoe)
Economii %	Savings %
Investiție M EUR	Investment EUR million
Scenariu recomandat	Recommended scenario
Rezidențial, comercial, serv publice	Residential, commercial, public services
An	Year

Note: The values in the table are cumulated until 2030

Figure 20. Reduction of CO₂ emissions

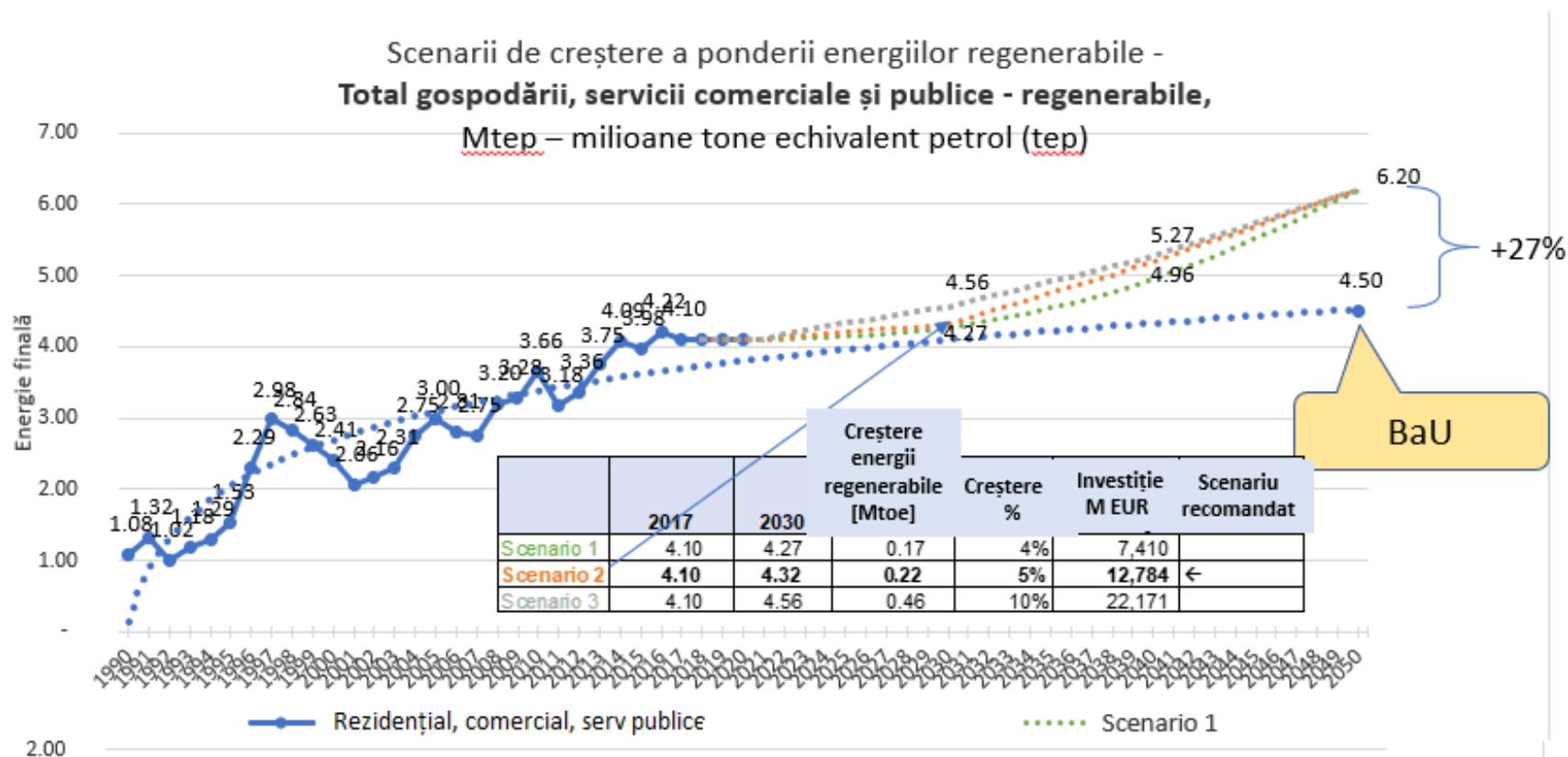


Scenarii de reducere a cantității de CO ₂ din clădiri - Total gospodării, servicii comerciale și publice - emisii de GES, MT - milioane de tone	Scenarios for reducing the amount of CO ₂ in buildings - Total households, commercial and public services - GHG emissions, MT - million tonnes
Milioane de tone	Million tonnes
Economii [Mtoe]	Savings [Mtoe]
Economii %	Savings %
Investiție M EUR	Investment in EUR million
Scenariu recomandat	Recommended scenario

Rezidențial, comercial, serv pub	Residential, commercial, public services
An	Year

Note: The values in the table are cumulated until 2030

Figure 21. Increased share of renewable energies



Scenarii de creștere a ponderii energiilor regenerabile - Total gospodării, servicii comerciale și publice - regenerabile, Mtep - milioane tone echivalent petrol (tep)	Scenarios for increasing the share of renewable energies - Total households, commercial and public services - renewable, Mtoe - million tonnes of oil equivalent (toe)
Energie finală	Final energy
Creștere energii regenerabile [Mtoe]	Renewable energy increase [Mtoe]
Creștere %	Increase %

Investiție M EUR	Investment in EUR million
Scenariu recomandat	Recommended scenario
Rezidențial, comercial, serv publice	Residential, commercial, public services

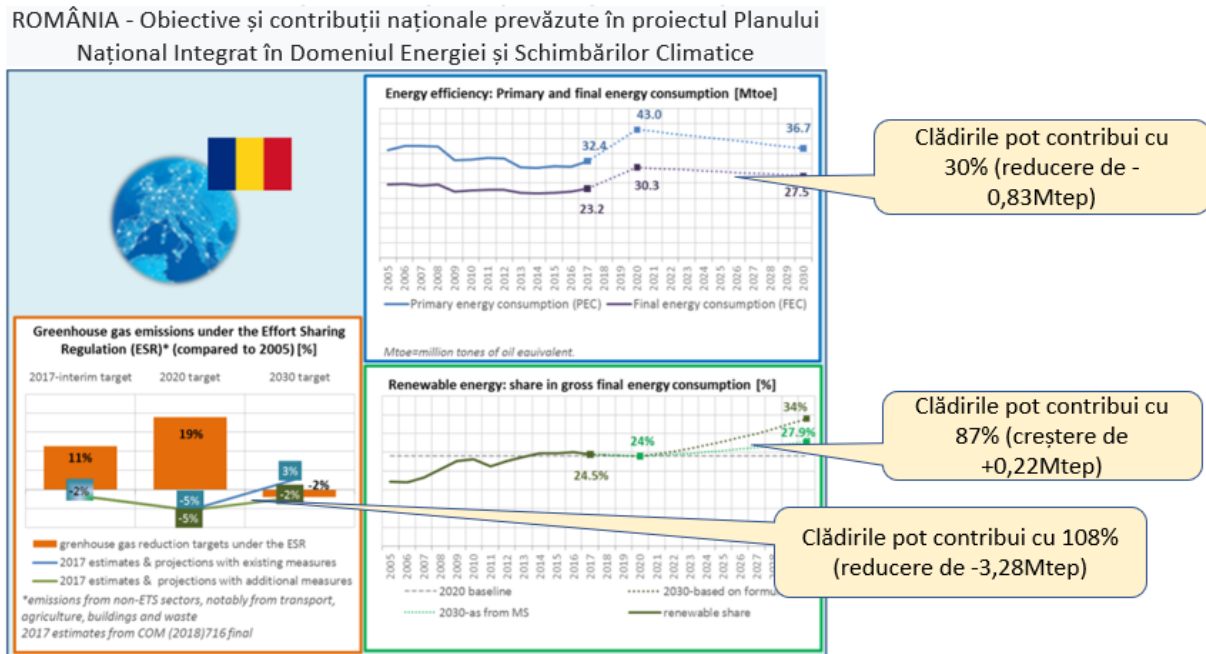
Note: The values in the table are cumulated until 2030

The analysis also considered the contributions of Scenario 2 to the overall energy saving targets in Romania, as outlined in the INECP project. The recommended scenario ensures that the building sector contributes approximately 30 % of the final energy consumption target, 108 % for reduction of CO₂ emissions and 87 % for renewable energy targets by 2030. Figure 22 shows these results in the context of the INECP project.

Other benefits associated with the implementation of the LTRS include:

- Improved thermal comfort in apartments and single-family houses, which can be estimated on the basis of the increase in indoor temperature up to the reference value of 21 °C for each building.
- Improved social cohesion (from stronger communities and OAs).
- Reduction of energy poverty and social exclusion (increased access to modern energy services: clean electricity, heating and cooking equipment (fuels and stoves not producing air pollution)).
- Improved urban environment by restoring façades with degraded finishes.
- Addressing the risks of degradation of undermaintained buildings, including those exposed to seismic risk. Furthermore, increasing post-disaster resilience and faster recovery. In terms of cost efficiency, savings and efficiency gains, significant benefits can be achieved when building renovation is planned and carried out in an integrated manner, taking into account energy efficiency, seismic safety and other interventions to increase architectural quality.
- Supporting economic growth and creating jobs, supporting the financial sustainability of district heating systems (by promoting reconnections).
- Supporting the research, development and innovation sector.
- Improving the quality of the construction workforce.
- Boosting economic activities as a result of fostering investment and job creation.

Figure 22. Recommended scenario: contribution to the targets of the Integrated National Energy and Climate Plan



Surse: Proiectul României pentru Planul Național Integrat în Domeniul Energiei și Schimbărilor Climatice, Eurostat (PEC2020-2030, indicatori FEC2020-2030 și PONDERI ale energiilor regenerabile), COM (2018) 716 final (estimări GES pentru 2017)

ROMÂNIA - Obiective și contribuții naționale prevăzute în proiectul Planului Național Integrat în Domeniul Energiei și Schimbărilor Climatice	ROMANIA - National objectives and contributions provided for in the draft Integrated National Energy and Climate Plan
Clădirile pot contribui cu 30% (reducere de - 0,83Mtep)	Buildings may contribute 30 % (reduction of - 0.83 Mtoe)
Clădirile pot contribui cu 87% (creștere de +0,22Mtep)	Buildings may contribute 87 % (increase of +0.22 Mtoe)
Clădirile pot contribui cu 108% (reducere de - 3,28Mtep)	Buildings may contribute 108 % (reduction of - 3.28 Mtoe)
Surse: Proiectul României pentru Planul Național Integrat în Domeniul Energiei și Schimbărilor Climatice, Eurostat (PEC2020-2030, indicatori FEC2020-2030 și PONDERI ale energiilor regenerabile), COM (2018) 716 final (estimări GES pentru 2017)	Sources: Romania's Project for the Integrated National Energy and Climate Plan, Eurostat (PEC2020-2030, indicators FEC2020-2030 and SHARES of renewable energies), COM(2018) 716 final (GHG estimates for 2017)

Chapter IX Indicators

1. Roadmap for implementation

In accordance with Article 2a(2) of the revised EPBD, in its LTRS, each Member State shall set out a roadmap for implementation with measures and domestically established measurable progress indicators, in order to ensure a highly energy efficient and decarbonised national building stock and in order to facilitate the cost-effective transformation of existing buildings into nearly zero-energy buildings. The roadmap for implementation will include significant milestones for 2030, 2040 and 2050, and specify how they contribute to achieving the EU's energy efficiency targets in accordance with Directive 2012/27/EU.

Table 8 presents the framework for defining indicators and milestones of the roadmap for implementation of the LTRS.

Table 8. Results, impact indicators and milestones of building renovation

Indicator	Unit	Reference value	Target values (gradual increase)		
			2020	2030	2040
Final energy savings	Mtoe	0			
	%	0 %	0.83 9 %	3.32 35 %	6.14 65 %
- residential	Mtoe	0	0.77	3.19	5.88
MFB	Mtoe	0	0.47	0.79	1.08
SFH	Mtoe	0	0.31	2.40	4.80
- non-residential	Mtoe	0	0.06	0.13	0.26
public buildings	Mtoe	0	0.05	0.09	0.16
commercial buildings	Mtoe	0	0.01	0.04	0.10
Reduction of CO2 emissions	Mtoe	0	2.34		
	%	0 %	24 %	49.1 50 %	78.5 80 %
- residential	M m2	0	2.03	4.20	6.41
Multi-family buildings	M m2	0	1.87	3.19	4.37
Single-family houses	M m2	0	0.16	1.02	2.03
- non-residential	M m2	0	0.31	0.71	1.45
public buildings	M m2	0	0.25	0.49	0.82
commercial buildings	M m2	0	0.06	0.22	0.63
Increase in the number of NZEBs (EP <50 kWh/m2/y; RES >40%; CO2 <7 kgCO2m2)	M m2	0	3.45	20.58	117.40
	%	0	1 %	4 %	23 %
- residential	M m2	0	0.86	13.31	93.06
Multi-family buildings	M m2	0	0.66	5.69	32.03
Single-family houses	M m2	0	0.20	7.63	61.03
- non-residential	M m2	0	2.60	7.27	24.34
public buildings	M m2	0	2.52	6.74	16.75
commercial buildings	M m2	0	0.07	0.53	7.59
Reduction of people affected by energy poverty	%	0 %	-30 %	-70 %	-100 %

Reduction of buildings in the lowest energy classes	%	0 %	19 %	23 %	26 %
Non-residential buildings equipped with BEMs or similar smart systems	%	0 %	18 %	45 %	100 %
- non-residential	Units	0	30 537	76 488	170 221
public buildings	Units	0	20 384	40 768	67 947
commercial buildings	Units	0	10 153	35 720	102 275
Number of one-stop shop initiatives	No	0	4	5	6
Increased awareness leading to concrete action (% of owners undertaking renovation actions out of total targeted owners)	%	0	19 %	57 %	100 %

Table 9 shows a list of indicators that should be monitored during the implementation of the LTRS.

The final list of indicators needs to be completed and agreed on as per the Action Plan for implementation of the Strategy, in order to ensure that all elements relevant to the targets are covered, together with the information sources, the institutions responsible for their collection and the necessary resources (e.g. training, subcontracting of surveys, appropriate staff, procedural details for monitoring indicators and the like).

During the annual reporting, a review of the actual status of implementation needs to be prepared, and deviations from targets need to be addressed through proposals to adjust programmes, actions and measures under the LTRS.

Table 9. Key indicators to be monitored during implementation

Clădiri renovate - Rezidențial <ul style="list-style-type: none"> ▪ <u>CMF</u> ▪ <u>LUF</u> - non-rezidențiale <ul style="list-style-type: none"> ▪ Publice ▪ Comerciale - După tipul de renovare <ul style="list-style-type: none"> ▪ Clădiri cu consum de energie aproape zero (NZEB) <ul style="list-style-type: none"> ○ rezidențiale ○ publice ○ comerciale ▪ Renovări profunde (> 60% economii) <ul style="list-style-type: none"> ▪ CPE - A ▪ CPE - B ▪ CPE - C ▪ CPE - <C 	Investiții - rezidențiale - publice - comerciale Investiții publice - rezidențiale - publice - comerciale Costurile investițiilor per economii anuale - rezidențiale - non-rezidențiale Costurile investițiilor per CO2 reduse - rezidențiale - non-rezidențiale Nr de proiecte integrate/agregate - rezidențiale - publice Inițiative de parteneriat public privat Investiții în inițiative de parteneriat public privat Numărul mediu de clădiri în proiecte integrate/agregate - rezidențiale - publice Nr de inițiative „ghișeu unic” în vigoare Inițiative de sensibilizare - Proprietari contactați - Proprietari care iau măsuri	Proporția venitului disponibil al gospodăriei cheltuit pe energie Populația care trăiește în condiții de locuire neadecvate (de ex. acoperiș spart) sau cu sistem de încălzire și răcire neadecvat Reducerea costurilor energetice per gospodărie (medie)/scăderea sărăciei energetice Clădiri din clasele energetice cele mai scăzute CPE-E, F, G Ocuparea forței de muncă în sectorul construcțiilor (nr de locuri de muncă create per milion EUR investit în sector) Creșterea PIB în sectorul construcțiilor Eliminarea/prevenirea barierelor de accesibilitate pentru persoanele cu dizabilități	Nr de clădiri echipate cu BEM sau sisteme inteligente similare - non-rezidențiale <ul style="list-style-type: none"> ▪ publice ▪ comerciale Cetățenii participanți la comunitățile energetice Nr de studenți absolvenți - cursuri universitare cu accent pe eficiența energetică și tehnologii inteligente conexe - pregătire profesională/tehnică <ul style="list-style-type: none"> ▪ Certificatori CPE ▪ Inspectori HVAC ▪ Proiectanți ▪ Supraveghetori tehnici ▪ Antreprenori Bugetul programelor naționale de cercetare în domeniul eficienței energetice a clădirilor Participarea universităților naționale la proiecte internaționale de cercetare științifică (de exemplu, H2020) privind eficiența energetică în domeniul construcțiilor
Consumul anual de energie - rezidențiale <ul style="list-style-type: none"> ▪ <u>CMF</u> ▪ <u>LUF</u> - non-rezidențiale <ul style="list-style-type: none"> ▪ publice ▪ comerciale 			
Reducerea anuală a CO2 - rezidențiale <ul style="list-style-type: none"> ▪ <u>CFM</u> ▪ <u>LUF</u> - non-rezidențiale <ul style="list-style-type: none"> ▪ publice ▪ comerciale 			

Renovated buildings	Investments	Proportion of disposable household income spent on energy	Number of buildings equipped with BEMs or similar smart systems
- Residential	- Residential		- Non-residential
▪ MFB	- Public	Population living in inadequate dwelling conditions (e.g. leaking roof) or with inadequate heating and cooling system	▪ Public
▪ SFH	- Commercial		▪ Commercial
- non-residential		Reduction in energy costs per household (average) / decrease in energy poverty	Citizens participating in energy communities
▪ Public	Public investments		
▪ Commercial	- Residential	Buildings in the lowest EPC energy classes - E, F, G	Number of graduates
- Per renovation type	- Public		- University courses with focus on energy efficiency and related smart technologies
▪ Nearly zero-energy buildings (NZEBS)	- Commercial	Employment in the building sector (number of jobs created per EUR million invested in the sector)	- Professional/technical training
○ residential			• EPC certifiers
○ public	Investment costs per annual savings	GDP increase in the building sector	• HVAC inspectors
○ commercial	- residential		• Designers
• Deep renovation (> 60 % savings)	- non-residential	Removal/prevention of accessibility barriers for persons with disabilities	• Technical supervisors
• EPC – A			• Contractors
• EPC – B	Investment costs per reduced CO2		
• EPC – C	- Residential		Budget of national research programmes in the field of building energy efficiency
• EPC – <C	- Non-residential		Participation of national universities in international scientific research projects (e.g. H2020) on energy efficiency in buildings-related topics

	Number of integrated/aggregated projects
	- Residential
Annual energy consumption	- Public
- Residential	
• MFB	Public-private partnership initiatives
• SFH	
- Non-residential	Investments in public-private partnership initiatives
• Public	
• Commercial	Average number of buildings in integrated/aggregated projects
	- Residential

	- Public
Annual CO2 reduction	
- residential	Number of 'one-stop shop' initiatives in force
• MFB	
• SFH	Awareness-raising initiatives
- Non-residential	- Contacted owners
• Public	- Owners taking measures
• commercial	

Chapter X Budgetary implications

1. Financial mechanisms to support mobilisation of investments

Article 2a(3) of the revised EPBD requires Member States to facilitate access to **financial mechanisms to support mobilisation of investments in the renovation needed to achieve the goals in Article 2a(1)**, i.e. a highly energy-efficient and decarbonised building stock by 2050 and the cost-effective transformation of existing buildings into NZEBs. Article 2a(3) of the revised EPBD sets out possible mechanisms and builds on Article 20 of the EED, which requires Member States to support the establishment of financing facilities, or the use of existing ones, for energy efficiency improvement measures.

Adequate financing is one of the most important elements to ensure that the various government strategies, policies and plans actually deliver the desired results. EU Member States have different approaches to the Government's role in implementation and financing, but it is widely accepted that **a certain level of government intervention is needed to overcome technical, financial, implementation and behavioural barriers**, which usually prevent energy efficiency renovation actions from taking place on their own (see Section 4.2). In addition, the state of market development requires some support until it is able to provide financing and services, and end-users can access financing and implement the measures on their own.

Romania has had significant experience in building renovation programmes and financing schemes over the last two decades. Nevertheless, even today, there are programmes which overlap and compete each other, and which offer different financing requirements, terms and instruments.

In this context, the vision in the strategy is to consolidate existing programmes into a single programme with different measures for each market segment. A large part of building renovations was based substantially on EU and IFI financing, with significant subsidy shares and minimal co-financing. Financing is currently sporadic in the programme cycles and is therefore neither predictable nor stable. Financial institutions were only marginally used; therefore, the ability to switch to sustainable and larger programmes remains very limited. **Financing schemes** must also address issues related to additional investment needs (e.g. for seismic/fire safety), the creditworthiness of owners' associations in multi-family buildings / municipalities / owners of single-family houses and citizens in energy poverty.

Considering the analysis of **investment scenarios**, the level of investment needs to achieve the 2030 energy efficiency target requires substantially more financing than currently provided by the EU and IFIs. Although an increase in the rate allocated by the Government from the State budget to such programmes could be taken into account, this cannot fill the financing gap.

An essential element of the LTRS is therefore to initiate **swift transition from subsidies to other financial schemes** by progressively reducing subsidies, increasing the level of co-financing and developing commercial financing mechanisms.

In the case of **public buildings**, only a small share of the subsidy funds (usually 20 to 30 %) may be necessary to allow for **payback periods shorter than 8 to 10 years**. Balance must be ensured by revolving loans, which are capitalised with EU or Government funds. ESCOs could also be brought to this market by using public financing.

In the case of **residential buildings**, the policy of gradually decreasing the rate of subsidies must be established and communicated and homeowners informed of the benefits of renovating buildings, explaining the benefits of renovation. Initially, the subsidy will be larger (between 60 and 80 %), the remaining amount being financed from EU funds under a grant / subsidised interest mechanism. Once the need to ensure co-financing and repayment has been accepted and the possibility of payback from energy savings has been demonstrated, co-financing may be outsourced to financial intermediaries in a form established after they are consulted. Every 3 to 5 years, the level of subsidy financing should be reduced by a further 15 to 20 %. In parallel, the MLPDA together with the relevant institutions may initiate a public communication campaign to educate and inform private owners of the benefits and costs of the proposed mechanisms.

One of the instruments considered under the Strategy is the **National Building Renovation Programme** to consolidate public funds (from EU programmes, national budget funds, IFI initiatives) for the purpose of providing a range of **products** to support all market segments. The main elements considered are:

- **partial funding through subsidies**, with a clear strategy to **gradually reduce non-repayable subsidies** and to support a strong awareness-raising (communication) campaign and administrative technical assistance for applicants (one-stop shop);
- **revolving loans (at the level of implementing intermediaries)**, which could cover co-financing requirements with a repayment obligation on building owners for a defined period, e.g. from 5 to 10 years;
- **loan guarantees** to facilitate the taking out of commercial bank loans for private (commercial and residential) buildings;
- **credit lines**, for banks participating in longer-term financing for building renovation loans;
- **dedicated financial instruments** (e.g. shareholding, loan loss reserve funds, performance guarantee funds, working capital loans) to support ESCOs, maintenance companies, utilities and other third-party providers that can contribute to building renovation with some repayment schemes;
- **loan schemes to individuals** to support the purchase and installation of complementary investments, such as thermostatic valves, heat cost allocators, efficient equipment including for ventilation with heat recovery and air-conditioning.

This type of financing mechanism would be similar to schemes used in other Member States, such as:

- (i) multi-family building modernisation funds in Lithuania;
- (ii) a combination of loans, technical assistance and grants for the renovation of multi-family buildings in Estonia;
- (iii) *Kreditanstalt für Wiederaufbau (KfW)* grants and loans for energy building renovation in Germany;
- (iv) the financing facility for sustainable energy implemented by the EBRD in Slovakia, SloVSEFF;

(v) the financing facility for sustainable energy implemented by the EBRD in Romania, RoSEFF. At national level, the implementation of this financing facility (RoSEFF) has helped finance investments of nearly EUR 4 billion in energy efficiency and renewable energy in 24 countries. In Romania, three SEFF programmes have been developed to finance 473 investment projects with a total value of EUR 189 million.

2. Institutional framework for financial mechanisms

The institutional framework for managing the financial mechanisms envisaged for implementing the Strategy must establish the following roles:

- **MLPDA** - the ministry responsible for the overall coordination of the energy efficiency policy in buildings and of the national renovation programme, and for the overall design and management of public financial mechanisms for building renovation;
- establishment and operationalisation of a 'Fund', in compliance with the public debt legislation, in order to mobilise public funds and IFI loans and serve as programme manager;
- **MFP** - the only institution that can contract government debt, the ministry responsible for relations with international financial institutions (IFIs) and promotion of public finance legislation;
- **MFE** - the ministry responsible for coordination of the non-repayable financial assistance granted to Romania by the European Union for the 2021-2027 financial programming period;
- **commercial banks** - the role to develop and to offer financial products, to manage credit lines, and to use guarantee schemes to provide the necessary co-financing as requested by building owners;
- **central government authorities**: responsible for assessing and prioritising buildings and for reporting relevant energy data for buildings owned and occupied by them;
- **local government authorities** and, where applicable, **management companies** which are the main implementing agencies - responsible for assessing and prioritising buildings, recruiting building owners, submitting applications, concluding financing/implementation arrangements, procuring and supervising all renovation services and works, approving invoices, reporting results; and
- **final beneficiaries** - building owners or tenants who agree to participate and invest in the renovation of their buildings with certain supervisory responsibilities in their respective areas of responsibility and to make the necessary repayments for grant-free schemes.

The MLPDA will act as coordinator of the **National Building Renovation Programme** in cooperation with MFP and other competent ministries, in line with the responsibilities outlined above. The MLPDA will take the lead in the overall management of the national programme and ensure the proper functioning of all aspects of the programme, including in the design and supervision of public financing mechanisms. Ongoing programme monitoring, regular evaluations and reviews and continuous dialogue with various implementing partners will be essential to ensure proper delivery of **financing schemes** with sufficient demand.

The **'Fund'**, which is responsible for mobilising funds and managing flows, can identify financial needs, help mobilise and deploy funding, including through financial mechanisms to manage, act as lender or paying agent for grant schemes / revolving loans, and carry out other tasks in accordance with its statutes. The **'Fund'** will be established by means of a law establishing its legal status.

To support the introduction of these mechanisms, intermediaries will be a core element of the national programme. These intermediaries would include **financial intermediaries** such as banks to help provide co-financing when needed and **'implementing intermediaries'** - which may include local government authorities, public or private maintenance companies, ESCOs, utilities or other qualified entities - that could borrow the necessary amounts for co-financing on behalf of building owners (in particular in the case of multi-family buildings), could help manage renovations and collect contributions/repayments from building owners after renovation. Building owners would remain the final beneficiaries and could play a role in supervising renovation and ensuring timely repayment of the loans in the financing package.

Based on experience in the EU, in particular in Eastern Europe, with the support of the World Bank, the various options of the institutional framework were analysed, including the **'Fund'**, financial intermediaries, implementing intermediaries and building owners. These institutions and their possible roles are summarised in Table 10.

Table 10. Institutions proposed for the implementation of financial mechanisms³⁰

Nivel 1 - „Fond”(F)	Instituție națională sau regională (de ex., Fond, Fond de Fonduri, Autoritate de Management, Banca de Dezvoltare, Agenție) care: - atrage resurse financiare către Programul de la IFI-uri, UE, donatori, guvern și alte surse; - distribuie resurse financiare către beneficiari direct sau prin intermediari financiari. - Execută monitorizarea și controlul, sprijină implementarea tehnică (ghiduri, documente standard etc.)
Nivel 2 - Intermediar financiar (IF)	Bancă comercială sau o altă instituție financiară, care: - distribuie investițiile F către beneficiari, - oferă Beneficiarilor cofinanțare și/sau prefinanțare suplimentară.
Nivel 3 - Intermediar implementare (II)	Municipalități, regii municipale (de exemplu, companii de întreținere, utilități) sau altele*, care: - reprezintă beneficiarul final (cerere de finanțare, achiziții, controlul implementării), - împrumută în numele beneficiarului și colectează rambursări prin mecanismul de economisire a energiei.
Nivel 4 - Beneficiar final (BF)	Asociațiile de proprietari, proprietari individuali, proprietari de clădiri publice și comerciale, - ia decizia de a investi în măsurile EE; - execută toate/o parte din sarcinile de implementare dacă nu sunt îndeplinite de (sau nu există) II, - își rambursează partea din investiție.
* Furnizori de energie care sunt obligați să obțină economii de energie	
Level 1 – ‘Fund’ (F)	National or regional institution (e.g. Fund, Fund of Funds, Managing Authority, Development Bank, Agency) that: - attracts financial resources to the Programme from IFIs, the EU, donors, government and other sources; - distributes financial resources to beneficiaries directly or through financial intermediaries; - performs monitoring and control, supports technical implementation (guides, standard documents, etc.).
Level 2 – Financial intermediary (FI)	Commercial bank or other financial institution that: - distributes F investments to beneficiaries; - provides the Beneficiaries with additional co-financing and/or pre-financing.
Level 3 – Implementing intermediary (II)	Municipalities, municipal enterprises (e.g. maintenance companies, utilities) or others* that: - represent the final beneficiary (grant application, procurement, implementation control); - borrow on behalf of the beneficiary and collect repayments through the energy saving mechanism.
Level 4 – Financial beneficiary (FB)	Owners’ associations, individual owners, owners of public and commercial buildings, - takes the decision to invest in EE measures; - performs all/part of the implementation tasks if they are not fulfilled by (or there is no) II; - reimburses its share of the investment.

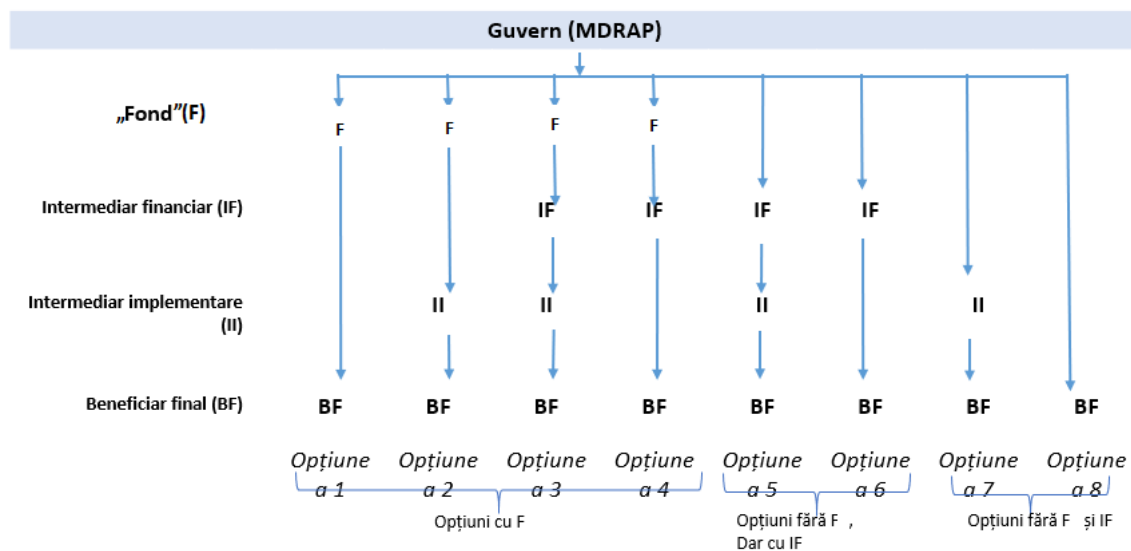
* Energy suppliers who are obliged to achieve energy savings

Not all of the above levels need to be involved in programme management and implementation. On the basis of these different levels of institutions, **eight institutional options** were analysed (Figure 23). The first set of options (1 to 4) includes a programme structure with a ‘Fund’ (F); intermediate options (3 to 6) include Financial Intermediaries

³⁰ The National Development Bank [Banca Națională de Dezvoltare] – as Fund of Funds, can only be taken into account at the time of establishment, estimated for 2022.

(FIs); some options (2, 3, 5, 7) are also based on Implementing Intermediaries (II); all options involve Final Beneficiaries (FB).

Figure 23. Institutional options



Guvern (MDRAP)	Government (MDRAP)
„Fond” (F)	‘Fund’ (F)
Intermediar financiar (IF)	Financial intermediary (FI)
Intermediar implementare (II)	Implementing intermediary (II)
Beneficiar final (BF)	Financial beneficiary (FB)
Opțiune a 1	Option 1
Opțiune a 2	Option 2
Opțiune a 3	Option 3
Opțiune a 4	Option 4
Opțiune a 5	Option 5
Opțiune a 6	Option 6
Opțiune a 7	Option 7
Opțiune a 8	Option 8
Opțiuni cu F	Options with F
Opțiuni fără F, dar cu IF	Options without F, but with FI
Opțiuni fără F și IF	Options without F and FI

Options a1 to a4 provide for a ‘Fund’ with the following advantages:

- (a) the ‘Fund’ can consolidate financial resources (e.g. State budget, IFI loans, EU funds) for the implementation of investment programmes;

- (b) the MLPDA may delegate tasks to a single entity in order to reduce its administrative burden;
- (c) it is easier to attract financial resources from international financial institutions that are not designed to cope with regional/local levels or several debtors; and
- (d) the 'Fund' will be designated to take the risks that local banks (FIs) do not wish to take, such as lending to owners' associations.

However, the 'Fund' has a number of **disadvantages** as well:

- (i) reduces government control over programme implementation;
- (ii) the terms and conditions of the 'Fund' must be drawn up and negotiated with appropriate management and administrative fees;
- (iii) the MLPDA should develop sufficient monitoring and control mechanisms to ensure that the funds are used for their intended purposes;
- (iv) the 'Fund' may require further capacity building in order to fulfil all its functions; and
- (v) the 'Fund' may not be willing to take all the risks associated with a loan to building owners, especially in the case of multi-family buildings.

The following two options (5 and 6) involve Financial Intermediaries (FIs) without 'Fund' (F). These options are consistent with typical credit lines, which are customary in the region, largely for industrial and commercial energy efficiency investments.

There are a number of **advantages** for financial intermediaries:

- (a) the use of financial intermediaries enables the programme to engage directly with commercial banks and introduce banking products for building owners, while ensuring long-term sustainability;
- (b) financial intermediaries can use their own funds, thus reducing the amount of funding that the Government should obtain for the programme;
- (c) the programme can build on the existing financial capacities of financial intermediaries, thus reducing the need for technical assistance and allowing for a quick start of the programme;
- (d) building owners will be obliged to open maintenance/repair and deep renovation accounts with lending banks, thus helping to secure repayments.

However, such options also have potential **weaknesses**:

- (i) as with the first options, the MLPDA has less control over the current programme implementation and reduced ability to direct financial intermediaries to finance owners' associations;
- (ii) the MLPDA may need to carry out a selection process and prior verification of participating financial intermediaries;
- (iii) the MLPDA should deploy further administrative and coordination efforts to manage more financial intermediaries;

- (iv) the terms and conditions for participating financial intermediaries should be drawn up, together with the negotiated fees paid by the Government or by building owners;
- (v) financial intermediaries may request technical assistance to develop appropriate loan securitisation for building owners and to assess energy efficiency investments; and
- (vi) financial intermediaries may not be willing to take all the risks associated with lending to building owners, which may **limit programme coverage**.

Options 7 and 8 involve **implementation arrangements** that do not include a 'Fund' or financial intermediaries. These structures could enable the programme:

- (a) to provide direct financial support at investment level without establishing new delivery and financing mechanisms;
- (b) to be launched faster as there would be no need for prior negotiations with a 'Fund' or with financial intermediaries;
- (c) to take direct control of the implementation and monitoring of the programme (by interacting with programme implementing entities, collecting feedback and identifying implementation problems);
- (d) to avoid payment of management fees that the 'Fund' or financial intermediaries would impose, thereby reducing financing costs;
- (e) to ensure that funds are accessible to all eligible participants in the programme without the risks perceived in the case of non-payment or creditworthiness restrictions.

However, such options would:

- (i) impose additional administrative burdens on MLPDA in the day-to-day programme management;
- (ii) require government agencies to conduct drastic financial controls and to have adequate and qualified staff and resources; and
- (iii) compel the Government to establish mechanisms for financing and repaying a large number of small loans.

The introduction of **Implementing Intermediaries (II)** who can help building owners implement investments, contribute to the supervision of contractors and help collect repayments offers several advantages to the programme. Although local government authorities serve as implementing intermediaries under the current programmes financed by the EU's structural funds and the European Investment Bank (EIB) in some sectors of Bucharest, the introduction of an extended national programme that would require an **accelerated pace of implementation** involves identifying a wider group of professionals who can perform these functions. In addition, a large number of smaller local government authorities may not have technical and administrative capacities, may not be willing to take on such functions, or may not have the capacity to be assigned sufficient debt to serve as aggregators.

Nevertheless, many other Eastern European countries, including Lithuania, Croatia, Bulgaria and Belarus, have relied on or plan to use implementing intermediaries (mainly through

municipal maintenance companies) to perform these functions and implement aggregated renovation projects with greater professionalism, which can be more efficient and provide beneficiaries with another option for financing and managing their renovations. Paragraph 4 sets out the institutional options corresponding to the financial options selected for each building type.

3. Financial options for building renovation

Building renovation programmes in the EU commonly use the following financial products: **grants, loans combined with grants and repayable grants**. Table 11 provides an overview of financial products and related advantages.

A national programme with a high rate of grants, such as 80 to 100%, currently used for public and residential buildings, would not be sustainable and would generate expectations at levels similar to those of open-ended grant funds. It would also not create a culture where building owners have to take responsibility for their buildings, but would rather generate the expectation that the Government remains responsible. As these buildings are renovated, building owners may not maintain their buildings properly, expecting to still receive grant support on a continuous basis. Furthermore, it would require substantial budgetary resources for the full renovation of the remaining building stock, which are unlikely to be provided.

However, the introduction of commercial loans, along with grants, would now seem very difficult for **public and multi-family buildings**, but could work for **single-family houses**. Thus, as a first step, the co-financing needs will have to be satisfied from public funded through repayable grants, for local government buildings and multi-family buildings, until financial intermediaries want and can take on such roles. These mechanisms would allow municipal buildings and multi-family buildings to fully cover renovation costs in advance and then repay part of them over time. This would help avoid compelling municipal buildings and multi-family buildings to access commercial bank loans or to mobilise contributions from homeowners, which could seriously slow down the programme implementation. The repayable component of the grant could vary from 20 to 60 % of the total investment depending on the expected energy cost savings, the repayment ability (financially permissive) and other factors.

Where relevant and possible, public funding made available for multi-family housing and public buildings should be contingent (on reconnection to the district heating system after renovation (or at least to recommend so).

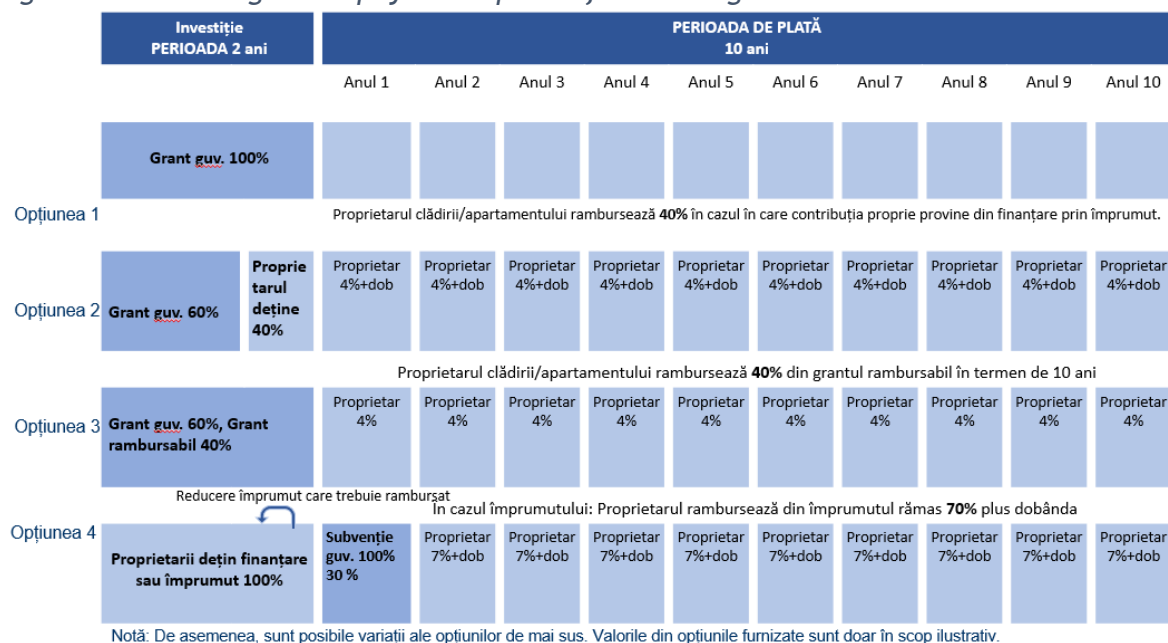
Table 11. Financial options and grants for implementation of the Strategy

Advantages	Disadvantages
Grant (100 %)	
<ul style="list-style-type: none"> • Attractive for building/apartment owners • Simpler to manage than the loan • Easier to manage for central government buildings 	<ul style="list-style-type: none"> • Requires sufficient public financial resources • Reduction of subsidies to achieve investment efficiency • Not sustainable

	<ul style="list-style-type: none"> Creates unmet demand and expectations for free public funding
Loan + Grant	
<ul style="list-style-type: none"> Brings more discipline to the project and the beneficiary Facilitates private financial sector participation Reinvestment of loan repayments for new projects 	<ul style="list-style-type: none"> More complicated financing mechanisms than for a grant Less attractive for building/apartment owners than a grant Financial intermediaries may not be willing to lend to municipalities or multi-family buildings.
Partially repayable grant (from 20 to 60 %)	
<ul style="list-style-type: none"> Brings more discipline to the project and the beneficiary Reinvestment of grant repayments for new projects Less complicated financing mechanism than for a loan Simpler transition from current municipal programmes (grant - 100 %) or ROP (grant - 85 %), as conditions remain very attractive for building/apartment owners 	<ul style="list-style-type: none"> Requires sufficient public financial resources for the non-repayable part of the subsidy Need for specific programmes for vulnerable groups Less attractive for building/apartment owners than a grant Provisions are needed to allow for repayment by municipalities under the budgetary system

Based on the various financing options, four options were analysed below, as briefly shown in Figure 24.

Figure 24. Financing and repayment options for building renovations



		Investment 2-year PERIOD		PAYMENT PERIOD 10 years							
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Option 1	Gov. grant 100 %	Building/apartment owner repays 40 % if their own contribution comes from loan financing.									
	Gov. grant 60 %	Owner has 40 %	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest	Owner 4 %+inte rest
Option 2	Gov. grant 60 %	Building/apartment owner repays 40 % of the repayable grant within 10 years									
	Gov. grant 60 %, Repayable grant 40 %	Reduction of loan to be repaid									
Option 3	Gov. grant 60 %, Repayable grant 40 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %	Owner 4 %
	Owners have funding or loan 100 %	Gov. subsidy 100 % 30 %	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest	Owner 7 %+inte rest
Option 4	Owners have funding or loan 100 %	In the case of loan: Owner repays from remaining loan 70 % plus interest									

Note: Variations of the above options are also possible. The values in the options provided are for illustrative purposes only

4. Financing scheme options for building renovation

Based on the above analyses, the following **options** will be analysed as a matter of priority for each market segment in the implementation of the Strategy:

- Institutional Option 1 and Financing Option 1 for **central government buildings**;
- Institutional Option 1 and Financing Option 3 for **local government buildings**;
- Institutional Option 2 and Financing Option 3 for **local multi-family buildings**;
- Institutional Option 4 and Financing Option 2 for **single-family houses**;
- Institutional Option 4 and Financing Option 4 (without grant) for **commercial buildings**.

(See Sections 25 to 29.)

The use of a ‘Fund’ can help mobilise the necessary funding for building renovation and assume day-to-day management by designating a Programme Implementation Unit (PIU). While financial intermediaries should be encouraged to take over medium- to long-term co-financing, discussions with local banks have revealed that they are not yet willing to take the risks associated with loans to some municipalities and OAs/apartment owners, and the financing costs to cover the risks they perceive may be high. However, as repayments to the ‘Fund’ are made, financial intermediaries should be introduced into the programme over time. Implementing intermediaries can be an important link between the ‘Fund’ and building owners/owners’ associations and can ensure the sound implementation of the programme.

However, given the early development of maintenance companies and of other potential implementing intermediaries, the Programme should provide in parallel technical assistance to promote a wide range of categories of implementing intermediaries, including:

- (a) local government authorities, some of which may be able and willing to lend and receive repayments;
- (b) companies providing financially sound utility services in the light of the current EEO regulations; and
- (c) companies providing operating, maintenance, facility management services / ESCOs / construction companies, which may be encouraged to take on such functions in parallel programme activities.

In fact, in some countries (e.g. Lithuania) with developed maintenance companies, the need to establish owners' associations was less essential as these companies can identify investment needs, present them to homeowners directly, monitor voting and implement approved projects that would be paid out from homeowners' monthly fees.

Figure 25. Institutional framework and financing proposed for **central government buildings**

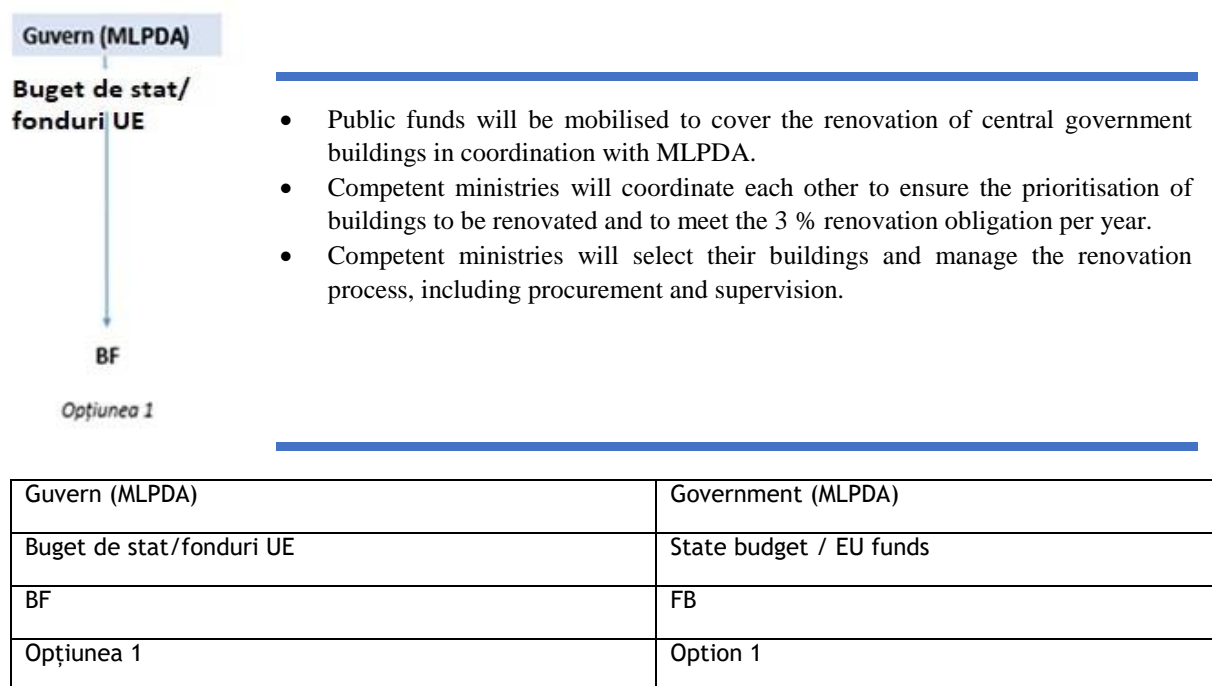
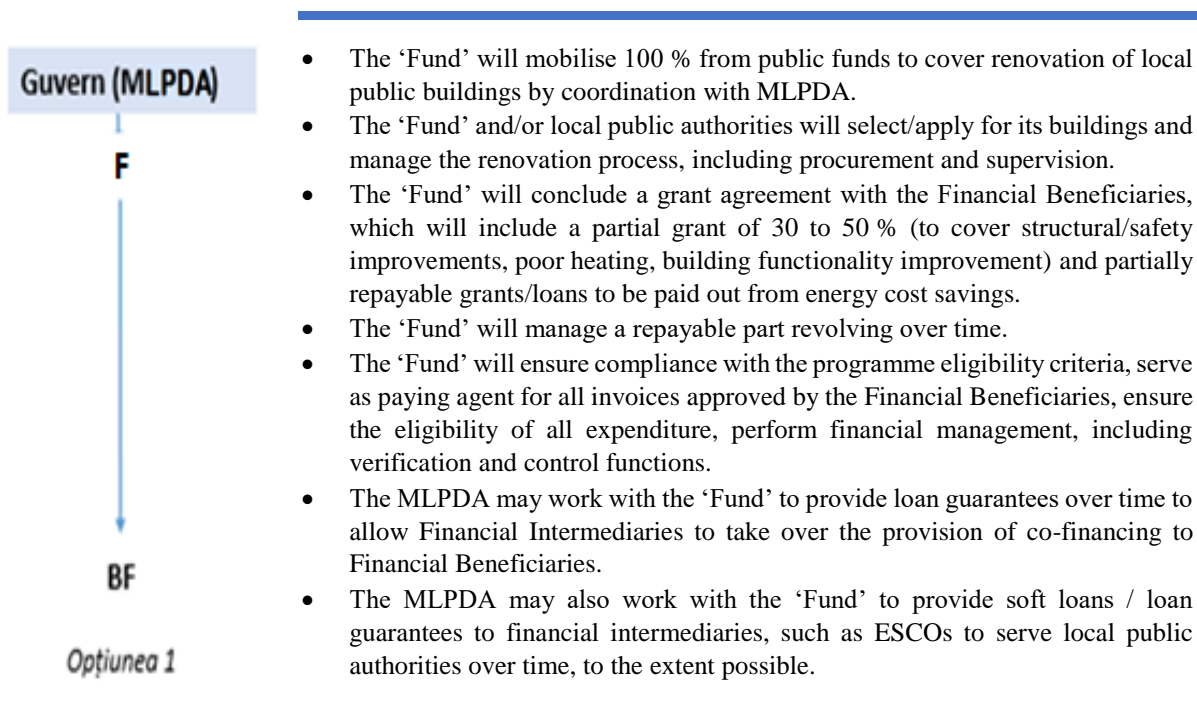


Figure 26. Institutional framework and financing proposed for local government buildings



Guvern (MLPDA)	Government (MLPDA)
F	F
BF	FB
Opțiunea 1	Option 1

Figure 27. Institutional framework and financing proposed for multi-family buildings³¹

³¹ Owners’ associations must be actively involved in the process, in particular in the implementation of renovation and acceptance, as final beneficiaries of the renovation. This applies to all financial/institutional options.

Guvern (MLPDA)



Opțiunea 2

- The ‘Fund’ will mobilise 100 % of public funds to cover renovation of multi-family buildings by coordination with the MLPDA.
- Implementing Intermediaries, who will be primarily local public authorities at the early stages, but eventually include maintenance companies and other entities, will select multi-family buildings and apply for the national programme, receive partial grants (up to 80 % in the early years, decreasing over time) and repayable grants (starting from 20 % and increasing over time), employ contractors and supervise building renovation, collect fees/repayments from owners and reimburse the ‘Fund’.
- The MLPDA will have to promote the creation and recruitment of other Implementing Intermediaries to join the programme over time, and training and Technical Assistance for new Implementing Intermediaries / local public authorities may be needed.
- The ‘Fund’ will ensure compliance with the programme eligibility criteria, serve as paying agent for all invoices approved by the Financial Beneficiaries, ensure the eligibility of all expenditure, perform financial management, including verification and control functions.

Guvern (MLPDA)	Government (MLPDA)
F	F
II	II
BF	FB
Opțiunea 2	Option 2

Figure 28. Institutional framework and financing proposed for *single-family houses*

Guvern (MLPDA)

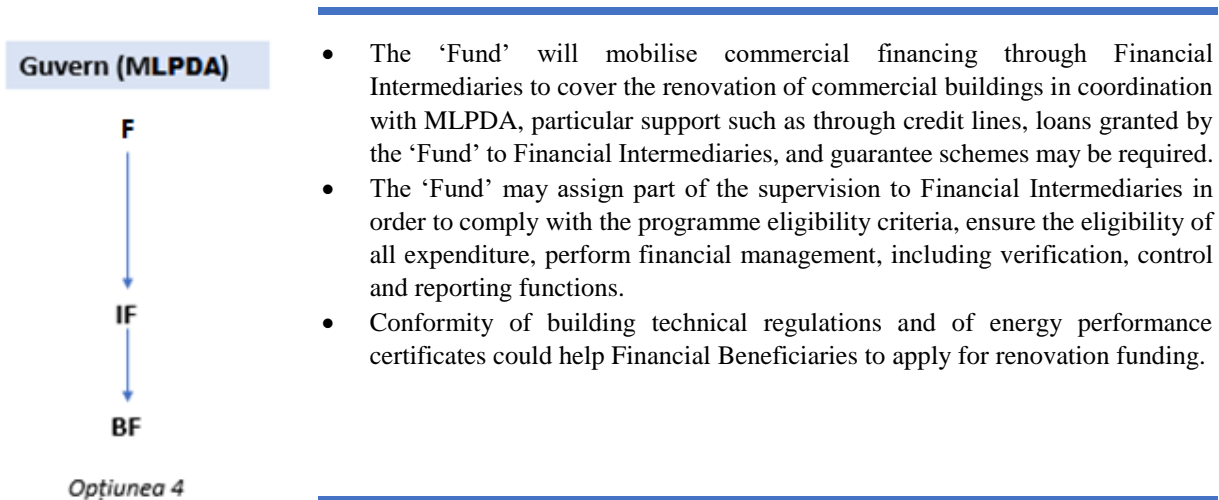


Opțiunea 4

- The ‘Fund’ will mobilise public funds to cover renovation of single-family houses in coordination with the MLPDA.
- The ‘Fund’ will provide partial grant support (from 20 to 30 %) and help Financial Intermediaries establish financing schemes (such as through credit lines, loans from the ‘Fund’ to Financial Intermediaries, guarantee schemes) for co-financing requirements.
- The ‘Fund’ may assign part of the supervision to Financial Intermediaries in order to comply with the programme eligibility criteria, ensure the eligibility of all expenditure, perform financial management, including verification and control functions.

Guvern (MLPDA)	Government (MLPDA)
F	F
IF	FI
BF	FB
Opțiunea 4	Option 4

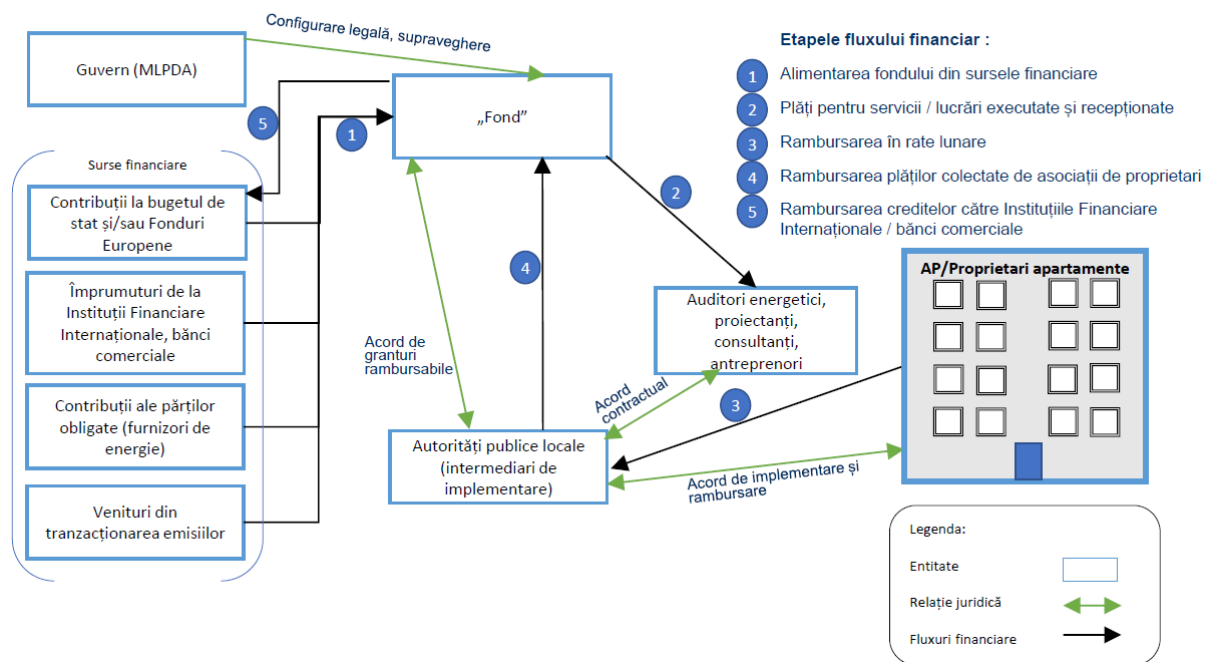
Figure 29. Institutional framework and financing proposed for commercial buildings



Guvern (MLPDA)	Government (MLPDA)
F	F
IF	FI
BF	FB
Opțiunea 4	Option 4

Figure 30 below is an example of financial flows for **multi-family buildings**.

Figure 30. Institutional and financial flows recommended for multi-family buildings

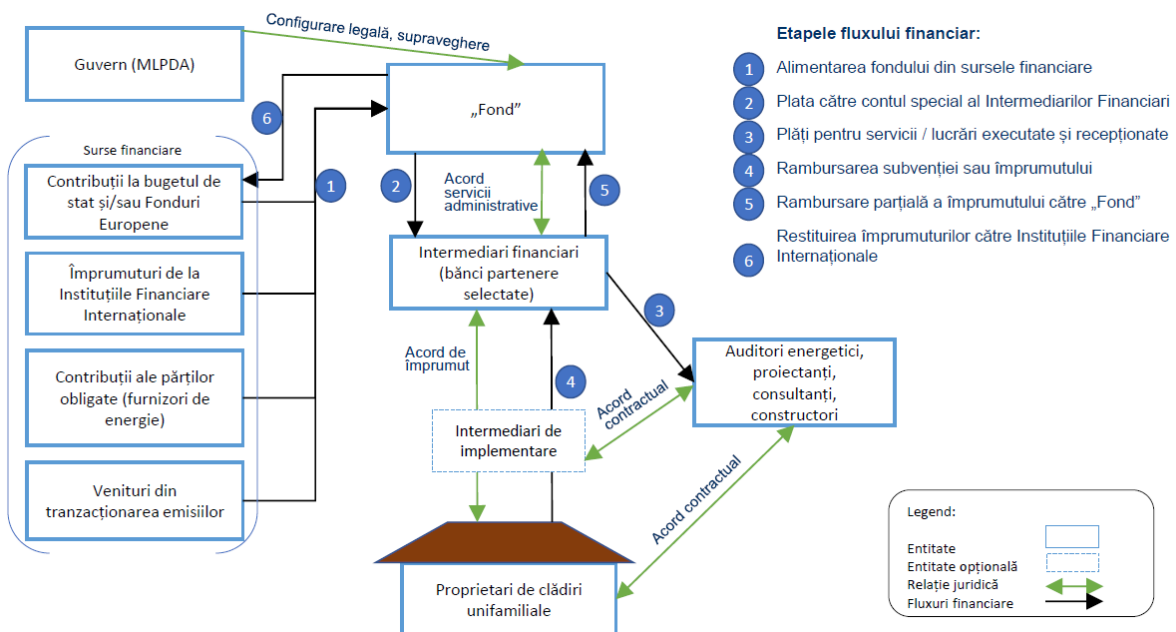


Gvern (MLPDA)	Government (MLPDA)
Configurare legală, supraveghere	Legal configuration, supervision
Surse financiare	Financial sources
Contribuții la bugetul de stat și/sau Fonduri Europene	Contributions to the State budget and/or EU Funds
Împrumuturi de la Instituții Financiare Internaționale, bănci comerciale	Loans from International Financial Institutions, commercial banks
Contribuții ale părților obligate (furnizori de energie)	Contributions from obligated parties (energy suppliers)
Venituri din tranzacționarea emisiilor	Revenues from emissions trading
"Fond"	'Fund'
Acord de granturi rambursabile	Repayable grant agreement
Autorități publice locale (intermediari de implementare)	Local public authorities (implementing intermediaries)
Etapele fluxului financiar:	Stages of the financial flow:
Alimentarea fondului din sursele financiare	Provisioning of the Fund from financial sources
Plăți pentru servicii / lucrări executate și recepționate	Payments for services/works performed and taken over
Rambursarea în rate lunare	Repayment in monthly instalments
Rambursarea plăților colectate de asociații de proprietari	Reimbursement of payments collected by owners' associations
Rambursarea creditelor către Instituțiile Financiare Internaționale / bănci comerciale	Loan repayment to International Financial Institutions / commercial banks
Acord contractual	Contractual arrangement

Auditori energetici, proiectanți, consultanți, antreprenori	Energy auditors, designers, consultants, contractors
Acord de implementare și rambursare	Implementation and repayment agreement
AP / Proprietari apartamente	OAs / apartment owners
Legenda	Legend
Entitate	Entity
Relație juridică	Legal relationship
Fluxuri financiare	Financial flows

Similarly, the example of financial flows for **single-family houses** is shown in Figure 31 below.

Figure 31. Institutional and financial flows recommended for single-family houses

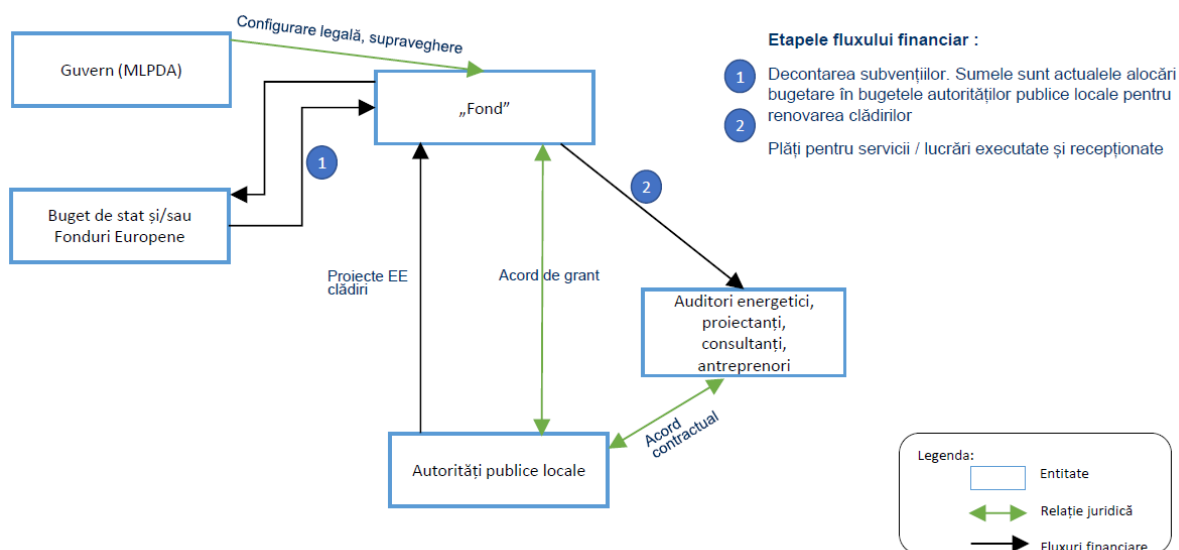


Gvern (MLPDA)	Government (MLPDA)
Configurare legală, supraveghere	Legal configuration, supervision
Surse financiare	Financial sources
Contribuții la bugetul de stat și/sau Fonduri Europene	Contributions to the State budget and/or EU Funds
Împrumuturi de la Instituțiile Financiare Internaționale, bănci comerciale	Loans from International Financial Institutions, commercial banks
Contribuții ale părților obligate (furnizori de energie)	Contributions from obligated parties (energy suppliers)

Venituri din tranzacționarea emisiilor	Revenues from emissions trading
”Fond”	‘Fund’
Acord servicii administrative	Administrative services agreement
Intermediari financiari (bănci partenere selectate)	Financial intermediaries (selected partner banks)
Acord de împrumut	Loan agreement
Intermediari de implementare	Implementing intermediaries
Proprietari de clădiri unifamiliale	Single-family building owners
Etapile fluxului financiar	Stages of the financial flow
Alimentarea fondului din sursele financiare	Provisioning of the Fund from financial sources
Plata către contul special al Intermediarilor Financiari	Payment to Financial Intermediaries’ special account
Plăți pentru servicii / lucrări executate și recepționate	Payments for services/works performed and taken over
Rambursarea subvenției sau a împrumutului	Repayment of the subsidy or loan
Rambursarea parțială a împrumutului către ”Fond”	Partial loan repayment to the ‘Fund’
Restituirea împrumuturilor către Instituțiile Financiare Internaționale	Loan repayment to International Financial Institutions
Acord contractual	Contractual arrangement
Acord contractual	Contractual arrangement
Auditori energetici, proiectanți, consultanți, constructori	Energy auditors, designers, consultants, builders
Legendă	Legend
Entitate	Entity
Entitate opțională	Optional entity
Relație juridică	Legal relationship
Fluxuri financiare	Financial flows

Figure 32 below is an example of financial flows for **central/local government buildings**.

Figure 32. Institutional and financial flows recommended for local government buildings



Guvern (MLPDA)	Government (MLPDA)
Configurare legală, supraveghere	Legal configuration, supervision
Buget de stat și/sau Fonduri Europene	State budget and/or EU Funds
"Fond"	'Fund'
Proiecte EE clădiri	Building EE projects
Acord de grant	Grant agreement
Autorități publice locale	Local public authorities
Acord contractual	Contractual arrangement
Auditori energetici, proiectanți, consultanți, antreprenori	Energy auditors, designers, consultants, contractors
Etapele fluxului financiar:	Stages of the financial flow:
Decontarea subvențiilor. Sumele sunt actualele alocări bugetare în bugetele autorităților publice locale pentru renovarea clădirilor	Paying out of subsidies. The amounts are the current budget allocations in the local public authorities' budgets for building renovation
Plăți pentru servicii / lucrări executate și recepționate	Payments for services/works performed and taken over
Legendă:	Legend:
Entitate	Entity
Relație juridică	Legal relationship
Fluxuri financiare	Financial flows

5. Budget needed

As mentioned in **Chapter VIII**, on the basis of calculations under the adopted scenario and statistical sampling, an estimated total financing of **EUR 12.8 billion** (approximately RON 64 billion) is needed for the investment costs to implement the recommended scenario by 2030.

This fund should be made up of all categories of funds, both public and private, taking into account statistical modelling of the number of buildings.

In addition, depending on the selected implementation mechanism, around EUR 700 million (approximately RON 3.5 billion) must be mobilised to support the development of renovation projects, market development and programme management costs (or approximately EUR 70 million, i.e. RON 350 million, each year until 2030).

It is also estimated that central government will have to provide between **EUR 40 million** (approximately RON 200 million) and **EUR 200 million** (approximately RON 1 billion) **annually** to support the repayment of investments to socially vulnerable persons. A combination of direct budget support, use of financing and private financing contributions could enable the necessary financing to be mobilised.

Box 9 provides an overview of the breakdown of investments by type of buildings and potential financing source for the first decade of the Strategy, i.e. until 2030.

Box 9: Breakdown of investments by type of building and potential financing source by 2030

Central government buildings (EUR 300 million from public budget / EU funds)

- Option 1 (100 % budget support) may be the most suitable for central government buildings as it is based on a 100 % subsidy option.
- If there are savings, budget allocations for energy and maintenance costs can be reduced for renovated buildings.

Local government buildings (EUR 1.3 billion of which ~ EUR 700 million from public budget / EU funds and ~ EUR 600 million from the private sector)

- Option with a revolving soft loan and/or a partial/repayable subsidy.

Multi-family buildings (EUR 7.6 billion of which ~ EUR 3.5 billion from public budget / EU funds, ~ EUR 4.2 billion from the private sector)

- Option with a revolving loan and a partially repayable subsidy. For example, an initial maximum level of 80 %, falling to 60 % after 5 years, to 40 % after 10 years.
- Reimbursed amounts could be collected and used to reimburse IFIs or renewed under the programme for future stages.

Single-family houses (EUR 3.2 billion of which ~ EUR 500 million from public budget / EU funds, EUR 2.7 billion from the private sector)

- Mortgages and partial subsidies for thermal insulation, mechanical ventilation with heat recovery and RES installations.

Commercial buildings (~ EUR 300 million from the private sector)

- Own financing of commercial building owners.
- Loans from commercial banks.

For the first implementation period, until 2030, it is estimated that approximately **EUR 5 billion** (approximately RON 25 billion) will need to be mobilised from the State budget as

well as through a package of financial measures which will include grants from EU funds under the National Reconstruction and Resilience Plan and the Regional Operational Programmes, in line with the legislation on public finance, public debt and the budgetary fiscal strategy.

In the first years until the establishment and operationalisation of the 'Fund', existing financing mechanisms, governed by the current programmes financed from the State budget and EU funds (e.g. the National Programme for Improving the Energy Performance of Residential Blocks, the Programme for the Heating Renovation of Residential Buildings under Government Emergency Order No 69/2010, the Regional Operational Programmes, the Energy-Efficient House Programme and the like) will be used.

Thus, in view of the 2021-2027 Cohesion Policy, investments in residential buildings as well as investments in public non-residential buildings are supported under the Regional Operational Programmes, in particular in the urban environment, with a view to increasing energy efficiency, addressing also in an integrated manner structural consolidation measures according to the level of exposure and vulnerability to earthquakes.

The total estimated allocation for these interventions, between 2021 and 2027, at the level of the eight Regional Operational Programmes is above EUR 870 million, of which EUR 700 million from the European Regional Development Fund.

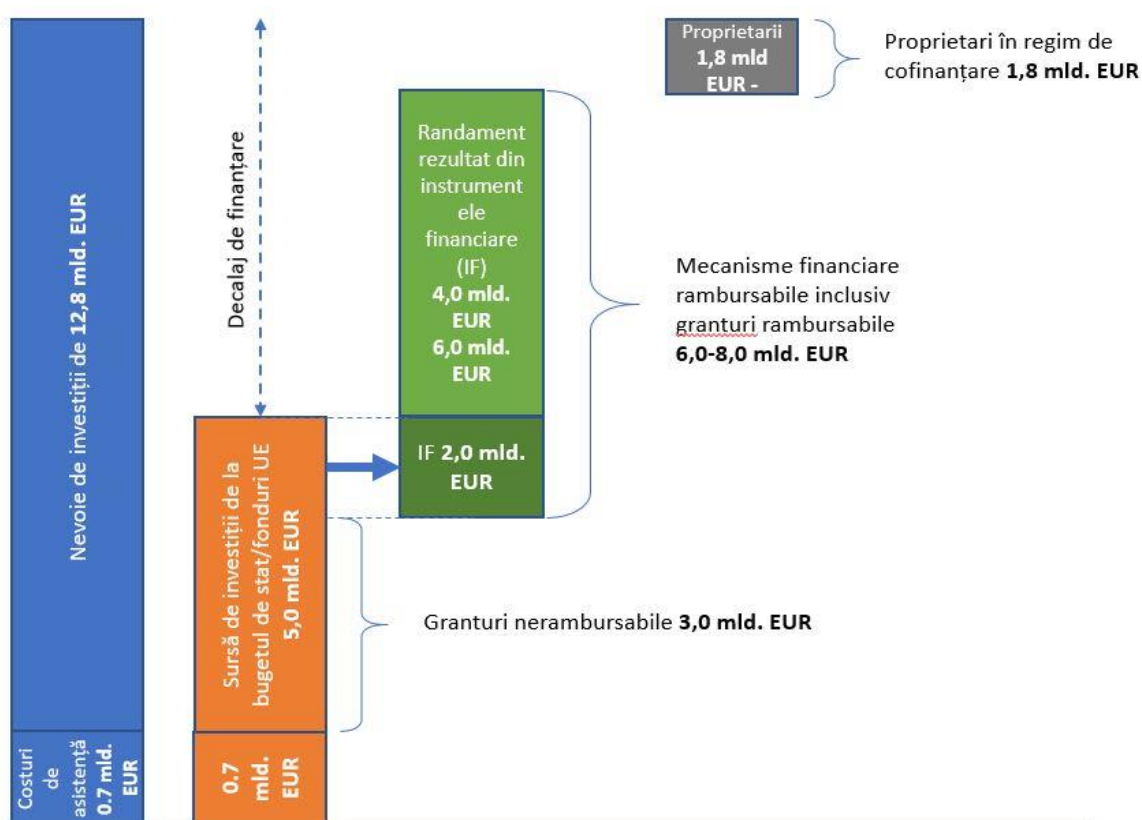
Furthermore, the National Recovery and Resilience Plan, as approved by Government Emergency Order No 155/2020 on certain measures for drawing up the National Recovery and Resilience Plan needed by Romania to access repayable and non-repayable external funds under the Recovery and Resilience Facility, envisages investments in increasing the energy performance of public buildings (including historic buildings) and multi-storey residential buildings. The total estimated allocation for these interventions, between 2021 and 2023, is EUR 1.25 billion.

By reference to the estimated need, approximately EUR 3 billion (RON 15 billion) should be dedicated to non-repayable grants, while approximately EUR 2 billion (RON 10 billion) should be employed to use EUR 4 to 6 billion (RON 20 to 30 billion) in financial instruments to reduce the financing gap. In addition, owners are expected to contribute approximately EUR 1.8 billion (RON 9 billion).

Financial support for renovations must also include **technical assistance and support for programme management** (namely management and administration of programmes and funds, subsidies for project preparation, implementation of training programmes, communication/awareness-raising campaigns on benefits and guidance, development of the database for monitoring building renovation and data collection mechanisms, knowledge transfer to the market and beneficiaries on how to optimise consumption and so on). Such interventions would require a budget of approximately EUR 70 million annually (RON 350 million) for the next 10 years, for a total of approximately EUR 700 million by 2030 (RON 3.5 billion), and costs are broken down in Table 12.

Figure 33 below summarises the financing options to meet investment needs.

Figure 33. Financing and use options



Costuri de asistență 0.7 mld. EUR	Assistance costs EUR 0.7 billion
Nevoie de investiții de 12,8 mld. EUR	Investment need of EUR 12.8 billion
0.7 mld. EUR	EUR 0.7 billion
Sursă de investiții de la bugetul de stat/fonduri UE 5,0 mld. EUR	Source of investments from State budget / EU funds EUR 5.0 billion
Decalaj de finanțare	Financing gap
Granturi nerambursabile 3,0 mld. EUR	Non-repayable grants EUR 3.0 billion
IF 2,0 mld. EUR	FI EUR 2.0 billion
Randament rezultat din instrumentele financiare (IF) 4,0 mld. EUR, 6,0 mld. EUR	Return on financial instruments (FI) EUR 4.0 billion, EUR 6.0 billion
Mecanisme financiare rambursabile inclusiv granturi rambursabile 6,0 - 8,0 mld. EUR	Repayable financial mechanisms including repayable grants from EUR 6.0 to 8.0 billion
Proprietarii 1,8 mld. EUR	Owners EUR 1.8 billion
Proprietari în regim de cofinanțare 1,8 mld. EUR	Owners by co-financing EUR 1.8 billion

Table 12. Breakdown of the technical assistance cost estimate by type of activity

Technical assistance, renovation programme preparation and management	EUR million
Structure of the governance mechanism strategy	0.5
Evaluation of financial mechanisms and development of evaluation programmes	0.5

Establishment of the Energy Efficiency Fund	0.5
Preparation of the Energy Efficiency Fund for operations	0.5
Development of an IT system to monitor the implementation of the Strategy, development of IT systems for Energy Efficiency Fund operations with other IT system interoperability: central buildings database (register), Energy Performance Certificates database, Structural Funds Management Information System.	1.5
Selection of participating financial intermediaries	0.5
Communication campaigns	10
Administrative costs of financial intermediaries	200
Establishment of the network of training facilities, which authorise and offer training courses and organisation of courses (renovation + NZEB)	35
Energy Efficiency Fund administration costs	50
Costs of preparation of renovation projects (energy audit, expertise, design costs)	400
TOTAL:	700

Chapter XI Legal implications

Table 13 below shows the main changes to the regulatory framework underpinning the implementation of the key measures proposed in the LTRS. The mechanism described above, comprising financial intermediaries and implementing intermediaries, can only operate if the public finance legislation is amended.

Thus, if the public finance legislation in force is amended, it will be possible to implement the financing mechanism presented and, if it the scenario of amending that legislation is not feasible, its simplification will be envisaged in compliance with the legislation in force.

Table 13. Legal implications of the key measures of LTRS

Action	Legislative acts to be drawn up and approved
Main legislative requirements	
Drawing up the LTRS action plan, approving the LTRS action plan and governance structure for the LTRS	Government Decision approving: <ul style="list-style-type: none"> - the Action Plan for implementation of the LTRS; - the establishment of the inter-ministerial coordination committee; definition of the responsibilities of each institution.
Completing the ESCO Regulation	MEEMA Order implementing ESCO in the residential sector
Making the Fund operational	Drawing up and approving the law/order establishing the 'Fund' Financial mechanism selected for the LTRS (sources, management, operationalisation)

Updating technical rules	MLPDA Orders for building technical regulations including optimal costs; improving fire safety rules for construction; guidelines on NZEB
Revising the Owners' Associations Law	Assessing the need to amend Law No 196/2018 integrating renewable energy sources (prosumers) and strengthening the role of owners' associations in supervising renovation
Secondary legislative requirements	
Market-based energy pricing	Amending Government Emergency Order No 114/2018 establishing public investment measures and budgetary fiscal measures, amending certain legislative acts and extending certain time-limits, as subsequently amended and supplemented, and Government Emergency Order No 19/2019 amending and supplementing certain legislative acts, as subsequently amended, regulating energy prices
Integrated National Energy and Climate Plan	Approving the INECP by Government Decision
District heating	Amending revised Law No 325/2006 on the public heat supply service, as subsequently amended
Ensuring the regulatory framework for the use of smart technology	Amending Law No 123/2012 to speed up smart metering before the current time-limit 2028; including smart networks; ANRE Order for Smart Metering, ANRE Order for the pilot project on the implementation of BEM in public and commercial buildings
Updating energy poverty legislation	Revising Law No 196/2016 to include heating aid and introducing disposable income criteria
Developing and approving the action plan on energy poverty	Government Decision approving the action plan prepared by the Minister for Economy, Energy and Business Environment, and the Ministry of Labour and Social Protection

Chapter XII Monitoring and evaluation procedures

1. Public consultation during the implementation of the Strategy

The LTRS implementation plan should also include the design and delivery of communication mechanisms to ensure that stakeholders can express their views on current and planned activities; mechanisms to call for ideas and feedback, present implementation progress and disseminate challenges and solutions/lessons learned.

In this respect, the following public consultation mechanisms are foreseen.

- Formalising a broad group of stakeholders in the form of a regular forum for consultation, policy-making and feedback on practical problems and barriers to building renovation. The group of stakeholders mobilised for the preparation of this Strategy could serve as a basis for future commitments in this regard.
- Organising regular consultations in the form of annual conferences with key stakeholders on the progress of implementation of the Strategy and discussions on corrective action and proposed improvements to the implementation of the Strategy, which could be a guiding tool for the management committee to take corrective action.
- Strengthened communication with the public to explain why energy efficiency is important, the potential for building renovation, social and economic benefits, Government's vision and programme plans, and how other stakeholders can collectively contribute to this vision. Dissemination of results and positive impacts can also be of utmost importance in conducting to the development of a constituency to support the continued financing and implementation of the LTRS and to ensure continued political commitment to LTRS objectives.

As regards improving communication with the public, it will be crucial to run the information and awareness-raising campaign for the successful implementation of the LTRS. The main activities must include:

- national information campaigns on TV, radio, internet and social media to reach target groups and promote renovation programmes;
- educational campaigns to inform users of the efficient use of energy and the setting of an adequate local comfort temperature, avoiding room overheating, and of recommended renovation measures and the benefits of applying them to housing conditions;
- information campaigns for office building users, through the distribution of brochures, leaflets and short briefing sessions; they will also be informed of the negative impact of opening windows when heating or cooling systems are in operation, as well as of the need for proper room ventilation, for reasons of hygiene and health;
- fostering the collection of information from building users and owners, who are encouraged to regularly share information on the levels of thermal comfort and indoor air quality (too cold or hot, air condition, dry air, air currents disturbing air in the working area, noise level too high from ventilators or air treatment facilities);
- promoting the use of energy-saving appliances, equipment and computers; and
- information on renovation programmes and availability of financing options, costs of implemented measures, actual benefits achieved, climate solutions for indoor air and use of renewable energy sources.

2. Governance

It is necessary to design formal governance arrangements for the LTRS, including a coordination mechanism for policy development and implementation at national level. Mechanisms also should be developed for policy and programme coordination between

ministries and public authorities, between central and local governments, between government stakeholders and non-government stakeholders, and between the Government and its citizens. This should include communication mechanisms to convey information on current and planned activities; mechanisms to call for ideas and feedback, dissemination of implementation progress, dissemination of challenges and solutions/lessons learned; and mechanisms to perform other tasks as defined in the LTRS.

Figure 34 shows a potential governance framework for the LTRS and its implementation. The framework will be defined and approved by Government Decision, together with the Action Plan for implementation of this Strategy.

Guvernul României	Romanian Government
MLPDA	MLPDA
MFP	MFP
ANRE	ANRE
MEEMA	MEEMA
MMAP	MMAP
INCD	INCD
Altele	Other
Membri	Members
Raportează	Reports to
Comitetul de conducere (CC)	Management Committee (MC)
MLPDA asigură activitatea tehnică a comitetului de conducere	MLPDA covers the technical work of the management committee
Funcții ale CC	MC functions
Raportare	Reporting
INCD / altă agenție publică	INCD / other public agency
Colectarea datelor privind fondul de clădiri	Collection of building stock data
Colectarea datelor privind certificatele de performanță energetică	Collection of data on energy performance certificates
Facilități în formarea profesională	Training facilities
Implementarea EPBD	EPBD implementation
Programare / Monitorizare	Programming/Monitoring

Implementarea SRTL	LTRS implementation
Programare / Monitorizare	Programming/Monitoring
Monitorizarea, analiza și raportarea indicatorilor SRTL și EPBD	Monitoring, analysing and reporting LTRS and EPBD indicators
INCD sau o altă agenție publică	INCD or other public agency
Mecanisme financiare și surse de finanțare constituite pentru: clădiri multifamiliale, locuințe unifamiliale, clădiri publice și comerciale	Financial mechanisms and sources of finance established for: multi-family buildings, single-family houses, public and commercial buildings
Autoritatea de Management pentru fonduri europene structurale, Instituțiile Financiare Internaționale etc.	Managing Authority for EU structural funds, International Financial Institutions, etc.
Îmbunătățire a normelor / standardelor	Improvement of rules/standards
Îmbunătățire a controalelor și inspecțiilor	Improvement of controls and inspections
Îmbunătățire a certificatelor de performanță energetică	Improvement of energy performance certificates
Sărăcia energetică și alte teme orizontale	Energy poverty and other horizontal issues
Departamentele relevante ale MLPDA și grupuri de lucru cu alte ministere	Relevant MLPDA departments and working groups with other ministries
Colectarea datelor privind indicatorii de implementare a EPBD	Collection of data on EPBD implementation indicators
Agenții naționale pentru renovarea clădirilor	National building renovation agencies
Colectarea datelor privind renovarea clădirilor	Collection of building renovation data

An inter-ministerial Coordination Committee will thus be set up to monitor the implementation of the Strategy. The Coordination Committee will include ministries, agencies and other institutions with key responsibilities and technical knowledge of the renovation strategy. The General Secretariat of the Romanian Government and the MLPDA establish the essential connection with other ministries and institutions (to be consulted on specific issues related to certain parts of the Strategy and programmes).

The Committee will take into account coordination issues, identify and sort out implementation problems, develop strategies to address key market failures and identify resources for programme needs. This will help strengthen the level of accountability and cooperation with other ministries at national level (Ministry of Economy, Energy and Business Environment, Ministry of Environment, Water and Forestry, Ministry of Public Finance) and with relevant departments. The Coordination Committee should also facilitate communication on the renovation programmes implemented by each ministry involved, supporting MLPDA's efforts to build accurate databases and reporting. The secretariat of the inter-ministerial committee and the monitoring of the work of competent ministries may be provided by the strategy department of the General Secretariat of the Government.

For successful implementation, the MLPDA must be provided with adequate resources to fulfil its institutional role as lead authority, and must have the administrative capacity to improve implementation, policy support, data management and monitoring to ensure that all elements of the LTRS can be efficiently implemented.

The detailed Action Plan for implementation of the LTRS will have to set out roles and responsibilities and to clarify its authority to collect data, to enforce regulations, to disseminate information and tools, to design and launch financing instruments, to provide training, to coordinate efforts and other functions as defined in the programme plans.

3. Monitoring, reporting and evaluation

As part of the governance framework for the LTRS, an efficient monitoring and evaluation system needs to be developed to better monitor progress and provide feedback for future policy and programme improvements. Currently, the only monitoring system in place for energy efficiency is the one designed under the NEEAP, which supports data collection by ANRE on broader energy efficiency measures, although the monitoring of building renovation is rather limited and fragmented and building owners are not obliged to report regularly. The scope of the monitoring and evaluation of the NEEAP must be extended to include all available energy-efficiency building renovation programmes with budgetary financing and by providing credits and estimates of fully privately funded building renovations.

For the purpose of implementing the LTRS, a comprehensive database comprising building stock, EPCs, information on energy fuels and energy consumption, and information on renovation programmes must be established (see also Section 5 of Chapter VII).

Certain data, including data on developments in the private sector, could be collected through automated processes; for example, a database where EPCs are generated via the MLPDA website. For the collection of national building stock data, the requirements of the INSPIRE Directive will be taken into account in order to publish an annual summary report of the building stock.

These summary reports may include different building characteristics (such as number of buildings, total useful floor area, construction period, climatic zone, main materials used for the structure, main materials used for the envelope, energy consumption, heating/fuel source, seismic risk class, reinforcement programmes and the like)³².

Comprehensive monitoring and evaluation may better reflect policies or implementation deficiencies, e.g. the need for programmes targeting energy efficiency in individual houses in poor rural areas whose owners cannot afford the existing programmes, such as Emergency Order No 69/2010 (subsidised loans) or Casa Verde Plus (a partial grant for interventions requiring a significant advance payment from beneficiaries). Regular surveys may pursue the level of satisfaction, benefits, concerns and other feedback to improve future programmes.

The Coordination Committee of the proposed LTRS governance structure must be responsible for monitoring and reporting the roadmap indicators in implementation and its secretariat must be authorised to request data reporting from each institution. This approach requires a robust database (including building stock, EPCs, renovation programmes) and regular monitoring of roadmap indicators in implementation. The functioning of the financing instrument that could be established for the LTRS (i.e. the 'Fund') should also be monitored by the Board. The reports monitoring the LTRS implementation should be published at least annually and consultations should be held with a wider group of stakeholders.

4. Main implementation actions

Table 14 centralises the main actions to be taken after the approval of the LTRS to ensure its implementation. After the Government has approved the LTRS and taken final decisions on the various policy options, implementation approaches, financing mechanisms, institutional structures and measures, detailed actions and programme proposals for the implementation of the Strategy need to be prepared in particular.

³² The 2017 LTRSs in the Walloon Region (Belgium), France and Malta are examples of good practice in providing an overview of the national building stock.

Table 14 - Main actions for implementing the Strategy

Main actions	Description of main actions	Responsible authority	Planning per year, quarter (Q)	Budgeting for technical assistance
Organising the structure of LTRS governance mechanism	Appointing, by decision of the Prime Minister, the Coordination Committee to draw up the Action Plan for Implementation of the Long-Term Renovation Strategy and to monitor its implementation,	GSGR, MLPDA, competent ministries	2020 Q4	no
	Organising the LTRS governance mechanism	Management Committee	2020 Q4	no
Drawing up and approving the Action Plan for implementation of the LTRS	Drawing up the Action Plan for implementation of the LTRS, consulting stakeholders and approving it by Government Decision (including inter-ministerial endorsement)	Coordination Committee	2020 Q4	no
	Identifying technical assistance (TA) to develop actions needed to implement the LTRS action plan	Coordination Committee	2021 Q1	no
	Developing an IT system to monitor the implementation of the LTRS on technical indicators	MLPDA with technical assistance	2021 Q2	yes
Amending the regulatory framework required to implement the LTRS	Gradually amending the legislative acts required to implement the actions set out in	Competent ministries	2021-2022	no

	the Action Plan for implementation of the LTRS			
Developing the Renovation Programme in line with the general objectives of the LTRS and the action lines	Preparing the financial mechanisms and defining the financing objectives and the renovation investment strategy: <ul style="list-style-type: none"> • central government buildings; • local government buildings; • multi-family buildings; • single-family houses; • commercial buildings. 	Competent ministries, with technical assistance	2021 Q1	yes
	Preparing the financing plan and funding sources for implementing the renovation programme	Competent ministries, with technical assistance	2021 Q1	yes
	Developing and approving the renovation programme for priority building types, including eligibility, preparation, implementation and financing requirements	Competent ministries, with technical assistance	2021 Q2	yes
	Drawing up the description of the renovation programme for local government buildings, including eligibility, preparation, implementation and financing requirements	Competent ministries, with technical assistance	2021 Q2	yes
	Drawing up the description of the renovation	Competent ministries, with	2021 Q2	yes

	programme for multi-family buildings, including eligibility, preparation, implementation and financing requirements	technical assistance		
	Drawing up the description of the renovation programme for single-family houses, including eligibility, preparation, implementation and financing requirements	Competent ministries, with technical assistance	2021 Q2	yes
	Drawing up the description of the renovation programme for commercial buildings, including eligibility, preparation, implementation and financing requirements	Competent ministries, with technical assistance	2021 Q2	yes
	Drawing up detailed guidelines for beneficiaries for the preparation and implementation of all building renovation projects	Competent ministries, with technical assistance	2021 Q2	yes
	Establishing mechanisms for financing renovation projects	Conducting an institutional analysis on financing mechanisms	MLPDA together with MFP and MEEMA	2021-2022
	Proposals to amend the legislative framework, where appropriate	Competent ministries	no	
	Adapting the mechanisms for implementing the LTRS under the assumption of no amendments to the public finance legislation	Competent ministries	no	

Ensuring LTRS communication activities	Drawing up the communication strategy	MLDPA with partners and technical assistance	2021 Q4	yes
	Drawing up the communication plan	MLDPA with partners and technical assistance	2021 Q4	yes
	Creating digital social networking platforms for programme communication	MLDPA with partners and technical assistance	2021 Q4	yes
	Launching awareness-raising campaigns on TV, radio, social networks (Facebook)	MLDPA with partners and technical assistance	2021 Q4	yes
	Launching programme kick-off events	MLDPA with partners and technical assistance	2021 Q4	yes
	Developing regional information campaigns to facilitate the development of the project portfolio	MLDPA with partners and technical assistance	2021 Q4	yes
Setting up training facilities and facilitating training courses	Developing training concepts for training in the field of building energy performance and energy auditing, for designers, certified/authorised specialists and contractors	MLDPA with partners and technical assistance	2021 Q1	yes
	Ensuring cooperation with Romanian construction and architecture universities and vocational training institutions in order to provide training courses	MLDPA with partners and technical assistance	2021 Q1	yes
	Drawing up training manuals	MLDPA with partners and	2021 Q2	yes

		technical assistance		
	Developing training programmes for trainers	MLDPA with partners and technical assistance	2021 Q3	yes
	Actual organisation of training courses	Competent ministries with partners and technical assistance	permanently	yes
Preparation, research and experimental application of design solutions	Developing reference projects for renovation of different types of buildings, with technical solutions and financial estimates, staged implementation	MLDPA with partners and technical assistance	2021 Q3	yes
	Updating specific technical regulations and developing new technical regulations	MLDPA with technical assistance	2021-2022	yes
	Developing pilot projects, with innovative solutions that can be implemented in the field of deep renovations and NZEB, for certain types of buildings	MLDPA with partners and technical assistance	2021-2022	yes

Stakeholders involved in the preparation of the Strategy and summary of consultations

- **Ministry of Regional Development and Public Administration, currently Ministry of Public Works, Development and Administration (MLPDA)** - overall responsibility for the implementation of the EPBD and coordinating Ministry for the LTRS drafting
- *General Directorate for Regional Development and Infrastructure*
 - *Technical Directorate*
 - *Directorate for Policies and Strategies*
 - *Directorate for Public Works*
- *General Directorate for Regional Operational Programme*
- **Ministry of Economy, Energy and Business Environment** - *General Directorate for Energy Policies; Directorate for Energy Efficiency*
- **Environment Fund Agency** - *Casa Verde Programme*
- **State Construction Inspectorate** [*Inspectoratul de Stat în Construcții*]
- **National Institute for Research and Development in Construction, Urban Planning and Sustainable Territorial Development (INCD URBAN INCERC)**
- **ANRE - Romanian Energy Regulatory Authority, Energy Efficiency Department**
- **Ministry of Environment, Water and Forestry** - *Directorate for Climate Change*
- **General Secretariat of the Government of Romania**
- **Ministry of EU Funds** - *Directorate for Policies*
- **Ministry of Public Finance**
- **Ministry of National Education, currently Ministry of Education and Research** - Department responsible for school construction and renovation - *General Directorate for Infrastructure - Schools, Universities*
- **Ministry of Health** - Department responsible for hospital construction and renovation - *General Directorate for Procurement, Heritage and IT - Hospital and Healthcare Facilities* - the Ministry also owns a number of hospitals throughout the country
- **Ministry of Culture and National Identity, currently Ministry of Culture** - *Directorate for Procurement, Administration and Investment*
- **Ministry of Interior** - MAI has several entities (including police forces) under its control, which own several buildings/units, including Police / Customs Authority, Border Protection Agency
- **Ministry of Justice** - *Directorate for Endorsement of Legislative Acts; Directorate for Investments*
- **Ministry of Agriculture and Rural Development** - *Directorate for Investment, Procurement, Heritage and Administration*
- **Ministry of Labour and Social Protection** - *General Directorate for Investment, Public Procurement and Internal Services*
- **Ministry of Economy, currently Ministry of Economy, Energy and Business Environment** - *General Directorate for Investment, Public Procurement and Internal Services*
- **Ministry of Transport** - *Directorate for Public Procurement and Public Domain Administration*
- **RAPPS - 'State Protocol Heritage Administration' Autonomous Company** [*Regia Autonomă Administrația Patrimoniului Protocolului de Stat*]

- Ministry of Youth and Sport - Directorate for Investment, Procurement, Heritage;
- Ministry of Tourism, currently part of the Ministry of Economy, Energy and Business Environment - Directorate for Economic Affairs, Public Procurement and Logistics
- National Institute for Statistics
- Ministry of Business Environment, Trade and Entrepreneurship, currently Ministry of Economy, Energy and Business Environment
- Ministry of Water and Forestry, currently Ministry of Environment, Water and Forestry
- Ministry of Research and Innovation, currently part of the Ministry of Education and Research
- Ministry of Communications and Information Society, currently part of the Ministry of Transport, Infrastructure and Communications
- Ministry of Foreign Affairs
- Ministry of National Defence
- Cluster Association for Promotion of Nearly Zero Energy Buildings (Pro-nZEB)
- Association of Manufacturers of Building Materials in Romania (APMCR - *Asociația Producătorilor de Materiale de Construcții din România*)
- Romanian Association of Building Contractors (ARACO - *Asociația Română a Antreprenorilor din Construcții*)
- Construction Companies Employers' Organisation (PSC - *Patronatul Societăților din Construcții*)
- Romanian Chamber of Commerce and Industry (CCIR - *Camera de Comerț și Industrie a României*)
- Renewable Source Producers Association (SUNE - *Asociația Producătorilor de Surse Regenerabile*)
- Romanian Association for Promotion of Energy Efficiency (ARPEE - *Asociația Română pentru Promovarea Eficienței Energetice*)
- Romanian Association for Promotion of Energy Efficiency in Buildings (ROENEF - *Asociația pentru Promovarea Eficienței Energetice în Clădiri din România*)
- Romanian Green Buildings Council (ROGBC - *Consiliul Român pentru Clădiri Verzi*)
- Federation of Associations of Energy Utilities Companies
- Ergonomics
- Romanian Installation Engineers' Association (AIR - *Asociația Inginerilor de Instalații din România*)
- Romanian Association of Structural Design Engineers (AICPS - *Asociația Inginerilor Constructori Proiectanți de Structuri din România*)
- Romanian Building Engineers' Association
- Romanian Association of Building Energy Auditors (AAECR - *Asociația Auditorilor Energetici pentru Clădiri din România*)
- Romanian Association of Architects (OAR - *Ordinul Arhitecților din România*)
- Habitat League of Owners' Associations
- Federation of Romanian Owners' Associations
- Community of IT Professionals 'Code for Romania'
- Association of Romanian Municipalities
- Association of Romanian Cities
- Bucharest Sector 1 Municipality
- Bucharest Sector 5 Municipality
- Brașov Municipality
- Non-profit organisation 'Orașe Energie în România' (OER)

- Romanian Association of Banks (RBA)
- Banca Transilvania
- BRD
- Unicredit Bank
- EU banks and IFIs (EBRD, EIB)
- Team of Young Researchers under the EfdeN Energy Efficient Smart House Project
- Technical University of Civil Engineering Bucharest
- 'Ion Mincu' University of Architecture and Urban Planning of Bucharest
- University 'Politehnica' of Bucharest
- Buildings Performance Institute Europe (BPIE)

Key points of discussions: Stakeholder consultation - May 2019³³

1. 14 May 2019 - Professional associations and academia (WB Office)

- There is no database dedicated to building thermal renovations and no functional model for data collection. Data collection was the responsibility of URBAN-INCERC and some years ago this activity was transferred to MLPDA. However, there is no dedicated format. Data is collected in different forms (PDF, Excel, image) and is not aggregated. The information is therefore difficult to read and must be converted into standardised format under a standardised process. The previous 2014 Energy Efficiency Strategy used data from URBAN-INCERC (it was coordinated by the MLPDA until 2010).
- In the Baltic States, there is a typology of family buildings. which enables to create a typology of data. The application of such typology in Romania is not possible as there are many types of buildings, including single-family houses.
- The MLPDA, with the support of the United Nations Development Programme under the project 'Improving energy efficiency in low-income households and communities in Romania' initiated the development of a software enabling data collection on a platform on the Ministry's website. There have been some attempts over the last five years, but have never materialised.
- A view was expressed that the database should be kept and maintained by a private entity. A few years ago, AIIR (Romanian Installation Engineers' Association) proposed to MLPDA to take over the database on energy performance certificates, but information outsourcing was accepted.
- Several types of land and building information should be available at the Ministry of Public Finance (MFP) based on the taxes paid by owners. The National Agency for Fiscal Administration (ANAF) / MFP keeps records of buildings for tax purposes, but the information is limited to square metres, although the taxes are based on the quality of the building materials used for buildings, the location of the property (rural environment, urban environment, centre), size and the like.
- There are problems caused by lack of a general cadastre at national level.
- Municipalities with more than 5 000 inhabitants have to report on EE to the energy regulatory authority, i.e. ANRE. The Agency provides cities with the data collection and

³³ NOTE – The key points of discussion are outlined in this Annex, as presented by stakeholders. They may contain incorrect or erroneously expressed views. Their presentation does not mean their acknowledgment by the MLPDA or the Government.

reporting model. Cities must draw up the City's Energy Action Plan in order to obtain EU funding. Municipalities / local authorities (LAs) obtain information from energy meters and bills. Although information is available, many municipalities and cities do not have the capacity to process and report the data.

- The market has evolved over time, daily requirements are now higher, and thermal resistance of buildings has increased. The Romanian Green Buildings Council (RoGBC) uses several energy performance calculations to increase the use of renewable energy (RE) in buildings from 10 to 20 %.
- There are problems with the civil servants' capacity. As reports are often prepared at short notice, the documentation is inaccurate, therefore civil servants cannot provide the most appropriate conclusions and solutions.
- EIB commercial financing has been available in Romania for 20 years and is one of the solutions for financing building renovation/EE programmes. The loan covers up to 75 % of the project cost, while the difference is covered by local authorities and a small share by homeowners. In Greece and Lithuania, people's contribution is based on income. Income in Romania is below the EU average and a quarter of Romanians cannot pay their energy bills.
- Public procurement award criteria applied according to the complexity and specificity of the contract are not clear enough for the ATUs, and in most cases they use the 'lowest price' criterion. The use of other award criteria entails identifying assessment factors relevant to the nature of the public contract, i.e. assessing proposals according to the identified factors, which is difficult for ATUs to achieve, as they are largely short of qualified public procurement personnel.
- The Romanian Green Buildings Council promotes a programme for green buildings with tax exemption; applications are submitted directly to Brussels. The programme worked well in western Romania (e.g. Alba Iulia).
- Large companies with corporate social responsibility budgets support EE/RE in public buildings by installing solar photovoltaic panels; the energy produced is used during the operating hours of the building.
- Due to lack of data, the renovation strategy risks ending up being only a list of options. The most difficult task is to find modelling closer to reality. Ideally, an EE strategy should be supported by a dedicated EU programme for Romania.

2. 15 May 2019, Bucharest - Competent ministries (WB Office)

- A centralised database is needed. Many ministries hold a series of data, but it is not centralised.
- Due to lack of data, the energy regulatory authority (ANRE) reports little data on EE in buildings and therefore on a potential success.
- As most ministries manage a significant building stock (e.g. the Ministry of Justice has 235 units), they should be responsible for these assets and gather information to contribute to the centralised building database.
- Some ministries have their own building investment programmes - the Ministry of the Interior (MAI) allocated EUR 300 million to building renovation and managed to modify the eligibility criteria for the 'Green Energy' programme under the Regional Operational Programme (ROP) to include public buildings as well.
- As data is essential for the building renovation strategy, it would be useful to have a guide indicating which buildings are eligible for renovation (MAI has a programme in place to assess their buildings). The database and strategy should include information on individual houses for vulnerable persons.

- The World Bank should provide a model of the type of data that should be collected to help standardise the process.
- Ministries are short of sufficient staff or the existing staff does not have the required technical capacity. People are overloaded with additional responsibilities for to ensure compliance with Law No 121/2014 on energy efficiency, as subsequently amended and supplemented, under which energy savings must be reported to MLPDA.
- A national entity needs to be set up to take the lead in data collection and centralisation, processing and monitoring, and in the implementation of the renovation strategy. It should be appropriately staffed (at departmental level and even at lower levels). Suggestions were made to set up a focal point in the General Secretariat of the Government of Romania (GSGR) or to strengthen the MLPDA's institutional capacity.
- The Long-Term Renovation Strategy should set out implementation responsibilities and therefore consider setting up an Implementation Committee. For example, the Ministry of Justice has the Strategic Management Council, which is in charge of implementing the Ministry's key strategies and decisions.
- Some considered establishing a new institution to take on responsibilities for data collection and strategy implementation, while others consider that there is no need for a new entity, but that existing institutions should work together, as legislation already sets out the roles and tasks of each entity. The problem lies in the lack of interest from some of the relevant entities, on the one hand, and shortage of staff, on the other hand.
- The Long-Term Renovation Strategy should be approved by Government Decision (GD) and it is important that it is implemented and enforced. The GD should emphasise the role of institutions, measures, deadlines, powers of local public authorities (which manage a large number of local public buildings).
- The MLPDA will most likely be responsible for the implementation and monitoring of the Strategy and needs support from all ministries.
- The Strategy should underpin EU-funded programmes. The Strategy should have a communication component and the database should be made public.
- There are concerns that if the share of financing grants is reduced, there will be no further interest in renovation/EE. For example, the Ministry of Environment, Water and Forestry (MM) wanted to reduce the level of the grant component for the Casa Verde programme, but there was no positive response from beneficiaries. Reducing the grant component would create a vicious circle in the residential sector, as low-income people cannot benefit from commercial loans. Solutions are needed to help these people pay their financial share. One possible option could be to use a Poverty Fund to co-finance renovation projects for low-income people (not only for multi-family buildings). Another option could be to cover 20 % of their co-financing share from government schemes, although it is not clear how such a financial agreement could work and who the signatories should be.
- There is a need for better coordination between institutions and existing programmes, such as improving access to energy for the poor or supporting the installation of solar panels and the like.
- A financial projection is required for government co-financing strategies related to EE/renovation, but the MFP does not know what amount would be necessary.

3. 15 May 2019 - Government agencies (WB Office)

- Data collection is the main problem faced by public administration and the lack of data aggregation is the main reason why some of the strategies are not implemented correctly and systematically. For example, the GSGR's Sustainable Development Department cannot collect data on indicators for target achievement and for implementation of the 2030 Sustainable Development Strategy. Ministries do not have

- an adequate reporting system as the National Institute of Statistics (INS) does not provide them with adequate questionnaires. The GSGR wants to improve coordination between institutions by placing two reporting experts in each ministry.
- Ministries have data points for data collection and reporting of several data, but data aggregation is challenging. The Ministry should have a single structure for data collection, verification and aggregation. The GSGR has taken the role as a strategy integrator. The impact of the strategies needs to be monitored at both national and local level.
 - INS has general housing information but does not have the protocol to develop relevant indicators. The housing database should be developed in GIS to show the level of renovation achieved.
 - Since local authorities and private investors do not report EE action and only EE data from the public authorities are reported to ANRE, the actual figures are higher than those recorded; therefore, the Agency's reporting to the European Commission is only partial.
 - The two main reasons for the poor quality of building renovation works are the construction companies' non-compliance with relevant legislation and the poor quality of the materials/equipment they use.
 - The State Construction Inspectorate (ISC), a subordinate entity of MLPDA, is responsible for checking the quality of works in accordance with Law No 10/1995 on quality in construction. The ISC can verify a thermal renovation project from two perspectives: 1) whether the improvement of thermal envelope efficiency is implemented as per the design; and 2) whether suitable materials are used for thermal renovation works. However, due to shortage of staff, the ISC only carries out random checks. Limited institutional capacity prevents the ISC from ensuring accountability of the verification process and developing indicators.
 - Law No 10/1995, as republished, as subsequently amended and supplemented, requires some construction rules, such as mechanical strength, building safety, noise protection, operational safety, fire protection. There should be an institution to verify the requirements for each of these rules and such obligations should be determined by entities such as the MM, AFM.
 - The ISC needs adequate staff to carry out quantitative building/EE tasks as required by the EU. Existing institutions (MLPDA, ISC), provided that they have adequate staffing and responsibilities, should deal with the building renovation strategy/process. More MM employees should be involved in this process.
 - The quality of works could be enhanced by introducing secondary checks. They consist of an on-site random (supervisory) control in order to verify whether the materials, equipment and construction works meet the required quality; any problems are subject to penalties. In Romania, the site manager, who is in charge of ensuring the quality of works, could also carry out a secondary check. All public works are currently carried out only in accordance with the designer's plans.
 - Law No 372/2005 (amended in 2013) transferred responsibilities for the EPC database and summaries of energy audit reports from URBAN-INCERC to MLPDA a few years ago. Currently, MLPDA should manage the database on energy audits and EPC, but this is not done because legislative changes have not been fully implemented.
 - ISC should check building energy auditors (BEAs) but faces difficulties due to the lack of a database. Moreover, there are four non-profit entities that carry out similar checks in parallel.
 - Currently, ISC can only monitor the quality of works and has no influence on the implementation of EE measures. The law should be amended to require beneficiaries to

prepare the EPC after the implementation of the EE measure to see what has been achieved.

- Under the law, 10 % of EPCs should be checked by ISC. However, it is not clear whether this is done because there is no aggregated database of all certificates or accurate information on their total number.
- The MLPDA centralises the EE data collected from the LAs and reports it to ANRE, which forwards it to the European Commission. Data may not be reported directly to ANRE, as the Agency has no jurisdiction over local authorities (and MLPDA has a greater influence at local level). The law does not provide for penalties for local authorities that do not report. Law No 121/2014 on EE should be amended to include coercive measures and to allow ANRE to come into direct contact with local authorities. ANRE has a database of 600 administrative territorial units and sends them letters on EE reporting. However, since local authorities are not able to assess energy savings, it is difficult to quantify the data they report.
- The process of obtaining building and refurbishment permits should be simplified, as now it may take several years (even more for historic buildings).
- ANRE set up a working group for promotion of the Energy Service Company (ESCO). There are several legislative discrepancies, as the law covers street lighting but not building lighting. ANRE tries to find ways to see whether ESCO could also apply to public buildings.
- The implementation of the renovation strategy and action plan should be a joint effort of MLPDA, as lead coordinator, and other public entities, including GSGR, to support them. A working group comprising representatives from all ministries is required. A pillar of the Strategy should cover coordination and legislative amendments in order to simplify some of the activities. The GSGR could be involved through the Strategy Unit to speed up this process.

4. 16 May 2019 - Undertaking associations (WB Office)

- Two databases have been developed over the last few years. One was developed by URBAN-INCERC which, at that time, requested the Building Register, but the data could not be retrieved. The MLPDA also paid for the development of another database (in accordance with the EU model), with the support of UNDP (Building Register). Unfortunately, the latest database is not available due to serious IT problems related to the access code (if the database is opened, the information may be damaged). Some data is used by environmental agencies but no new entries can be added to the EPC.
- Obtaining the EPC is relatively easy and the certificate can be obtained via email. As the information is largely inaccurate, EPC data is not published, although in accordance with the law public buildings have to display energy information in a public/visible place.
- Building energy auditors have to send EPC data within 30 days but do not have an official electronic model/format. A new methodology with a new model is being prepared and should be ready in 1 or 2 years. Currently, there are presumably approximately 3 million EPCs in Romania but data relating thereto is not centralised.
- Only 100 of the 900 LAs prepared energy plans (and sent EE data to ANRE). Most of these plans are of poor quality. The law should require local authorities to report EE data.
- 'Only a few people at MLPDA are in charge of building renovation / EE, which is far from enough.
- Many central government staff members lack EE training or knowledge.
- Many institutions deal with issues such as EE, housing and environment separately, not under a common approach. For example, the 2030 Energy Strategy lacks the building component.

- EE in Romania is primarily a State-managed programme. As a result of the actions carried out, people expect renovation to be free of charge (up to 100 % grant).
- Moreover, there are cases where people would like to contribute financially but cannot. For example, 100 buildings in Ploiești are ready to pay for the renovation works, provided that they receive some support by obtaining the design and permits free of charge.
- There is limited EE track record at institutional level, despite the many things that have been done and amounts spent for that purpose.
- The Casa Verde Programme is not currently active. There is no programme targeting single-family houses.
- The decision of the Court of Justice indicates that there is an EE depreciation of buildings (in Italy, Germany). However, if this were to ever apply in Romania, it would be difficult to prove that energy consumption has indeed dropped by 50 %, as many people do not turn on heating. It could be said that EE is quite cost-effective because nobody knows how much money is being spent or whether the projected reduction in energy consumption will be achieved.
- The quality of proposals and evaluations of EE projects from public (and EU) funds is very poor. On-site visits show that there is no correlation between the EPC and the actual state of the building. The quality of work is also poor, with delays in implementation and low quality materials. The quality of works is better for EE interventions financed through commercial loans, as banks employ independent experts to assess the project and the works.
- The lack of technical expertise on the part of the ATUs has led to the exclusive/excessive use of the 'lowest price' award criterion under award procedures for works/design and execution contracts, which may lead to questionable quality of the works performed / services provided. Public procurement also applies to blending (regardless of the funding source). For example, even if a single euro comes from public funds, the project must comply with public procurement rules.
- There is a discrepancy in the use of materials. For example, mineral materials are required to insulate buildings with more than 10 floors, but not for buildings with fewer floors. Thermal insulation rules date back to 1999.
- Construction companies are often discouraged from engaging in EE works, as purchasing at the lowest price makes it impossible to gain profit.
- Energy service companies have been present in the Romanian public sector for about 8 years. Romanian energy service companies are small companies with around 50 employees and most of them are branches of large multinational corporations. There are no energy service companies in the field of public/private building renovation, as there is no legislation on energy service companies as such. Private building owners are not interested in the whole work package, but only in a few activities.
- When the pilot project on energy performance contracting was introduced (part of the pilot project focused on refurbishing the district heating source), there was a lack of awareness within the LAs.
- There is great potential for energy service companies in the area of public buildings, but this requires a legal framework for energy performance contracting. Legislation should focus on improving the institutional capacity of energy service companies and open the market only to companies that provide good quality works. The projects prepared by energy service companies under the Large Infrastructure Operational Programme (LIOP) are of high quality.
- Energy performance contracting legislation should clarify some key issues such as ownership of the contract and assets, as the thermal envelope belongs to the service company but the building is owned by the LA. ANRE (or another public entity) should

validate the type of contract, namely a works contract or a service contract. Another important issue to be addressed is the statement of off-balance-sheet items (i.e. those not counted as liabilities).

- The new strategy should take into account the fire safety of single-family houses (two-thirds of Romanians live in single-family houses) so as to reduce energy poverty and provide the public sector with the necessary staff.
- Renovation of residential buildings is linked to district heating. The reported average energy consumption values are not correct because several district heating systems have been closed and many apartments are not adequately heated as they did not replace district heating with other heating sources. As the EU promotes EE in the district heating system, Romania should approve the reconnection to the district heating network, together with energy performance contracting and vertical distribution (allowing to disconnect those who do not pay heating bills without affecting others).

5. 16 May 2019 - Association of Romanian Municipalities and Association of Romanian Cities (WB Office)

- 'Orașe Energie în România' (OER) is developing the building strategy (Our Buildings) for six medium-sized cities: Sibiu, Bacău, Satu Mare, Târgoviște, Mizil and Bistrița. The project is implemented in partnership with Buildings Performance Institute Europe and with financial support from the German Ministry of Environment. The strategies must be completed by 2020 and will cover the time period from 2020 to 2030.
- OER monitors energy consumption in 100 public buildings in Brașov based on the data in energy bills and from building energy managers. EPC data is overestimated and reported figures do not reflect the reality on the ground. There should be two energy performance values: one at the start of the project and one post-EE intervention. In reality, energy consumption at the end of the project is much higher than the actual reported value. BEAs often conduct energy audits from their offices without going to the building location.
- The energy consumption database developed by OER is owned by municipalities and cities which pay an administration fee to OER. Cities use the data to improve energy consumption.
- OER runs public campaigns to teach children about energy efficient use. Nevertheless, funds from local budgets for awareness-raising activities are limited.
- Sector 1 (S1) in Bucharest has a refurbishment programme comprising 1 220 of a total of 1 300 multi-family residential buildings (80 buildings do not qualify for renovation). A number of 860 buildings have already been refurbished, while work is in progress on the others. Most of the payments are from the sector budget and from the EIB. The EIB operates in the field of EE only in Bucharest, namely in all sectors except Sector 3.
- EPC data shows that the refurbishment of more than 300 multi-family buildings has resulted in 44 % energy savings and reduction in CO2 emissions by 55 %.
- Sector 1 will soon close EE renovation projects and will focus on upgrading the lifts in 901 MFBs.
- Sector 1 has a pilot renovation project for single-family houses as part of a programme for 5 000 dwellings. The pilot project of 25 to 30 units is implemented with funds from the Ashoka Foundation. Energy audits must be carried out before works start. The refurbishment works mainly cover the change of windows and the thermal insulation of walls. The objective is to achieve energy consumption of 130 kWh/m² per year.
- A number of 150 MFBs in Brașov were refurbished with EU funds, many with public money and many others with private funds. Energy savings of 30 % were achieved. Homeowners usually renovate the building façade.

- Public procurement is a difficult and lengthy process, and the tender lasts for 2 to 3 years. The main problems relate to methodologies and lack of contractors (many are not interested in EE works). Most contractors are Romanian companies but there are also foreign companies, including from Vietnam and China.
- The European Bank for Reconstruction and Development (EBRD) has several refurbishment programmes, with co-financing. However, small towns cannot carry out too many refurbishment works due to the lack of programmes for which they could qualify.
- Sector 1 consults citizens on major policy issues. For example, the Sector sometimes organises consultations with 800 owners' associations at the Sector municipality headquarters. The meetings for the implementation of projects take place on the sites of the projects concerned. Sector 1 employs 10 staff members to be in charge of building refurbishment.
- There are 800 000 unused square metres of terrace roof in residential buildings in S1. The Sector's administration requested ANRE to amend the law in order to allow owners' associations to install solar photovoltaic panels (5 kW installed capacity) and to supply the produced RE to public buildings. Revenues should go to owners' associations which should decide how to use the money (e.g. to cover common expenses). The current legislative framework does not allow owners' associations to sell electricity to the National Energy System.
- OER invited the WB to attend an event related to the preparation of strategies for the six cities, in Braşov, in early July.

6. 16 May 2019 - Issues related to the involvement of banks / international financial institutions (IFIs) (WB Office)

- There is weak governance and an opaque transparency system that revolves around building renovation.
- Many financing institutions do not find it attractive to lend to Romania because it is an EU country. In addition, technical understanding lacks at the highest level.
- The renovation programme under GEO No 69/2010 (with 0% interest) was difficult to access.
- Customers applying for loans for EE projects must provide EPCs. Five per cent of the EPCs are not accepted by banks and need to be re-checked. Customers with rating A energy certificates obtain cheaper loans. However, the Romanian Government does not want to increase the level of EE ambition from rating B to rating A.
- The building EE renovation proves to be a win-win situation. For example, for an apartment of 100 m², the owner pays EUR 12/month for renovation and saves EUR 30/month on energy consumption or, in other cases, people pay for renovation around EUR 20 per month (for 10 years).
- CEC is a State-owned commercial bank with an extensive network throughout the country, including in villages, accounting for 50 % of all bank branches in Romania. Most of the loans are granted to agriculture and SMEs to co-finance EU projects. Investments usually have a grace period of 1 year, which extends to 3 years for EU projects. CEC has carried out various lending programmes for the EIB and the EBRD. However, the cost-effectiveness of these programmes is difficult to quantify. CEC cannot be compared with the German State-owned bank KfW.
- If necessary, CEC is able to adapt a building EE renovation product, provided that there is a way for the owners' association to fully disburse the loan, as the bank can neither take the financial risk nor sell the apartments in the building to recover their loan.

However, CEC does not have any energy efficiency specialists for the time being to assess energy efficiency investments.

- Some measures are needed to improve building renovation in Romania. For example, the beneficiary should sign the contract with the construction company before going to the bank or at least provide proof of the agreement. The intended quality of the renovation should increase. EU technical performance standards should be introduced (which should be higher than the minimum standards required by the existing legal framework), and technical criteria for projects with 40 to 60 % EU grants should be applied.
- Support to commercial financing should be provided for. The level of grants is still very high - for example, 90 % grants are awarded under AFE programmes. If the level of grants is to be reduced to only, say, 15 %, IFIs such as the EBRD could increase funds for this type of financing five times. For the Green Economy Financing Facility (GEFF) programme in Romania, the EBRD collaborated with UniCredit and Banca Transilvania as partners.
- The future Strategy should include cost optimisation and raise contribution-based minimum standards.

7. 17 May 2019 - Bucharest Sector 5 (Sector 5 Municipality)

- Sector 5 (S5) administration is responsible for the refurbishment of residential and public buildings in the Sector. There are 2 000 multi-family buildings, of which 385 have been refurbished, 143 are undergoing refurbishment and 399 are awaiting renovation. The Sector uses money from various sources - the EIB, the local budget, the State budget and (very few) EU structural funds.
- The main funding source is represented by EIB loans covering up to 75 % of the project cost - the shares of MLPDA and the Sector. They have very attractive interest rates and the loan should be paid out in 20 years. Ninety-nine buildings are renovated with EIB loans. The EIB has a programme of EUR 900 million in Romania but Bucharest has reached its borrowing limit. Sector 5 hardly uses EU funds, given that the Bucharest-Ilfov region has only been allocated small amounts because this region is more developed.
- A number of 385 buildings were refurbished with local budget funds and the refurbishment of 20 buildings was co-financed from the State budget. Pursuant to Government Emergency Order No 69/2010, 60 % of the funds come from the MLPDA and 40 % from the local budget (including 10 % from owners' associations). However, since the MLPDA did not have funds available, the Sector used money from the local budget. In accordance with Government Emergency Order No 18/2009, the share of costs payable by the owners' associations (10 %) was covered by the LAs. Now there are problems because the share of the owners' association can only be covered by the LAs under certain conditions (beneficiaries are low-income families, have disabilities).
- There is an investment programme covering 55 schools, 30 of which have an EE component, financed under the National Local Development Programme and from EU funds. Other buildings included in the programme are day-care centres for children and the elderly, social services centres and the like.
- The Sector administration is responsible for tendering for the design and execution of works. This is usually achieved through packages for a large number of buildings. There is an ongoing tender procedure for a package of 143 buildings comprising 8 contracts. Many directorates of the Sector administration (such as the EE Directorate and the Development Directorate) are involved in the refurbishment programme. In addition, the Sector administration employs external consultants for the specifications, works and supervision. The EE project duration is usually 2 years (including works). The warranty

period for the construction works is 3 years, which is completed with the final acceptance of works.

- The refurbishment cost for a two-room apartment of 50 to 60 m² is RON 50/month for 10 years, of which 5 years are the grace period. The legal framework provided for a standard investment cost of EUR 66/m², but the actual cost varies; for example, in the case of 10-storey buildings, the cost is higher.
- The Sector administration is responsible for designs and works, as owners' associations cannot be legally involved in the procurement procedure. Owners' associations empower the city/sector/mayor's office to represent them before third parties and to act on their behalf. Owners' associations remain involved throughout the renovation process and request thorough and good quality work.
- There are problems with the public procurement procedure. Many municipalities are reluctant to organise tenders because they fear prosecution. Contracts worth of more than EUR 5 million must be published in the *Official Journal of the European Union*.
- Heating bills after renovation from the district heating operator and from the owners' associations show a significant cost reduction. People's feedback on comfort and energy savings is very good.
- EPCs are only available for refurbished buildings - with data before and after renovation. EPCs are required by the technical documentation. Rating B is the current possible solution for EE in Romania.
- The refurbishment of buildings with level 2 seismic risk is eligible under government programmes, but not from EU funds. There is a need to harmonise eligibility criteria for refurbishment in the field of EE and linked to seismic risk.
- Sector 5 has the largest concentration of poor people in Bucharest, with 14 areas gathering vulnerable groups. The Sector administration supports poor families by: 1) granting subsidies if they engage in community service; 2) granting aid for the payment of rent; and 3) paying the rent for orphans (over 18 years of age who are no longer living in social centres).
- Sector 5 Council has recently voted to cover renovation costs from the local budget for those earning less than the minimum wage.
- There are 1 300 applications for social housing in the Sector - this is managed by Bucharest Municipality.

Key points of discussions: Stakeholder consultation - June 2019

Context of the Strategy, main conclusions of the gap analysis, national targets for improving building EE

- In the context of the Strategy, it would be important to include and take into account all best practices applied within the municipality.
- The energy consumption data must be verified twice. Other data could be added, such as data from electricity suppliers, more information on the building energy consumption data from electricity and gas suppliers.
- Progress towards the 2020 objectives should not be overestimated. The country can be on track to meet these objectives but has not yet achieved them.
- District heating issues could be further dealt with.

National building stock - state of play, possibilities for developing the renovation of the stock of residential and non-residential, public and private buildings, analysis of renovation activities

- Stakeholders express their concern about the challenge of creating a sustainable and reliable data collection system for the building stock, which is considered a prerequisite for a robust monitoring mechanism and realistic targets. As far as possible, the data should be extracted or reconciliated with the database existing in the National Building Register (cadastre).
- In general, a specific institution should be designated with a clear mandate for data collection.
- Stakeholders recommended confirming the data before proceeding to analysis.
- For reference buildings (MFBs and others) it would be important to confirm the year of construction. Some old buildings are more affected by seismic risks, although the year of construction is not the only element to consider.
- As regards renovation packages, stakeholders made the following comments/recommendations: (i) double-checking the size of buildings. Cooling (in some climatic zones) could also be considered; (ii) it may be useful to add another more ambitious package for thermal insulation. It would also be better to omit from the description a specific material name.
- Renovation and long-term strategy should be more closely linked to urban planning. Staged interventions should be taken into account.
- It is important that the strategy fits the pace of renovation in the light of the ultimate energy consumption objectives.
- When referring to the option of covering the financing needs, it is important to note that the consolidated State budget covers only part of the financing needs. Renovation will have to be financed from other sources as well.
- The financial impact must be explained for each category of buildings. The optimal average cost makes sense from this point of view.
- The stakeholder recommended selecting a scenario with an ambitious deep renovation pace.
- It is important to also include other forms of indirect impact of building renovation (such as health, acoustic comfort and the like).
- Account must be taken not only of increasing the structural and energy performance of buildings, but also of improving the architectural quality of both the renovated buildings and their urban context.
- In addition to classic solutions (thermal system, joinery, technical equipment), the Strategy should allow for interventions that increase the quality of housing through alternative and innovative solutions.
- The extension of the lifetime of some existing buildings must be doubled by measures fostering good urban life by making the use of these buildings attractive and functional.
- It must be ensured that building classification criteria are defined in order to correctly prioritise interventions.
- It is necessary to identify the importance and interdependence of the various types of interventions in order to establish their correct order if they are to be carried out in stages.
- The strategy should encompass and promote existing good practice examples, which it should review in terms of affordability and sustainability, in order to provide optimisation models to local authorities.

Objectives, indicators, policies and measures of the Strategy

- Energy consumption is not just a way of measuring objectives and targets. It may depend too much on user behaviour. There may be buildings in rural areas where large energy consumption is not recorded because they cannot afford them, but they would still require renovation. A mechanism needs to be put in place to meet the needs of vulnerable groups.
- It has been suggested to revise the rating A level as the proposed level is not very ambitious, especially if it is projected for 2050. However, it has been noticed that the system will change over time and the classification will be fit for purpose.
- While stakeholders agreed to promote better use of the EPC, they raised serious concerns that certificates are not consistent in terms of quality and reliability.

Implementation of institutional, organisational and financial mechanisms

- Stakeholders recommended going beyond the consolidation of existing programmes by developing new programmes (e.g. single-family houses).
- The difference in energy consumption (measured before and after renovation) could be considered as a trigger point for the grant/payment at the owners.
- A consolidated national system must be set up to monitor programme implementation, which is applied to all programmes.
- Energy service companies should play a more important role than they currently do. They should be included in the Strategy. Romania has been developing a framework for Energy Service Companies since 2014. A working group has been set up to complete this framework, considering the great renovation potential of public buildings.
- Energy performance standards should be further developed.
- It will be important for the financing analysis to also include and monetise other potential benefits, such as those related to health, indoor environment, energy poverty and the like, although monetisation will be difficult.
- Implementation programmes need to be designed in flexible ways to ensure maximised remediation of potential technological disruptions. Public policy is always struggling to keep pace with new technologies.
- When assessing the financial impact and the financial option, it is important to include the total operating and maintenance costs. Guarantees for 5 or 10 years after renovation must be included.
- The programme databases should be securely and reliably stored and shared. The Ministry of Communications could support this by using existing storage and cybersecurity systems. A clear strategy needs to be established for use of GIS technology with such databases.
- In the past, stakeholders expressed concerns about the general public's experience with renovation to address seismic risk and the mistrust it created among people. The impression is still very negative and generally against renovation programmes. It would be important to conduct a survey and an information programme to ensure that people agree with renovation to reduce energy consumption.
- More creditors should be outlined when the Strategy approaches financing options / debtors / financial sources.
- A consultation event involving high-level officials could help raise awareness of the Strategy and increase the likelihood of its successful implementation.
- Municipalities expressed concerns about the reduction of the grant contribution to support renovation packages.

Key points of discussions: stakeholder consultation - September 2019

Renovation packages, cost optimisation and triggers

- Technical solutions: the minimum scope (national requirements), full renovation, full renovation + renewable energy are a good approach.
- The trigger point for MFBs should include major events affecting the building (such as a catastrophic event). At that time, however, it might be cheaper to rebuild MFBs instead of renovating them.
- After incidental fires, any EE work must be accompanied by measures to increase fire safety and other safety measures.
- 60 % of users live in multi-family residential buildings (MFBs) and they should be given priority in the renovation strategy.
- NZEBs and the assessment of deep renovation should be included in the Strategy. We need to impose standards for NZEBs in Romania.
- Renovation packages must be affordable, given the purchasing power in Romania.
- Given that Romania is prone to earthquakes, any EE renovation programme should be implemented together with reinforcement to withstand earthquakes.
- For historic buildings, innovative solutions are needed. The costs for such a category of buildings will be much higher than estimated for buildings in other categories.
- In order to ensure that users follow renovation programmes, they need to be educated about EE improvements and associated benefits. The labour market as well as design, architecture and engineering services need to be further developed.
- Trigger points for single-family houses (SFHs): adding the possibility of being included in the programmes developed by municipalities. Municipalities previously implemented small programmes for SFHs (e.g. in Bucharest Sector 1). A national programme needs to be developed to target SFHs.
- Main trigger point in relation to the transaction: the buyer should be informed about the building energy performance / energy consumption, but renovation should not be a requisite for the transaction.
- Energy poverty should be one of the trigger points, especially for the worst performing buildings. Transferring part of the State budget from social programmes to energy poverty should be considered. Public buildings / educational establishments.
- For schools/universities: mechanical ventilation systems with heat recovery should be considered as key measures, and shading systems should be taken into account (included as complementary measures).
- In the case of office buildings, a distinction must be made between those intended for public use and those intended for private use. Trigger points may differ.
- Buildings designated as historical/national monuments would require special packages and programmes.
- Aspects related to the cooling system must be included. As alternative systems, façade ventilation and micro-ventilation devices are considered.
- An inventory of the building stock is needed. The database must be centralised.

Renovation scenarios

- The proposed scenarios seem appropriate, but their implementation will require monitoring and they will have to be readjusted over time if the pace of implementation is not satisfactory.
- In order to confirm the selection of the scenario, the health benefits have to be assessed: respiratory diseases. Priority should be given to natural ventilation in MFBs, although this may not be sufficient. Mechanical ventilation must also be considered. Only natural ventilation can reduce comfort.

- Scenario 1 is likely to be the easiest to implement. Scenario 2 would be ideal, but there are doubts based on past performance. Scenario 3 would require a level of coordination and expenses which are unlikely at this stage.
- As Romania is a country with a high seismic risk, it is necessary to add the reinforcement-related costs to address problems in case of earthquake.
- The market needs to be strengthened to ensure implementation. The market is underdeveloped for such a challenge. Some details on labour/worker demand should be included in order to have a sketchy idea of who is to be involved in the implementation.

Financing

- For SFHs, the dwelling is usually used as security. For the owner, the value of energy savings is rarely comparable to the risk of losing the dwelling. This ratio is very unbalanced and different guarantee mechanisms need to be identified.
- The projected high influence cannot be achieved due to reliance on repayable amounts that can be too high. The 60 %-40 % split can be difficult for municipalities. Other municipalities face co-financing problems.

Other problems

- Worst performing buildings: owners of single-family houses are not only vulnerable people and the rate of 30 % vulnerable people in multi-family housing may be too high.
- Energy poverty = the need to address the problems of the district heating system - these issues need to be correlated.
- The absence of long-term energy performance contracts limits the long-term commitment of private companies and long-term financing.
- Indicators must be realistic and practical.
- Action plans need to be elaborated in detail to ensure proper implementation.