



GUIDANCE: HOW TO DRAFT AN EFFECTIVE RENOVATION STRATEGY

Transferring Visegrad experience with Energy Efficiency
Building Policies to North Macedonia



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EXECUTIVE SUMMARY

The project "Transferring Visegrad experience with energy efficiency building policies to Macedonia" is aiming to support the Ministry of Economy and other governmental institutions of North Macedonia in creating policies for energy efficiency of buildings, and especially in the preparation of the national strategy for energy efficiency renovation of the buildings.

The aim of this guidance is transferring of knowledge and lessons learnt during preparation and implementation of renovation strategies in three EU member states (Slovakia, Poland, Hungary), which have been developed and adopted respective strategies for renovation of the buildings in accordance with EU legislation. In order to increase capacities, to prepare, implement and evaluate strategic document for building renovation in North Macedonia, the experiences and good practices from Slovakia, Poland and Hungary are being shared in this document.

The document includes and describes general framework, main parts of renovation strategies essential for effective implementation, describes lessons learned, best practices, but also failures to be avoided during drafting a national renovation strategy.

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1. INTRODUCTION

For both, European Union countries and North Macedonia, buildings represent the sector with the largest energy consumption, which account for nearly 40 % of final energy consumption. At the same time, existing building itself offers great potential for energy savings. Therefore, the national strategic document should reflect the importance of energy efficiency and the role of the building sector for the achievement of the energy and climate goals and for the transition to clean energy. At the same time, effective policies or incentive programs are key to address the issue of air pollution and increasing the housing quality of citizens. Building renovation is also viewed by as a key component and investment area for recovery of economies hit by the pandemic restrictions.

Renovation Strategies should provide strong tools to support the transition into a highly energy-efficient and decarbonised building stock by 2050 and accelerate the cost-effective renovation of existing buildings and ensure an increase in deep renovations. A strategy should not be an end in itself, but a starting point for stronger action. Implementation is rarely straightforward and comes with challenges.

Visegrad countries have their own experience with preparation of strategies, establishing policies and programs to support energy efficient renovation of buildings, which can be shared to countries like North Macedonia.

1.1 EU CONTEXT

The EU aims to be climate-neutral by 2050. This objective is at the heart of the European Green Deal¹ and in line with the EU's commitment to global climate action under the Paris Agreement². As part of the European Green Deal the European Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990.

Buildings in EU are responsible for approximately 40% of energy consumption and 36% of CO₂ emissions in the EU. Currently, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient, while only 0.4-1.2% (depending on the country) of the building stock is renovated each year. Therefore, more renovation of existing buildings has the potential to lead to significant energy savings.

Based on European Commission strategy "Renovation Wave"³, energy efficiency is an essential component for action, with the building sector as one of the areas where efforts must be ramped up. To achieve the 55% emission reduction target, by 2030 the EU should reduce buildings' greenhouse gas emissions by 60%, their final energy consumption by 14% and energy consumption for heating and cooling by 18%. According to Commission, it is therefore urgent for the EU to focus on how to make our buildings more energy-efficient, less carbon-intensive over their full life-cycle and more sustainable.

¹ More info: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

² More info: https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en

³ Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662>

Directive (EU) 2018/844⁴ amending EU Energy Performance of Buildings Directive (EPBD) sets a clear direction for the full decarbonisation of the European building stock by 2050. Based on directive, national governments of EU member states were required to establish "long-term renovation strategies for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private" by 10 March 2020. In the past, EU Member States had to set up a long-term renovation strategy (LTRS) to comply with the EU Energy Efficiency Directive EED (2012/27/EC). National renovation strategies were first introduced in 2012 by the EU Energy Efficiency Directive (EED). With substantial amendments, the long-term renovation strategies are now more comprehensive. The amendments to the EPBD create a clear path towards achieving a low and zero-emission building stock in the Union by 2050, underpinned by national roadmaps with milestones and domestic progress indicators, and by public and private financing and investment. New national long-term renovation strategies are required to ensure the renovation of existing buildings into highly energy efficient and decarbonised buildings by 2050, facilitating the cost-effective transformation of all existing buildings into nearly zero-energy buildings.

According to European Commission, apart from accelerated renovation rates, a Union-wide and sustained increase in deep renovations is also necessary. National strategies with clear guidelines and outline measurable, targeted actions as well as promoting 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.

However, the long-term renovation strategies should be prepared by 10th March of 2020, only few member states of European Union were able to deliver their strategy by this date. By the end of October 2021, all member states, except Poland, has finalized their LTRS⁵.

The government of Slovak Republic approved Slovak LTRS [5] on January of 2021 and the government of Hungary approved Hungarian LTRS [6] on July of 2021.

The Commission has published an analysis⁶ of the long-term renovation strategies that were submitted by 15 November 2020 (by 13 member states). It contains an overall assessment of the different strategies, lists the planned measures and highlights best practice, and analyses each LTRS separately following a common template, which can be also useful for countries like North Macedonia.

1.2 MACEDONIA CONTEXT

This sub-chapter consist of information provided by project partner (Habitat, MK).

Background

The cost of inefficient energy use in Macedonia significantly affects the national economy. It erodes capital and maintenance budgets, and increases total product cost. The energy import in the country is high, in the range of 60% in 2017, and has been increasing during the last few years. According to

⁴ Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0844&from=EN>

⁵ All LTRS can be found at: https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en

⁶ Available at: https://ec.europa.eu/energy/sites/default/files/swd_commission_preliminary_analysis_of_member_state_ltrss.pdf

statistics, the final energy consumption per capita in Macedonia is 3 times lower than the consumption in OECD countries. The energy intensity is about 3 times higher compared to the average of the EU and about 1.6 times more than new member states from Central and Eastern Europe. This is despite the fact that the country has made a significant progress over the past 15 years and energy intensity, defined as the energy consumed to produce a unit of GDP, has declined by approximately 20-25%⁷.

The statistics show that the building sector represents the largest component of total final energy consumption, accounting for around 40%. Various international and domestic studies estimate potential for energy savings of 10-35% in the residential sector. The main features of the residential sector in Macedonia include: most of the residential buildings are old and in poor condition; a high number of not fully legal dwellings; a high number of modern buildings of poor quality; seasonal occupancy of buildings; poor quality of buildings especially in rural areas with lack of external insulation; heating using electricity; and usage of inefficient wood and coal stoves. Based on the main characteristics of the residential sector, the technical opportunities for improving energy efficiency in this sector are very significant.

According to the last census of 2002, the large majority of residential buildings, approximately 47%, was constructed in just the twenty years between 1961 and 1980 while new construction decreased thereafter. The estimated number of registered dwellings today is more than 760.000 that constitute above 55 million square meters of living floor area. By 2002 there were 10.000 multi-family apartment buildings according to statistics, which number increased to estimated 12.000 multi-family apartment buildings today.

Macedonia, being in at the initiation phase of the EU integration process, aims to implement the *EU acquis* and to adopt EU Energy Efficiency rules, norms and standards. In addition, Macedonia is a member country of the Energy Community and as such needs to implement three Directives related to the energy efficiency: Energy Efficiency (EED-2012/27/EU); Energy Performance of Buildings (EPBD- 2010/31/EU); and Energy Labelling of Products (ELD-2010/3/EU). The promotion of energy efficiency is part of the Europe agenda. The energy efficiency *acquis* requires measures to increase efficiency at all stages of the energy chain; generation, transmission, distribution, and consumption. The measures focus in particular on the residential sector, where the potential for savings is greatest.

Most of the documents, analysis, policies and strategies that are supporting transposition of EU energy directives are developed with donor support (EBRD, GIZ, USAID, EU, Bilateral technical support, etc.) which testifies to the persistent lack of institutional capacities within the government institutions to internally generate policy reforms and necessary restructuring.

Legal environment and compliance with EU regulations

Macedonia has signed the Treaty for establishing the Energy Community (EnC) and as a result has undertaken a number of commitments, which refer to the harmonization of national legislation in the field of energy and environment with EU legislation.

One of the commitments to EnC, as well as obligations of the Law on Energy Efficiency is to prepare a National Energy Efficiency Action Plan (NEEAP) which should report on the measures that have

⁷ Financing Energy Efficiency Investments in the Western Balkans. WBIF. 2016

been implemented in the previous three years, but also to propose measures to reduce consumption in the period from the next three years.

According to the Directive 2011/27/EU for energy efficiency, the Directive 2010/31/EC for energetic characteristics and Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU, adopted and reviewed by the Ministry Council of Energy Community, the Ministry of economy prepared a Law on energy efficiency. The Law in energy efficiency encompasses efficient use of energy in Macedonia, policy for energy efficiency, responsibilities of the Ministry of Economy and Energy Agency, energy efficiency and consumption in the public sector, obligatory and alternative measures for energy efficiency, energy controls in the industry and commercial sector, energy efficiency in transmission, distribution and consumption, implementation of energy services and financial models for supporting measures for energy efficiency, energy efficiency of the buildings, labelling energy consumption and eco-design of products that are using energy and other relevant issues on energy efficiency.

The new law constitutes the cornerstone of Macedonia's energy efficiency legislation and recognizes energy efficiency as important for improving Macedonia's energy security and international competitiveness. It recognizes the importance of reducing energy consumption in buildings and therefore it requires development of a Strategy for buildings renovation in the country.

The fourth NEEAP was released in April 2021, and covers the period 2020 – 2022. The document reviews what has been realized in the period 2016-2018 and propose measures for the period 2019-2022. Having in mind that collecting a data for preparation of the action plan started in 2019 and preparation continued in 2020, as well as the situation with Covid-19, this Action plan review the period 2016-2019, and proposing measures for 2020, 2021 and 2022.

In 2019, the EU adopted the Clean energy package which introduces the principle of energy efficiency first. This principle further emphasizes the role of energy efficiency at EU level, and it is applied in the Energy Strategy of Macedonia until 2040 as well as in the National Energy and Climate Plan.

The Strategy for Energy Development of the Republic of n. Macedonia until 2040 (the Strategy) is prepared according to the requirements of the new Energy Law, which was adopted end of May 2018. Overarching goal of the Strategy is to provide an evidence-based policy in the energy sector through a robust analytical work and broad participatory consultation, which supports sustainable growth and is understood by all stakeholders and implemented by the Government. The Strategy provides a platform for the overall energy sector modernization and transformation in line with EU energy trends, contributing to increased access, integration and affordability of energy services, reduction in local and global pollution, and increased private sector participation, while considering Macedonia's development potential and domestic specifics. Having said that, the Strategy integrates climate and environmental aspects of the energy sector, while proposing an affordable, reliable and sustainable energy for the future. In parallel, a Strategic Environmental Assessment (SEA) is developed as a separate document to assess environmentally viable and sustainable options for achieving the goals.

Energy efficiency of the buildings

Law on energy efficiency (enacted in February 2021) is suggesting preparation of the Strategy for reconstruction of the residential, public and commercial buildings to 2030. The Strategy for reconstruction is aiming to provide efficient and economically viable reduction of energy consumption and at the same time, environment pollution reduction and mitigation of climate changes.

Strategy for reconstruction of residential, public and commercial buildings to 2030, among other, will include: overview of the national building stock through statistical sampling, identification of cost-benefit approaches for reconstruction which are relevant for the building's type and climate zone, policies and measures for stimulus of cost-benefit reconstruction of the buildings, including significant reconstruction in progress and in phases; advanced perspective for decision making for investment of the individuals, construction sector and financial institutions, evidence based assessment of energy savings and other benefits, other directions for measures, methodologies and targets about reconstruction of the buildings.

The Strategy for reconstruction of residential, public and commercial buildings to 2030 will be based on the Study for topologic approach for energy assessment on residential buildings. At the same time, the typology will be essential part of the Rule Book for energy characteristics of the buildings and will help to ease and accelerate the certification of the new buildings.

For the purpose of developing the Strategy for reconstruction of residential, public and commercial buildings to 2030, the Ministry of Economy approached to Habitat Macedonia, to develop building typology for the housing sector based on successfully developed EU-funded TABULA project that was carried out in more than 20 countries, including an assessment of Serbia and Bosnia and Herzegovina as countries in the Western Balkans. The project is based on a national classification of the country's residential building stock, differentiating buildings by construction year, building size classes, level of energy consumption and CO₂ emission reduction.

Currently Habitat Macedonia is a part of consortium, financed by National Fund for Innovations, is implementing the TABULA project in Macedonia. The project is intending to harmonize the Macedonian Residential Building Typology with the common TABULA definition. The project shall provide classification of type of dwellings (single family houses, terraced houses, free-standing multi-family houses, and apartment blocks) with their respective floor areas. Energy auditing of building models shall indicate the energy consumption in residential buildings in Macedonia for heating, ventilation and domestic hot water preparation. TABULA shall also assess the potential energy savings and CO₂ emission reduction after standard and advanced level improvements. Estimates for standard and advanced improvements shall show the savings potential for each pre-defined type of building. The conclusions drawn from this project shall be the basis for development a comprehensive and well-targeted strategic document for the residential sector in the country.

2. GUIDANCE

This chapter provides guidance on how to draft an effective long-term renovation strategy and provides a template with most essential parts in accordance to Article 2a of Energy Performance of Buildings Directive⁸ (EU) 844/2018 and also with Commission recommendation⁹ (EU) 2019/786.

In this chapter you can find two types of boxes. White box describes EPBD requirements or explanation according to the EPBD Guidance note by the European Commission. Sub-chapter also includes blue box with recommendations, examples, lessons learned or tips based on experiences from Slovakia, Poland and Hungary. Detailed analysis of Slovak, Polish and Hungarian LTRS can be found in Annex I – III, which were provided by our project partners.

Box 1 - Areas of policy and action to be covered in the LTRSs in accordance with EPBD [1]

Pursuant to Article 2a of the EPBD, Member States are required to:

- a) establish a comprehensive strategy aimed at achieving a highly efficient and decarbonised building stock by 2050 and cost-effective transformation of existing buildings into Nearly zero energy buildings standard (NZEB);*
- b) set out a roadmap with measures, measurable progress indicators and indicative milestones for 2030, 2040 and 2050;*
- c) carry out a public consultation on their strategy before submitting it to the Commission and set out arrangements for further inclusive consultation during implementation;*
- d) facilitate access to mechanisms through smart financing to support the mobilisation of investment; and*
- e) submit their strategy as part of their final integrated national energy and climate plan (NECP) and provide information on implementation in their integrated national energy and climate progress reports.*

The following list of elements and sections provides a basic content outline to include in the renovation strategy, as set out in the Directive:

- ✓ Overview of the national building stock, based, as appropriate, on statistical sampling and expected share of renovated buildings in 2020,
- ✓ Roadmap with domestically established measurable progress indicators,
- ✓ Investment needs,
- ✓ Existing and planned policies to meet the targets,
- ✓ Public consultation process,
- ✓ Implementation experiences of most recent long-term renovation strategies,
- ✓ Overview of social and economic benefits of implementing renovation policies.

⁸ Available at: <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32018L0844>

⁹ Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019H0786>

2.1 OVERVIEW OF BUILDING STOCK

Starting point of each strategy should be an overview of the national building stock. The basis of a good renovation strategy is establishing an accurate understanding of the building stock, including age, building typology, ownership etc. The composition of the building stock can be illustrated using graphs and tables. To be able to address relevant policies and provide effective and clear overview, it is recommended to divide the buildings into segments based on typology of buildings in accordance with following table:

Table 1 – Typology of building stock

Main typology	Building typologies
Public buildings	Offices & administrative buildings
	Educational buildings
	Hospitals & health facilities
	Buildings for culture events
	Other
Residential buildings	Single-family houses
	Apartment buildings
Private non-residential buildings / commercial buildings	Offices
	Retail and restaurants buildings
	Hotels & hostels etc.
	Health facilities
	Sport buildings
	Other

What kind of data should be collected?

- a) General information:
 - Typology of building
 - Ownership
 - Climate zone /geographic description
- b) Technical information:
 - Age (year built)
 - Construction type

- Gross floor area (m²) / Heated floor area (m²)
- Building performance (U-value for different components)
- c) Energy information:
 - Energy consumption (kWh/m²/year)
 - Energy use based on subcategory ((kWh/m²/year or % of total energy use)
 - Heating
 - Hot water
 - Ventilation
 - Cooling
 - Lighting
 - Appliances
 - Energy source ((kWh/m²/year or % of total energy use)
 - On-site renewables
 - Biomass
 - Natural Gas
 - Bio Gas
 - Oil
 - Coal
 - Lignite
 - Etc.
 - Energy supplies ((kWh/m²/year or % of total energy use)
 - Electric boiler
 - Heat pumps
 - Biomass boiler
 - Fossil fuel boiler
 - District heating
 - Etc.

Useful data can be also provided via data from energy performance certification. One useful indicator could be the number of EPCs and their labels according to different age bands. This will demonstrate the building performance level for different building typologies or age bands.

In terms of data complexity, it should be noted that, the most detailed data should be provided by public buildings, especially buildings owned or occupied by central government. At least the floor

area (expressed in square metres), type of building, age and data on energy performance should be collected in the overview.

To be able to plan renovation policies and activities, it is also important to know percentage of already renovated buildings (ideally in each typology category). Based on European Commission recommendations, beyond the percentage of renovations, it is helpful to define them in terms of depth, such as "light," "medium" and "deep", or transformation into nearly zero energy building standard. EU Member States now have to include the expected share of renovated buildings in 2020 in their overview of the national building stock, see box below. The data can be set as a number of buildings, m² of renovated buildings or by % of renovated building stock.

Box 2 – Recommendations by European Commission [2]

Article 2a(1)(a) of the revised EPBD adds to this by requiring Member States to include the "expected share of renovated buildings in 2020" in their LTRS.

The expected share of renovated buildings may be expressed in different ways such as:

- a) percentage (%)*
- b) absolute number*
- c) m² of renovated space per type of building.*

Renovation depth (e.g. "light", "medium" and "deep") could also be used for greater accuracy. Transformation into nZEBs could be another indicator. More generally, 'deep renovation' should result in both energy and greenhouse gas efficiency.

"Expected share" is not intended as a binding target but rather as a figure that realistically represents the likely rate of completed building renovation in 2020. Member States can also mention the expected share of completed renovation for 2030, 2040 and 2050, in line with the requirement to provide indicative milestones for these years.

In order to realise the greatest energy-saving potential, decrease general energy inefficiency in building stock and to be able to target most vulnerable building owners, EU member states should in their LTRS also identify and describe the worst-performing segments of their national building stock. There are several options and characteristics which can be used to identified "worst-performing segments", for example:

- a) setting a specific threshold, such as an energy performance category (e.g. below 'D'),
- b) targeting buildings by building type (e.g. premanufactured multi-family buildings),
- c) targeting specific urban or sub-urban districts (e.g. with high level of energy poverty),
- d) using a primary energy consumption figure (expressed in kWh/m² per year),
- e) targeting buildings built before a specific date (e.g. before 1980),

Box 3 – Collecting data from Census of Population, Housing and Dwellings in Slovakia

The main basis for processing the overview of the building stock in Slovak LTRS are results of the Census of Population, Housing and Dwellings in 2001 and 2011, which also provides one of the most complex available data. However, it only concerns residential buildings, especially Single-family houses and Apartment buildings.

Regarding SFH, number of dwellings in SFH, the construction period, the reconstruction period (partial or complete) or the information whether there is a thermal insulation, is available from the census. No detailed data is available on the energy consumption of existing single-family homes. The LTRS also includes few detailed typical geometric characteristics of family houses, based on set of family house representatives, which were used to determine the scale for energy certification of buildings. From the given database, basic geometric data are available such as built-up area, area of windows, facades, roofs, or total floor area.

Regarding apartment buildings, the building stock overview is built on Census of Population, Housing and Dwellings in 2011 and the database of the apartment buildings for years 1994 – 2003. However, these data are more than 20 years old, at present, there are no other comprehensive data that would replace the data from that database with the scope of the information. From the database of buildings, data on energy consumption for heating of apartment buildings for individual years 1994 - 2003 are available for the entire apartment building stock and also basic geometric data on apartment buildings (built-up area, area of windows, facades, roofs, floor area).

2.2 ROADMAP WITH MEASURABLE PROGRESS INDICATORS

Essential part of each long-term strategy is goal setting in accordance with general national strategic goals (e. g. climate, energy, social, etc.). The goal pursued should provide an effective basis for identifying investment needs and necessary measures to be implemented in order to achieve the objective. Each long-term renovation strategy should set out a comprehensive roadmap that links targets and measures to a clear timescale and shows how the sections of the strategy link to each other. As building renovation is identified as important measure of achieving climate goals in EU, in a line with achieving climate neutrality by 2050, the goal for building sector was set to decarbonised building sector by 2050.

However, a „decarbonised“ building stock is not defined in EU legislation, according to European Commission, it can be considered as one whose carbon emissions have been reduced to zero, by reducing energy needs and ensuring that remaining needs are met to the extent possible from zero-carbon sources. This approach allows for various routes to decarbonisation, taking into account the Member State's national energy mix, preferences, potential and characteristics.

In accordance with EPBD, the roadmap shall include indicative milestones for 2030, 2040 and 2050, and specify how they contribute to achieving the Union's energy efficiency targets in accordance with Directive 2012/27/EU and Roadmaps must be comprised of **measurable progress indicators and indicative milestones**.

Box 4 – EPBD requirements for renovation roadmap [1]

According to Article 2a(2) of EPBD, roadmaps must include:

- a) measurable progress indicators – these can be quantitative or qualitative variables to measure progress towards the long-term 2050 goal of reducing greenhouse gas emissions in the Union and ensuring a highly energy-efficient and decarbonised national building stock. They can be revised if necessary; and*
- b) indicative milestones – these can be quantitative or qualitative objectives. Member States must 'include indicative milestones for 2030, 2040 and 2050 and specify how they will contribute to achieving the Union's energy efficiency targets in accordance with [the EED]'*.

The intention of EPBD roadmap is not to introduce a sectoral target for the building sector, nor to establish legally binding targets. It is important to mention that the setting of ambitious and clear milestones is key to reducing investor risks and uncertainties, and engaging stakeholders and business.

The following table presents several possible milestones a different approach within setting an milestone. The milestones should be set on the information that should already be included under the “overview of the building stock”.

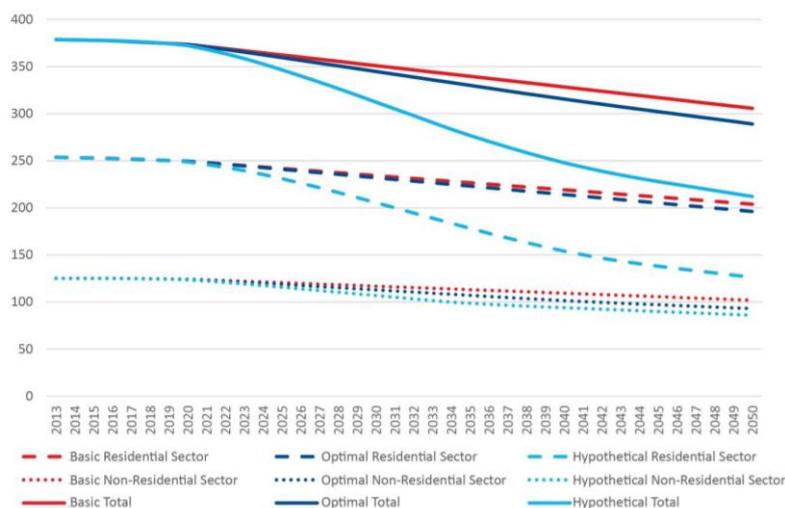
Table 2 – Example of indicator for milestones

Indicator	Milestone 2030	Milestone 2040	Milestone 2050
CO ₂ reduction [Mt CO ₂ /a] – total/ per typology			
CO ₂ reduction [%]			
Energy consumption [TWh/a]			
Energy consumption [%]			
Renovation rate [% per year]			
Depth of renovations [% / year / depth type]			
Share of renewables			
Share of EPC classes in building stock			
Other			

It also recommended to use a graphic visualisation with indicative milestones, where the transition will be illustrated. The diagram can illustrate decarbonisation path based on different indicators, for example transition based on energy performance certificates (EPCs), reduction of CO₂ emissions, reduction of energy consumption, percentage of different depth renovation path, etc.

It is also useful to include “business as usual” scenario into the graphic visualisation, which will effectively describe why the ambitious measures and increase of investment is needed. Optionally (see Polish example in Annex II) there can be set different scenarios which reflect different ambitious (for example “optimal scenario”, “realistic scenario” and “conservative scenario”).

Chart 1: Example: model final energy consumption in buildings [PJ] in Czech LTRS



Source: LTRS of Czech Republic

Box 5 – Example from Hungary

In developing the LTRS, Hungary will establish a monitoring system against a set of indicators to check the achievement of the strategic ambitions. This will allow for the continuous processing of feedback and, if necessary, the identification of new intervention points. Its final form will be the so-called **Building Renovation Monitoring System (BRMS)**. The online interface will be set up in line with the indicators in the Strategy. The programme will also be able to link, inter alia, with the State Public Buildings Register, the electronic applications of the National Building Register, in particular the e-certification system, and, for public buildings, with the Municipal Property Register and the Central Public Investment Control System (CIPCS). The BRMS will be able to measure and record five main **indicators** as a result of complex data collection:

1. number of buildings renovated per building type (number/type);
2. floor area of public buildings renovated (m²/type);
3. energy savings and CO₂ emissions savings (kWh; tco²);
4. Financial resources spent on building renovation (Ft; Ft/kWh);
5. which policy measure is achieved with what result (for the results of points 1, 2 and 3) (Ft/kWh).

The BRMS, according to plans, starts to operate from 2023. If properly implemented, the BRMS could be an excellent tool to monitor progress of the milestones set out in the LTRS, allowing the measures to be adjusted and adapted to the needs of the time.

2.3 EXISTING AND PLANNED POLICIES TO MEET THE TARGETS

One of the most essential part of renovation strategy is the one, which focus on policies description. As the strategy is to set out a long-term vision to deliver on certain target (e. g. for EU member states a 2050 decarbonisation goal), and it is stated that country need to go beyond "business-as-usual" countries should go beyond a simple inventory of existing measures and provide a long-term view of the development of future policies and measures.

Every policy planning should start with evaluation of progress, existing barriers and shortcomings, on which public policies should focus on. This sub-chapter may define the list of potential measures (also based on abroad countries experiences) to deliver. However, it is highly recommended to divide the chapters, where the next one is focusing on planned policies actions and policy commitments, not just potential measures.

Table 3 – Example of description of barriers and potential measures

Barriers	Potential measures
Low energy and legal awareness of owners or customers.	Communication campaign to raise awareness about benefits of deep renovation.
Limited access to financing in public and private sector.	Creating incentives for deep renovation (subsidies, financial instruments, etc.), Improving legislative environment for private investments (e. g. Energy Performance Contracting),
Large number of owners of one property (especially apartment buildings).	Improve legislative framework for homeowners' association,
Public procurement and tenders taking into account in particular the lowest price.	Supporting green public procurement (binding or motivation approach),
Low quality of project work influenced also by the prevailing offer of processing at a low price.	Improve legislative environment and introduce minimum prices for engineering activities, Support education and trainings for architects etc.
Low quality of processing of energy certificates influenced also by the prevailing offer of processing at a low price.	Improve legislative environment and introduce minimum prices for engineering activities, Support education and trainings for architects etc.
Unsatisfactory education and skills acquisition system for green professions.	Support education and trainings for architects etc. Support secondary technical schools and provide access to learning and trainings,
Lengthy construction proceedings (also for the renovation of buildings) and public procurements.	Support reform of construction proceedings and public procurements, Increase capacities at construction offices,
..	

It is useful to divide this chapter into two sub-chapter, which will describe a list of existing policies and measures and the second one, which will describe the list of new and proposed policies and actions. However, strategy should not consist only from simple inventory of existing measures, it is useful to describe the measures which are already implemented. It can be also useful to analyse the benefit of existing measure or policy, how existing policies have addressed the barriers to renovation and analyse if the measure is in a line with roadmap.

To support clarity of document itself, it is useful to divide list of policies and measures into separate categories. The example of potential categories is provided below:

Legislative and regulatory policies

- Legislative framework with minimum energy standards for new and renovated buildings,
- Legislative with the definition of energy poverty,
- requirement on Mandatory renovation rate for public buildings,
- Improving legislative framework for energy communities,
- Etc.

Fiscal and financial policies

- Support schemes for energy renovation in form of grants,
- Positively discriminate more ambitious projects with lower tax rate,
- Providing guaranties or other financial instrument for commercial bank to provide soft loan for apartment buildings renovation,
- Developing a mechanism to encourage renovation via third party financing e.g. ESCOs, EPCs
- Etc.

Informative and educational policies

- Improving data collection mechanism about national building stock,
- Establishing communication campaign to increase benefits awareness of renovations,
- Supporting trainings, education and school's activities, establishing knowledge and experience sharing networks
- Supporting technical assistance in form of One-stop-shops
- Etc.

Research and development policies

- Supporting research and development at universities and supporting cooperation with private sector,
- Supporting demonstration projects,
- Etc.

To support clarity, list of measures, policies and actions should have a clear and uniform template, where all necessary information will be described. Example of template and all possible information is described in table below:

Table 4 – Example of description of measure, action or policy

Type of information	Description
Name of policy or measure	...
Type of policy or measure	...
Brief description of policy or measure	...
Introduction date and/or duration date	...
Evaluation of success	...
(If), the source of funding	...
Estimated impact on measurable progress indicators	...
Estimated impact on energy consumption or CO ₂ emissions reduction	...
..	...

Importance of Action Plan as a complement to the strategic document

When planning a policy for more than 30 years, it is necessary to take into account that the achieved final values will be influenced by a number of factors that cannot be expected at present. Also setting a commitment of action for 30 years is not the easiest task as the current pen holders will probably not be the one who will be responsible for achieving the long-term goals. The policy action, which looks over the election period, is challenging to implement. Therefore, it is necessary to focus on short-term list of actions, which have to be in a line with long-term roadmap. That is why a short-term action plan as a complement to the strategic document can be useful tool, how to transpose needed policies into action.

The action plan over the next few years, ideally at least until the first milestone in 2030, should include timeline with commitment and explicitly detail of action and policies, description who is responsible for implementation the action and how activity will be financed.

Box 6 – Good example of legislative measure in Poland

The Act on the energy performance of buildings is planned to introduce (as one of changes) in 2021, that the energy performance certificates will contain the following data about certified buildings:

- a) the number of the certificate,
- b) address of the building, or of the part of the building (dwelling),
- c) issue date,
- d) validity period,
- e) final energy indicator
- f) primary energy indicator,
- g) share of RES in the yearly final energy demand
- h) CO₂ emission value

The Central Register of Buildings Emissions (CEEB) was adopted on the basis of the Act of October 28, 2020 amending the Act on supporting thermo-modernization and renovation and certain other acts (Journal of Laws of 2020, item 2127). The main objectives of the act prepared by the Ministry of Climate and Environment are the fight against smog and energy poverty and the improvement of the energy efficiency of buildings. The act will result in the elimination of dust emissions from the so-called low emission, i. e. from the communal and housing sector (these are most often individual households, small local boiler houses, workshops and service facilities). The implementation of these goals is to be supported primarily by the launch of the Central Emission Register of Buildings and improvement of the operation of the Clean Air Program and the Stop Smog Program. The inventory is to cover about 5-6 million buildings, initially it will be 500 thousand. buildings per year. The general inventory of buildings will be combined with the submission of written declarations on heat and combustion sources - by the end of 2021.

The CEEB is an IT tool for inventorying low-emission sources in buildings. This system will collect key information on the sources of emissions in the municipal and housing sector.

The system is also to enable the collection of data on the energy condition of buildings and information on forms of public aid (subsidies, preferential loans) granted for thermal modernization or replacement of boilers in buildings.

The criterion for entering a building into the system will be the power of the source, regardless of the legal form of use of the building. Therefore, CEEB will cover not only residential buildings, but also public buildings, including small local heating plants or small production plants, provided that the rated thermal power of the fuel combustion source used does not exceed 1 MW.

Under the new amendment of Energy Performance of Building Directive, European Commission underline the importance of few new specific areas, on which public policies and Renovation strategies should focus on. Governments are asked to especially focus on policies and actions to stimulate cost-effective deep renovation of buildings, actions to tackle the worst-performing segments of the building stock, address incentives to target all public buildings, outline measures against energy poverty, and outline initiatives to promote smart technologies and well-connected buildings and communities.

These areas could trigger the renovations and increase of renovation rate and depth within the building stock. At the same time, these areas cover one of the main challenges, which should be solved on the road to carbon neutral economy.

Box 7 – EPBD requirements [1]

According to Article 2a(2) of EPBD, Each Member State shall establish a long-term renovation strategy to support 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 into nearly zero-energy buildings. Each long-term renovation strategy shall encompass:

- a) ...
- b) ...,
- c) *policies and actions to stimulate cost-effective deep renovation of buildings, including staged deep renovation, and to support targeted cost-effective measures and renovation for example by introducing an optional scheme for building renovation passports*
- a) *an overview of policies and actions to target the worst performing segments of the national building stock, split-incentive dilemmas and market failures, and an outline of relevant national actions that contribute to the alleviation of energy poverty;*
- b) *policies and actions to target all public buildings;*
- c) *an overview of national initiatives to promote smart technologies and well-connected buildings and communities, as well as skills and education in the construction and energy efficiency sectors; and*
- d) ...

Policies and action on deep renovation

However, each member state of EU should have a definition of deep renovation in their legislation, level of renovation depth is also defined in Commission Recommendation on Building Renovation (EU) 2019/786. Written in Commission Recommendation on Building Renovation (EU) 2019/786: The following renovation depths have been developed in the context of the EU Building Stock Observatory on the basis of primary energy savings:

- light (less than 30 %);
- medium (between 30 % and 60 %); and
- deep (over 60 %).

Principle of building renovation passport - concept of individual building renovation roadmaps, outlining a deep step-by-step renovation plan with customised recommendations for individual buildings – can be considered as a useful tool for staged deep renovation.

Box 8 – Good example of support policy in Slovakia

Slovakia is one of the countries in the European Union with the highest rate of renovation of apartment buildings. The share of renovated apartment buildings at the end of 2019 in Slovakia is more than 67%.

There are several factors behind this. In our opinion, it is a long-term combination of expertise in the field of renovation of prefabricated apartment buildings and financing. This was initially provided by commercial banks, which were later joined by the State Housing Development Fund. It provides soft loans for the renovation of apartment buildings and we estimate that today the State Housing Development Fund participates in the financing of about 90% of renovated apartment buildings. For homeowners, a zero-interest rate is a huge attraction, although commercial credit sources can offer lower monthly payments with longer maturities.

Loans in the amount of 1155 mil. € were provided from the State Housing Development Fund in the period from 2006 to 2019 for the renovation of the apartment building, which represents 253,350 flats in apartment buildings.

Based on Slovak LTRS, Existing forms of support is a solid basis for the development of other financial platforms. The basic pillar of financing building renovation projects will continue to be loans with a preferential interest rate provided for a long period (approximately 20 years). Those loans provided in combination with state subsidies and private capital form is proven and effective tool for renovation in the segment of apartment buildings.

Policies and action on worst-performing buildings and energy poverty

This sub-chapter should include at least a short description of each policy and action, its scope and duration, the allocated budget and the expected impact. To plan a policy or action on these challenges, it is important to define (or have a binding definition) them.

The worst-performing buildings provides the biggest potential for energy savings and can be considered as the segment with most barriers. There are available different approaches on how to determine the worst-performing segments of national building stock. There are several options and characteristics which can be used to identify "worst-performing segments", for example:

- a) setting a specific threshold, such as an energy performance category (e. g. below 'D'),
- b) targeting buildings by building type (e. g. premanufactured multi-family buildings),
- c) targeting specific urban or sub-urban districts (e. g. with high level of energy poverty),
- d) using a primary energy consumption figure (expressed in kWh/m² per year),
- e) targeting buildings built before a specific date (e. g. before 1980),

In case of energy poverty, to develop targeted support and to define how many households in energy poverty should be targeted within the certain support scheme, the most important task is to identify the target group at risk of energy poverty, which is necessary to define target groups and

criteria for administrative requirements. There is no standard definition of energy poverty in EU, and it is therefore left to Member States to develop their own criteria according to their national context. But for example, there is no binding definition of energy poverty within Slovak legislation yet.

There are many ways to set the definition of a household at risk of energy poverty. For example, to use social aspect, the support condition may depend on the amount of household income (for households whose income is e.g., less than the national median, or other conditions also linked to income). To involve energy aspect, this group may be the household whose energy expenditure per m² is higher than specified threshold (national median) and at the same time, their incomes are less than the national median.

Policies and actions to target all public buildings

The main role for public buildings in the context of achieving the set milestones in Renovation strategies is to lead by an example. This segment should lead by example also in renovation rate and in ambition of renovations, therefore renovation depth.

Member states of EU are already required renovate 3% of buildings owned and occupied by central government or deliver equivalent savings (under Article 5 of the EED). Based on last proposal, this should be extended to all public buildings, therefore also for buildings owned and occupied by municipalities and other public entities. This could be considered as one of most important policy.

Additional added value of public buildings should be availability of data. As it was already mention on previous chapters, data about building stock are crucial part of data-based policy planning. Public building should lead by example also in this topic.

Incentives to use smart technologies and skills

To support R&D, smart technologies and new "green" skills, different type of incentives can be used. Successful examples are programs that support the development of new best available techniques (BAT) in a form of research grant program, which support innovation or pilot and demonstration projects that could intensify and accelerate the deployment of new technologies and approaches.

Innovation and its support will speed up the process of preparing and saving energy. Thanks to them, the new trend will become a common practice in 5-10 years. Promoting innovation in the buildings sector is necessary in order to meet the long-term goal of 2050, which is to ensure a highly energy-efficient and decarbonised national building stock and to facilitate the cost-effective transformation of existing buildings into near-zero energy buildings. It is also important to make efforts to support the adaptation of cities to climate change (adaptation of buildings to climate change), to address the quality of the indoor environment (highly energy efficient buildings and new climates) and the smart cities concept, which is closely linked to building preparedness. into smart energy networks with other buildings and infrastructure elements in cities in order to reduce energy consumption.

Supporting research and development of key technologies and concepts for the buildings of the future would help to adapt innovative technologies and products for industrial production. The construction of pilot projects (model buildings) would help to remove barriers (whether technological or mental on the part of more skeptical building owners) and the process of using new technologies and concepts would be sufficiently optimized.

Pilot projects support the introduction of innovations (new products and processes) into the construction and renovation of buildings, as they allow them to be verified in practice by reducing economic risk. The publication of the results of the pilot project speeds up the introduction of innovation in the market and reduces costs. Model projects (buildings) then serve as a positive example of the use of innovative techniques and concepts for investors and builders, who often do not want to embark on innovative and more ambitious projects. Implementing the results of research projects into demonstrative projects (buildings) would set an innovative direction for the construction of buildings. The introduction of innovations also has an impact on the support of the domestic construction sector, which will gain an advantage and the ability to export itself with new products and technologies. The target group is scientific institutions, academia (universities) and companies dealing with innovations in the field of reducing the energy performance of buildings, elements of sustainability in the building sector and the quality of the indoor environment.

Examples of activities:

- Research studies
- Development of technologies, systems and components
- Basic technology-related research
- Innovative construction and reconstruction concepts
- Support for pilot and demonstration projects developed under the program
- Evaluation and monitoring of demonstration projects
- Support for the dissemination and transfer of know-how

2.4 INVESTMENT NEEDS

In addition to setting a clear roadmap with measurable indicators and goals, it is also important to identify and quantify the scale of investment required to deliver the strategy and policy packages and potential sources of the investment needed. The list of investment needs can be set as cumulative investment cost until specific milestone (e.g. 2030, 2040 or 2050) or by annual investment needs for certain years.

The calculation of investment needs has to reflect the scenarios presented in roadmap and can also provide information for "business as usual" scenario and additional decarbonisation scenarios.

It is highly recommended to divide investment needs into different category (e.g. based on typology of buildings). Therefore, monitoring of planned allocation is more effective and clearer both for public servants and non-government sector. For example, in Slovakia, investment needs are divided into two categories (residential buildings and non-residential buildings).

Besides that, it is also important to define possible sources of investment to implement the strategy and answer the question how to mobilise additional investments needed. At the same time as maximising the allocation of public funding sources to the renovation of buildings, it is important to identify ways to leverage additional private-sector investment.

Box 9 – Example from Hungary and Slovakia

Hungary: The Strategy sets out 35 policy measures. The investments needs are identified for each policy measure; therefore it is not particularly calculated on a sector basis. Details on the approach and methodology of calculations are not provided. A total estimated cost is included in the strategy, according to which the total estimated cost of achieving climate neutrality in 2050 is in the order of about HUF 50 thousand billion, which implies the mobilisation of resources equivalent to 2.5% of GDP per year until 2050.

Slovakia: The model of the investment need for the renovation of the building stock in Slovakia is accordance with the set milestones points to an annual absorption capacity of 1.1-1.2 billion EUR, while the highest should be in the period 2026 - 2031 at the level of 1.3 billion EUR per year. The estimated investment need is calculated using a calculation model, which was also used for setting energy and climate targets. The investment need is defined cumulatively for the years 2030, 2040 and 2050.

2.5 PUBLIC CONSULTATION PROCESS

Public consultation throughout the process of development and implementation is essential part of strategy preparation. Transparent process involving stakeholders and the general public should be something, where democratic countries rely on in developing policy and legislation. Government and relevant public body, responsible for Renovation strategy preparation, should allow sufficient time to consult on the development and implementation of their LTRS. By involving the public and support participative approach, consultation can improve policy results. The direct or indirect involvement of stakeholders is essential for the dissemination of the Renovation strategy and can promote consensus and acceptance of the strategic document. Consultation will ensure that stakeholders are actively involved and will encourage cooperation in delivering a successful and effective strategy. It is also an opportunity to gather data and information from outside of government to strengthen the strategy, get feedback on feasibility of proposed policies and on practical issues or barriers.

The EU Governance Regulation stresses the importance of stakeholder exchange and consultation in various ways. As written under the Article 2a of revised EPBD, EU member states had to carry out a public consultation on their strategy prior to submission to the Commission and define modalities for further and inclusive consultation during implementation.

It is important to determine the consultation format (e.g. open or targeted) and method (e.g. face-to-face meetings/events, written submissions or online questionnaire). However, there may already be procedures for consultation on major policy or legislative initiatives that could be also applied. The choice of the format also depends on the length of the entire process and the specific tasks. It is therefore recommended to establish the modalities for consultation in an inclusive way during the implementation of Renovation strategy. Responsible body should ensure that stakeholders have time to engage and that their views are taken into account in the strategy development process.

Identifying stakeholders is an important first step. Identifying stakeholders early ensures involvement and input from external stakeholders such as building experts, energy and climate expert, owner associations, the finance sector representatives, etc. This stage should identify which stakeholders to engage, and how should they be involved during the development of strategy.

Government may also consider setting up a stakeholder platform, roundtables or different working group specific for different topics. Since the renovation strategy will probably has to be updated on a regular basis, establishing a long-term consultation format may be useful.

The following broad principles, adapted by European Commission from the UK government's guidance¹⁰ on consultation, can serve as useful guidelines:

- a) **Consultations should be clear and concise:** *It should be clear what questions are being asked and the number of questions should be limited to those that are necessary. Questions should be easy to understand and easy to answer.*
- b) **Consultations should have a purpose:** *Responses should be taken into account when taking policy forward. Consultation on policies or implementation plans should be held when their*

¹⁰ Available at: <https://www.gov.uk/government/publications/consultation-principles-guidance>

development is at a formative stage. There should not be questions during consultation about issues on which you already have a final view.

- c) **Consultations should be informative:** *Enough information should be given to ensure that those consulted understand the issues and can give informed responses.*
- d) **Consultations are only part of a process:** *It should be considered whether informal iterative consultation is appropriate, using new digital tools and open, collaborative approaches. Consultation is not just about formal documents and responses. It is an ongoing process.*
- e) **Consultations should last for a proportionate amount of time:** *The length of the consultation should reflect the nature and impact of the proposal. Consulting for too long will delay policy development. Consulting too quickly will not give enough time and will reduce the quality of responses.*
- f) **Consultations should be targeted and inclusive:** *It should be considered the full range of stakeholders affected by the policy, and whether representative groups exist. Consider targeting specific groups if appropriate. It should be ensured that they are aware of the consultation and can access it.*
- g) **Consultations should be agreed before publication:** *It is recommended to seek collective agreement before publishing a written consultation, particularly when consulting on new policy proposals.*

Box 10 – Example from Hungary (more like mistakes to be avoided)

The public consultation process was minimal and insufficient. The participation was not inclusive; the process only comprised one event: an online consultation organized by the Ministry of Innovation and Technology. On 4 August 2020, a professional consultation on the LTRS was held with the participation of relevant government stakeholders, professional organisations, academic institutions, market players and banks. The online event was not suitable for debating the strategy; some presentations were made to introduce the concept of the strategy, followed by some guided questions to the participants. After the event no information was available on the process and the content of the finalized LTRS. The draft text has not been made publicly available for comments and remarks.

One of the underestimated aspects is also cooperation between state bodies (e. g. ministries, state agencies, etc.) Different state bodies are responsible for different policies covering building sector itself. Providing data, designing measures and proposing needed public policies for Long-term renovation strategy must be based on effective cooperation between interested state bodies. Often, the ministry which is responsible for drafting Renovation strategy has no competency to implement identified policies. Thus, effective platform and effective communication between state bodies is an essential part for implementation of Renovation strategy.

2.6 IMPLEMENTATION EXPERIENCES OF RECENT STRATEGIES

As it is written in Introduction of this document, a strategy should not be an end in itself, but a starting point for stronger action. Implementation is the most important part and comes with challenges. That why it is important to evaluate implementation of previous versions of strategies. Renovation strategies should describe needed policy actions with concrete measures and deadlines. Only with concrete description it can be possible to carry of an evaluation of implementation.

Based on the obligation arising from the EU directives, member states of EU started with preparation of unified Renovation strategies in 2014. This first strategy should be updated in 2017 and the current Long-term Renovation Strategy is generally the third version. Base on EPBD requirements, this version should also includes detail of implementation of its most recent long-term renovation strategies.

Box 11 – EPBD requirements [1]

According to Article 2a(2) of EPBD:

Each Member State shall annex the details of the implementation of its most recent long-term renovation strategy to its long-term renovation strategy, including on the planned policies and actions.

It is also recommended to evaluate if the identified barriers and obstacles have not been removed or if any policy action were implemented with a focus on removing certain barriers and obstacles written in previous Renovation strategy. If not, it is useful to describes reasons why the identified barriers and obstacles are still there, if the barriers are still reasonable or not.

Box 12 – Experiences from Slovakia

Slovakia: The requirements and description of the policies defined in the previous strategy, which can be evaluated for their successful implementation, are based primarily on binding legislative measures. These are, for example, increased requirements for the energy performance of buildings, which require adjustments to legal and technical regulations, or the continuously prepared and approved Renovation Building of relevant buildings, which is prepared annually based on compliance with Article 5 of Directive 2012/27/EU. The defined investment need was not met and it cannot be said that the required new forms of support would be implemented in the required amount. Many of the defined barriers and obstacles have not been actively removed.

2.7 OVERVIEW OF DIRECT AND WIDER BENEFITS

The evaluation of direct and wider benefits of building renovations, mostly the social, environmental and economic ones, can provide a useful support for effective implementation of strategies. Publishing strategy with overview of wider benefits is an opportunity to promote renovations of building as an effective measure, which may contribute to different public policy challenges. Also, it is an opportunity to raise awareness and garner support for the strategy.

On the one hand, it can enable a more holistic and integrated approach, highlighting synergies with other policy areas. This could involve other government departments, ministries and stakeholders not dealing with energy or buildings, but also stakeholders from the health, environment, finance or social sectors and departments. On another hand, it can provide an effective set of arguments for mobilization of finances from states budget or other funds. Monetisation of the benefits that arise from energy renovations in addition to the cost savings is often overlooked.

Based on EU Directive, Long-term renovation strategies should explain the direct and wider benefits.

Box13 – EPBD requirements [1]

According to Article 2a(2) of EPBD:

Each long-term renovation strategy shall encompass:

an evidence-based estimate of expected energy savings and wider benefits, such as those related to health, safety and air quality.

Generally, to identify and quantify the benefits arising from renovations of building may be divided by different segments of benefits such as:

- **Economic benefits:**
 - energy bill savings,
 - increase in GDP,
 - increase in property values,
 - impact on public finances,
 - impact on economic activity of inhabitants,
 - reduction of energy import bill,
 - increased energy security of country,
- **Environmental benefits:**
 - reduced greenhouse gas emissions,
 - air quality improvements,
- **Social benefits:**
 - health benefits of inhabitants and citizens,
 - reduction of energy poverty,

- increased comfort,
- increased productivity.

There is a wide range of studies [8, 9, 10] that carry out such assessment including the monetisation of the wider benefits, which can be used as an input for Long-term renovation strategy.

The next part describes example of calculation of macroeconomic benefits [11] from Single-family houses renovation public support in Slovakia for two scenarios of support.

Box 14 – Macroeconomic impact of Single-family houses renovation investments in Slovakia

Basic scenario (A): Overall investment = €226,9 mil.; Overall public support = €100 mil.

Ambitious scenario (B): Overall investment = €220,0 mil.; Overall public support = €100 mil.

Impact on GDP

Building renovation is a sector which, thanks to a wide supply chain, supports the activity of various sectors of the economy, from small businesses to various types of subcontracting. Building renovation can be considered a sector with a high multiplier effect. This figure shows that an increase in production in one sector of the national economy (in this case the construction sector) will have a positive effect on an increase in production in other sectors of the national economy. According to a author, an investment multiplier value of 1.3 can be considered.

Scenario A: The total building renovation investment of €226.9 million will generate an additional GDP of EUR €295 million,

Scenario B: The total building renovation investment of €220.0 million will generate an additional GDP of €286 million.

Job creation

The calculation of job creation in the study is based on data on labour productivity in the construction sector in 2014 per employee, which was €28,455. According to this figure, the authors calculated the number of jobs created with an investment of €100 million, which is 3515 new jobs created. However, this figure can be considered conservative. Data on labour productivity for the whole sector include data from civil engineering, which are specific to the lower use of human working capital. However, in the case of building renovation work, this is a sector with a high proportion of human labour. The number of new jobs created could be double in this respect based on authors. However, it is also necessary to take into account that the newly created working capital will not be filled entirely only by new job positions, but part of these jobs will be filled by the already existing working fund.

Scenario A: The total building renovation investment will create 6,512 jobs.

Scenario B: The total investment in the renovation of euro buildings will create 6313 jobs.

According to authors, when comparing job creation from a model state support of €100 mil. and job costs created through state aid (the 10 most important state investment incentives in 2002-2016), it can be stated that job creation through direct investment in building renovation is more efficient compared to the investment incentives spent on foreign investors.

Box 15 – Macroeconomic impact of Single-family houses renovation investments in Slovakia

Basic scenario (A): Overall investment = €226,9 mil.; Overall public support = €100 mil.

Ambitious scenario (B): Overall investment = €220,0 mil.; Overall public support = €100 mil.

Contributions to the public budget

	Basic scenario	Ambitious scenario
Gross wages in construction	713,00 €	713,00 €
Net salary	560,79 €	560,79 €
Social insurance - employee	67,02 €	67,02 €
Social insurance - employer	179,66 €	179,66 €
Health insurance - employee	28,52 €	28,52 €
Health insurance - employer	71,30 €	71,30 €
Tax	56,67 €	56,67 €
Duties and taxes on average wages in construction	403,17 €	403,17 €
Number of new jobs created	6512	6313
Total contribution to the public budget (monthly)	2 625 443 €	2 545 212 €
Total contribution to the public budget (annually)	31 505 316 €	30 542 547 €
VAT	20%	20%
Renovation investment	226 902 902 €	219 963 825 €
Added value of investment ***	45 380 580 €	43 992 765 €
VAT benefit (one-off)	9 076 116 €	8 798 553 €
Unemployment benefits (modelled monthly)	296,4 €	410 €**
Number of new jobs created	6512	6313
Public finance savings (monthly)	2 669 920 €	2 588 330 €
Public finance savings (per year)	32 039 040 €	31 059 960 €
Total benefits of the model investment in the public budget (annually) ****	72 620 473 €	70 401 060 €

* Calculated for year 2018,

** Average data,

*** The amount of added value is considered at the level of 20%,

**** The calculation assumes a 100% share of newly created jobs.

3. CONCLUSION

Renovation of national building stock is crucial part of policy packages to deliver wide range of strategic goals, with the most relevant, achieving climate neutrality. To be able to achieve goals and targets, each country need a strategy, which will set a clear roadmap with milestones and with a definitions of measures or policies needed to achieve them.

To be able to decarbonize building stock, first, we need to know our building stock. Knowing the building stock, its technical details and potentials, is crucial for planning the policies. It allows us to use data-based public policy planning and supporting value-for-money principles.

Knowing the goals and the direction where the countries building stock should head is generally "easy to provide" analytical task based on Unions and national strategic targets. The answer on how to get there is more demanding. Renovation strategies can go the way of listing the possible needed actions or by setting a policy commitment. That is why a short-term action plan as a complement to the strategic document can be useful tool, how to transpose needed policies into action. In our jurisdictions, the policy action, which looks over the election period, is challenging to implement. Short-term action plan, prepared with accordance to strategy, can be an effective tool.

To be able to implement renovation strategies, consensus and acceptance of the strategic document within stakeholders, other ministries, wider public and politics is important. Therefore, the direct or indirect involvement of stakeholders is essential and should not be underestimated.

This document described general framework, main parts of renovation strategies essential for effective implementation, described lessons learned, best practices, but also failures to be avoided during drafting a national renovation strategy in Slovakia, Hungary and Poland.

A strategy itself should not be an end in, but a starting point for stronger action. Even the best written renovation strategy can be useless without implementation of specific measures and actions into the reality. Thus, the main work starts just after the strategic document approval.

REFERENCES

- [1] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast); available at: <http://data.europa.eu/eli/dir/2010/31/2021-01-01>
- [2] Commission Recommendation (EU) 2019/786 of 8 May 2019 on building renovation (notified under document C(2019) 3352) (Text with EEA relevance.); available at: <http://data.europa.eu/eli/reco/2019/786/oj>
- [3] Bean F., Rata C., Steuwer S., Tzanev D., *EU Energy Performance of Buildings Directive – Guidance for public officers – Navigating new requirements for renovation strategies*, 2019, available at: <https://www.bpie.eu/publication/eu-energy-performance-of-buildings-directive-guidance-for-public-officers-navigating-new-requirements-for-renovation-strategies/>
- [4] Building Performance Institute Europe, *A template for developing national long-term renovation strategies*, 2019; available at: <https://www.euki.de/en/euki-projects/accelerating-climate-action-buildings-strengthening-civil-society-and-policy-makers-in-romania-and-bulgaria/>
- [5] Ministry of Transport and Construction of the Slovak Republic, *Long-term renovation strategy for building stock*; available at: https://ec.europa.eu/energy/sites/default/files/documents/sk_2020_ltrs_en_version.pdf
- [6] Hungarian Ministry of Innovation and Technology, *Long Renewal Strategy on the basis of Directive (EU) 2018/844 with a view to fulfilling the eligibility conditions for the payment of cohesion funds for the period 2021-2027*; available at: https://ec.europa.eu/energy/sites/default/files/documents/hu_2020_ltrs_en.pdf
- [7] Ministry of Industry and Trade of the Czech Republic, *Long-term renovation strategy to support the renovation of the national stock of both public and private residential and non-residential buildings*, available at: https://ec.europa.eu/energy/sites/default/files/documents/cz_2020_ltrs_official_translation_en.pdf
- [8] International Energy Agency, *Multiple Benefits of Energy Efficiency*, 2019, IEA, Paris; available at: <https://www.iea.org/reports/multiple-benefits-of-energy-efficiency>
- [9] Pollitt H. and co., *The macro-level and sectoral impacts of Energy Efficiency policies*, European Commission, 2017; available at: https://ec.europa.eu/energy/sites/ener/files/documents/the_macro-level_and_sectoral_impacts_of_energy_efficiency_policies.pdf
- [10] Washan P., Stenning J Goodman M., *Building the Future: Economic and discal impacts of making homes energy efficient*, 2014; available at: https://www.housingnet.co.uk/pdf/Building-the-Future-Final-report_October-2014_ISSUED.pdf
- [11] Paksi R. (Building for the Future, SVK), *Potential of supporting the renovations of Single-family houses in Slovakia*, 2021; available at: <https://bpb.sk/studie/potencial-podpory-obnovy-rodinnych-domov/>

Annex I – STEP-BY-STEP GUIDANCE¹¹

This guidance serves as a step-by-step checklist for strategy preparation or certain policy preparation

1. Defining the problem
 - a. What is the strategies' / policies' purpose?
 - b. Based on what is strategy / policy needed?
 - c. Who should be involved?
2. Understanding the starting position
 - a. Building stock / segment analysis,
 - b. Available financial resources (Investment/borrowing capacity of the local government, residential or commercial sector,
 - i. Budget lines for energy efficiency,
 - ii. Borrowing capacity/willingness,
 - iii. Available financing sources,
 - iv. Segments energy expenses,
 - v. Etc.
 - c. Existing policies, support schemes and regulations,
3. Setting the target
 - a. Defining the target
 - i. Explain the target that should be achieved,
 - ii. Explain and define when should be target achieved,
 - iii. Define the methodology for setting and measuring the target (financial / technical modelling),
 - b. Defining what is needed to reach the target
 - i. Which and how many buildings to renovate,
 - ii. How deep the renovation should be,
 - iii. What resources will be needed (from local government and building owners).
 - c. Securing the actions
 - i. Stakeholders' involvement strategy
 - ii. Marketing analysis for each segment (benefits detections)
 - iii. Defining what is needed from new policies and actions
 - iv. How to finance the strategy (where are the future possibilities sources, how to leverage public sources)
4. Planning strategy execution

¹¹ Source: BPIE, *A template for developing national long-term renovation strategies*, 2019; own customization

- a. Preparation of timeline with policy actions,
 - b. Optionally prepare different scenarios,
 - c. Organisational structure of local/central government (existing + required).
 - d. Information sources
5. Monitoring of implementation and risk management
- a. Monitoring
 - i. What should be monitored
 - ii. How to warn if there is an intention that milestones will not be reached
 - iii. Implementation awareness
 - iv. Involving stakeholders into monitoring
 - b. Risk assessment
 - i. Defining what can go wrong
 - ii. Risk management strategy
6. Awareness of strategy actions, building the acceptance and support
- a. Creating marketing campaign for different policy actions
 - b. Securing proper public and stakeholders' involvement

Annex II – Analysis of Slovak LTRS

1. Overview of the national building stock: starting point of each strategy is an overview of the national building stock.

This section describes what kind of data are provided, which necessary information is missing, what sources and data they are based on.

The overview of national building stock in Slovak LTRS covers residential buildings, especially single-family houses (SFH) and apartment building, and basic information about public buildings. The overview does not include data about commercial (non-resident private) building stock.

The main basis for processing the overview of the building stock in Slovak LTRS are results of the Census of Population, Housing and Dwellings in 2001 and 2011, database of buildings of the Technical and Testing Institute of Civil Engineering including apartment houses and non - residential buildings built before 2003, statistical survey on non-residential buildings on an annual basis (new and significantly renovated non-residential buildings after 2016) and information system INFOREG used for registration of energy certificates issued for new and renovated buildings.

Regarding **SFH**, the building stock overview is built on Census of Population, Housing and Dwellings in 2011 and statistical reports published by the Statistical Office of the Slovak Republic on the number of completed dwellings in family houses for the period 2012 - 2019. More detailed statistical data or databases with data are not available about family houses. From the census, number of dwellings in SFH, the construction period, the reconstruction period (partial or complete) or the information whether there is a thermal insulation, is available. No detailed data is available on the energy consumption of existing single-family homes. The LTRS also includes few detailed typical geometric characteristics of family houses, based on set of family house representatives, which were used to determine the scale for energy certification of buildings. From the given database, basic geometric data are available such as built-up area, area of windows, facades, roofs, or total floor area.

Regarding **apartment buildings**, the building stock overview is built on Census of Population, Housing and Dwellings in 2011 and the database of the apartment buildings for years 1994 – 2003. However, these data are more than 20 years old, at present, there are no other comprehensive data that would replace the data from that database with the scope of the information. From the database of buildings, data on energy consumption for heating of apartment buildings for individual years 1994 - 2003 are available for the entire apartment building stock and also basic geometric data on apartment buildings (built-up area, area of windows, facades, roofs, floor area).

At present, there are only data from the database characterizing **non-residential buildings**, which are owned by the state and local governments. Of the total number of non-residential buildings, 15,435 buildings owned by the state and local governments were identified between 1994 and 2003. Information on the average heat consumption for heating is available only for the years 1994 - 2003. Data on the built-up volume of buildings is also available. Since 2016, the Statistical Office of the Slovak Republic has been conducting a statistical survey on the number of completed non-residential buildings (also for private non-residential) from the issued approval decisions.

The expected share of renovated buildings in 2020 is calculated only for SFH and apartment buildings. The calculation is based on data from Census of Population, Housing and Dwellings in 2011

and the share of renovated residential buildings in 2020 is calculated by recalculating the total annual results of ETICS production and expert estimation. The census data contains information on whether the building has been partially or completely insulated. From these data, the percentage of significant renovation of family and apartment houses could subsequently be expressed. There are no relevant statistics and monitoring on the non-residential buildings fund that would allow analytical activities in this segment of buildings.

Pros and cons:

- + *Complex (but not actual) data about residential buildings*
- *No data about commercial (non-resident private) building stock*
- *Old data about public building*
- *Lack of sufficient data about public buildings*
- *To be able to plan sufficient public policies and meeting the set goals, more detailed data about quantify the number, type, size (floor area) of each combination of building type and age, energy use (heating, cooling, (kWh/m² or % of total energy use)) or energy source is required*
- *Expected share of renovated buildings in 2020 is calculated only for residential building*

2. Roadmap to decarbonised buildings stock by 2050: LTRS must include roadmaps with measurable progress indicators and indicative milestones

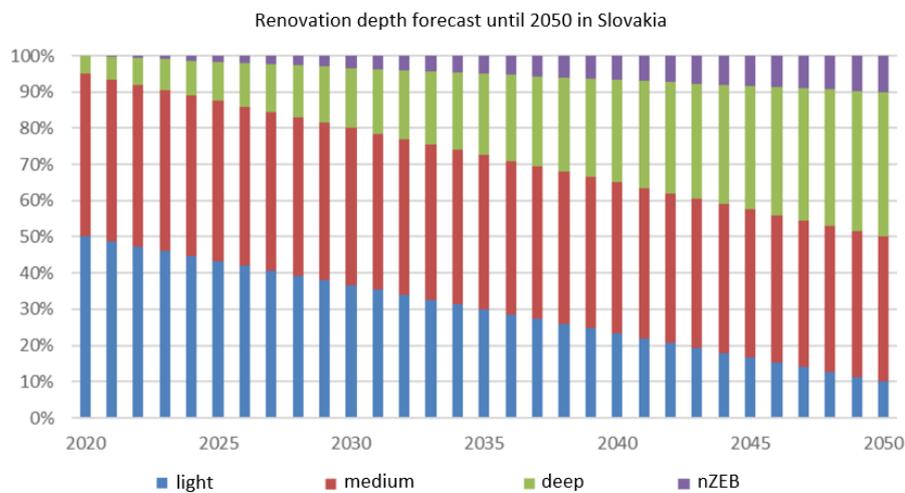
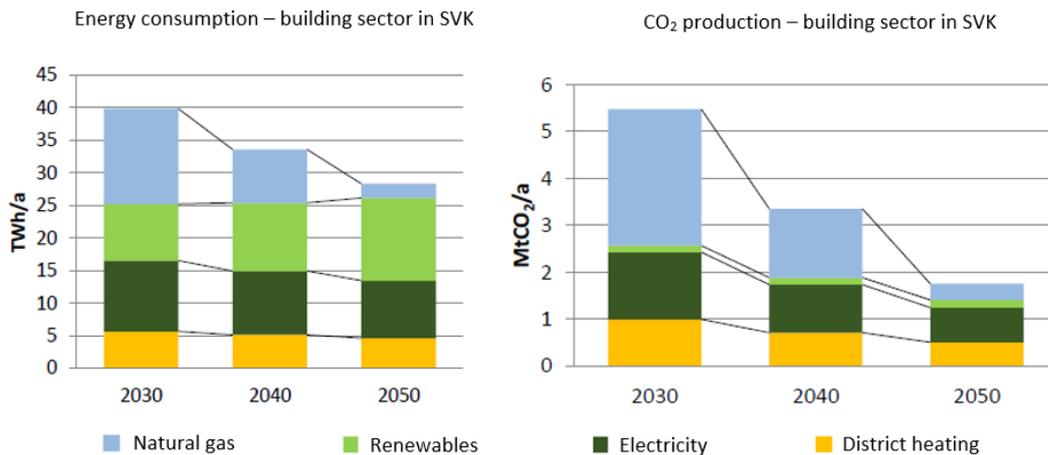
This section describes what indicators and milestones are set, how are indicators and targets defined, briefly explain the methodology behind the scenario modelling; describe whether the milestones are in a line with a target of highly decarbonised building stock by 2050

The basis for setting the milestones was the definition of the basic line of energy consumption for the building sector and related CO₂ emissions, calculated at the level of 2016. For the purposes of determining the baseline of CO₂ emissions in the building sector in the Slovak Republic, valid CO₂ conversion factors for individual energy carriers were used in the calculation. A reduction of at least 90% compared to 1990 is expected, which would mean achieving climate neutrality in 2050. The same methodology was used to determine the baseline emissions in the building sector in 1990 as for the level in 2016. The total amount of CO₂ emissions in the building sector was set for 1990 at approximately 14.2 MtCO₂, which compared to the level at 8.54 MtCO₂ in 2016 represents a reduction of 40%. Achieving the long-term target of reducing greenhouse gas emissions in the Union by 80-95% compared to 1990 levels means setting a target at national level for the building sector in the range of 0.7-2.8 MtCO₂. For the purpose of determining the national trajectory, a mean range of 1.8 MtCO₂ was considered.

Roadmap also includes renovation depth scenario as a significant shift from the implementation of partial renovation of buildings (light and medium forms of renovation) to the implementation of deep renovation (also by gradual steps) is required.

The roadmap must also include measurable progress indicators and an evidence-based estimate of energy savings. The determination of measurable progress indicators was based on available data sources, qualified estimates of the total floor area of residential and non-residential buildings in the

Slovak Republic, the current rate of renovation in the building sector, taking into account the increasement of deep renovations. The estimate of energy savings as well as the investment need to achieve these savings was calculated using a calculation model. It is expected that all buildings will be renovated by 2050. The cumulative amount of energy savings at the final consumer is set for 2030, 2040 and 2050. Likewise, the cumulative CO₂ savings in the building sector are set for these years, which are in line with the objectives of the strategy.



Source

Pros and cons:

- + Energy consumption and CO₂ reduction roadmap based on calculation model in a line with directive target
- + Renovation depth scenario included
- Milestones and indicators are not divided into segments of building sector

3. Investment needs: to achieve the milestones, member state should prepare a list of investment needs

This section describes the methodology behind calculation, if the investment needs include all sector, if its divided into segments.

The model of the investment need for the renovation of the building stock in Slovakia in accordance with the set milestones points to an annual absorption capacity of 1.1-1.2 billion EUR, while the highest should be in the period 2026 - 2031 at the level of 1.3 billion EUR per year. The estimated investment need is calculated using a calculation model, which was also used for setting energy and climate targets. The investment need is defined cumulatively for the years 2030, 2040 and 2050.

Pros and cons:

- *The investment need is divided into only two categories (residential buildings and non-residential buildings)*

4. Existing and planned policies to meet the targets:

This section should consist of description of few existing or planned policies which can be set as a good practice, lessons learned or failures to be avoided related to goal of increasing the renovation depth and rate. Please pick max 10 policies and briefly describe them (each in one paragraph, or you can use a table format). May include general principles on how to successfully implement policies such as support programs, if there is a good example in your country.

Pros and cons / evaluation:

The strategy argues in several parts that, in order to achieve the ambitious targets, increased efforts are needed in the intensity of the ongoing renovation of the building stock, both in terms of the emphasis on carrying out a deep renovation and a significant increase in the renovation rate. According to the strategy, the fulfilment of the proposed objectives requires the supplementation of existing forms of support with new forms of support with sufficient financial resources, with a targeted focus on areas requiring intensified efforts to increase energy efficiency.

Although the strategy itself states that a fundamental change is needed to meet the objectives through the introduction of highly ambitious policies and a significant increase in funding, the strategy does not find an adequate proposal to modify existing public policies or to propose new ones. To a large extent, this is a summary of existing public policies, which, even according to the strategy, are not sufficient to meet the proposed objectives.

4.1 Legislative (Strengthening information and legal certainty - reinforcing the quality and use of Energy Performance Certificates, requirements for energy performance of buildings (NZEB; renovations), etc.)

The basic public policy is the determination and application of minimum requirements for energy performance of new buildings, existing buildings during their major renovation, building structures and elements, technical heating systems, hot water, ventilation, cooling and lighting of the building

and their combinations, determined on the basis of cost-optimal levels of minimum requirements for EPB (law, implementing regulation, technical specifications).

Interim goals for achieving individual energy levels of construction were set in Decree no. 364/2012 Coll., Which implements the law in three-time stages as follows:

1. low-energy level of construction for new and renovated buildings from 1.1.2013 given by the upper limit of energy class B for individual categories of buildings;
2. the ultra-low energy level of construction for all new buildings from 1 January 2016, given the upper limit of energy class A1, for renovated buildings, provided that the cost-effectiveness conditions are met;
3. the energy level nearly zero energy building for new buildings owned and managed by public entities from 1.1.2019 and all new buildings from 1.1.2021 is given by the upper limit of energy class A0 for the global indicator (primary energy).

Major renovation must meet the EPB requirements if it is economically, technically and functionally feasible. If this is not functionally, technically and economically feasible, all building structures and elements on which a major renovation is carried out must meet at least the thermal technical properties according to the technical standard (e.g., STN 73 0540-2 + Z1 + Z2).

In order to meet the basic requirements for constructions and specially to meet the minimum requirements for EPB, it is already necessary to ensure the implementation of deep renovation of buildings - renovation of the thermal envelope and implementation of the necessary interventions in the technical systems of heating, hot water preparation. Achieving level of nearly zero energy building requires the efficient use of renewable energy sources.

Cost-effectiveness evaluation procedures are determined by the standard *STN EN 15459-1 Energy performance of buildings. Procedures for economic evaluation of energy systems in buildings. Part 1: Calculation procedures, module M1-14*. These procedures have also been used to set cost-optimal levels of minimum requirements for EPBs under EU Commission Regulation no. 244/2012, supplemented by national parameters.

4.2 Finance (Mobilization of investments for building renovations – existing or planned support schemes, financial instruments, using public funding to leverage additional private-sector investment, tax incentives, dedicated financial products and business models for building renovation such as green mortgages, etc.)

Existing financing policies:

Renovation of Single-family houses			
Policy	Type of support	Supported measures	Source of financing
Subsidies for the insulation of a family house	Grant	Insulation of a family house: - Facade insulation, Insulation of the roof - insulation of dividing structures between heated and unheated space - Replacement of external windows / doors Eligible cost is also heat source replacement	State budget

Renovation of SFH	Soft loan	Facade insulation, Insulation of the roof, replacement of external windows / doors	State housing development fund (state budget)
Support for use of RES in family houses	Grant	Photovoltaic panel Solar collector Biomass boiler Heat pump	ESIF (National programme)
Solid fuel boiler replacement	Grant	Replacement of old solid fuel boiler in SFH	ESIF
Renovation of Apartment buildings			
Elimination of systemic failures of apartment buildings,	Grant	Elimination of system fault on apartment building	State budget
Renovation of Apartment building	Soft loan	- Facade insulation, Insulation of the roof - insulation of dividing structures between heated and unheated space - Replacement of external windows / doors - Modernization or reconstruction of common parts of an apartment building and common facilities of an apartment building	State housing development fund (state budget)
Support for use of RES in apartment buildings	Grant	Solar collector Biomass boiler	ESIF (National programme)
Renovation of public buildings			
Improving the energy efficiency of a public building	Grant	a) improvement of thermal-technical properties of building structures; b) modernization of heating / air conditioning systems, hot water systems, lighting, lifts in order to reduce energy consumption; c) installation of measurement and control systems; d) a change in the method of heat supply towards the use of efficient district heating systems (hereinafter referred to as "DH"); e) installation of equipment for the use of RES for energy consumption in the building.	ESIF
Improving the energy efficiency of a public building	Grant	a) insulation of the perimeter walls and the building envelope, b) roof insulation / replacement, c) insulation of the lowest and highest floor,	Environmental fund

		<p>d) replacement of opening fillings (windows, doors),</p> <p>e) modernization / replacement of heat source (also with the use of renewable energy sources, except biomass in the areas of air quality management) and associated heat and / or hot water distribution,</p> <p>f) work and supplies in connection with the implementation of measures intended for the conservation of places, nesting, reproduction or rest of a protected animal,</p> <p>g) application of innovative technologies for the use of waste heat (recuperation, exchangers for the use of waste heat, etc.),</p>	
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Planned financing policies:

Policy	Type of support	Supported measures	Source of financing
Reducing the energy intensity of public buildings	Grant (potential for combination with EPC)	<p>Support for deep renovation of public buildings in the form of:</p> <p>a) insulation of the perimeter walls and the building envelope,</p> <p>b) insulation of the roof cladding,</p> <p>c) replacement of original opening fillings (windows, doors),</p> <p>d) hydraulic balancing of the heating system after insulation or replacement of the technical system of the building</p> <p>e) significant renovation of the technical equipment of the building, including the introduction of intelligent metering systems and the installation of building automation and control, including energy-saving monitoring systems</p> <p>(f) the application of elements to protect biodiversity and elements that support adaptation to climate change.</p>	ESIF 2021-2027

Reducing the energy intensity of buildings - apartment buildings	Soft loan	<p>Support for deep renovation of residential buildings in the form of:</p> <ul style="list-style-type: none"> a) thermal insulation of the perimeter cladding, b) insulation of the roof cladding, c) replacement of the original hole fillings, d) elimination of a system failure of an apartment building e) hydraulic balancing of the heating system after insulation or replacement of the technical system of the building f) replacement or modernization of technical systems, including the introduction of intelligent metering systems and the installation of building automation and control, including energy-saving monitoring systems (SMART technologies) g) installation of self - regulating devices on an individual basis <p><i>Building renovation projects will be addressed comprehensively, also with the use of elements for the protection of biodiversity and green infrastructure to support adaptation to climate change. Cost-effective in-depth renovation of buildings will be promoted and where relevant and feasible, the installation of RES will be part of a comprehensive renovation.</i></p>	ESIF 2021-2027
Improving the energy efficiency of SFH	Grant (potential for soft loan co-financing)	Deep energy renovation included green infrastructure measures	Recovery fund
Renovation of historical public buildings	Grant	Support for renovation in order to improve the construction and technical condition of historic public buildings in order to improve the possibility of their use and reduce operating costs.	Recovery fund
Renovation of public buildings	Grant	General renovation of public buildings in other components of Recovery and Resilience Plan with an aim to reduce primary energy demands at least by 30 %	Recovery fund
Improving energy efficiency in companies (buildings)	Grant / finance instrument	Support for energy efficiency measures in enterprises resulting from energy audits. (insulation of buildings intended for business)	ESIF 2021-2027
Support for increasing the share of RES use in households	Grant	Support for the installation of small installations for the use of RES in the production of heat / cold (self-consumers of heat and energy communities), including the modernization of heating installations / modernization of air	ESIF 2021-2027

based on self-consuming energy from RES and communities producing energy from RES		conditioning systems through a contribution in the form of vouchers. Support for the installation of RES equipment (for electricity generation) for self-consumers and energy communities	
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Regards to residential buildings, it is currently applied system of economic instruments, in the form of direct and indirect support:

a) Direct state support:

- subsidies within the housing development program provided by the Ministry of transport and construction, for the elimination of systemic failures of apartment buildings,
- subsidies for the insulation of a family house
- subsidies for small renewable energy sources in households (SFH and apartment buildings),
- soft loans for renovation of residential building provided through the State Housing Development Fund

b) Indirect state support:

- mortgage financing, in which state support is provided in the form of a state contribution to mortgage loans and a state contribution to mortgage loans for young citizens and a tax bonus
- a building savings system with state support provided in the form of a state premium for building savings for natural persons and for associations of owners of flats
- State support program for the renovation of the housing stock in the form of bank guarantees for loans (however, currently is not used due to the availability of other support tools)

4.4 Technical support (Increasing the capacity to prepare and implement projects and scaling up technical assistance, developing energy advisory services for citizens and businesses, creating one-stop-shops, etc.)

Providing basic technical support and information to the owners of residential building about the possibilities of acquisition and installation of equipment for the production of RES, including financial support, is provided by Slovak Innovation and Energy Agency through free energy consulting in five consulting centres across country within the ESIF project. Also, technical assistance in project preparation related to Energy Performance Contracting is provided by the Slovak Innovation and Energy Agency.

4.5 Policies and action on energy poverty

In terms of policies on energy poverty, Slovakia has no established a specific policy or action aiming directly on tackling energy poverty in Slovak households. However, based on LTRS, the Slovak Republic has established systemic support mechanisms in the field of energy performance of

building, which are not directly linked to the amount of income but to meet the energy criteria but serve to prevent the emergence of energy poverty in the future.

These are the following support mechanisms:

- contribution for the insulation of a family house,
- contribution to the installation of small installations for the use of renewable energy sources in households (family and apartment houses),
- subsidies provided for the elimination of system failures of apartment buildings,
- state premium for building savings (provided to natural persons as well as legal entities, eg the association of owners).

According to LTRS, the policy which also contribute to tackling energy poverty problem is also the existing legal regulation of the obligation to create an operation, maintenance and renovation fund by the owners of apartment building, which represents a good precondition for creating an environment to motivate apartment owners in apartment buildings to renovated the building. This is also supported by stimulating and accessible financial mechanisms as well as state support.

4.6 Policies and action on public buildings

The Slovak Republic has not implemented comprehensive programs to support the renovation of public buildings, as well as in residential sector. Until now, renovation of public buildings has been financed mainly from the ESI Funds, but also from state budget or budget of municipalities. Other sources of financing represent national Environmental fund, which is funded by sale of emission allowances under EU ETS system. According to Slovak LTRS the main financial sources for increased investment needs in the upcoming years should be an allocation in new programming period of ESIF and investments to public building sector within Recovery and Resilience Plan.

Public budgets, including ESIF, are not big enough to ensure building renovation at the optimum rate only through non-repayable grants, therefore, according to Slovak LTRS, there is an intention to channel private funds through energy services. From February 2019, public administration entities in the Slovak Republic may conclude energy efficiency contracts for the public sector aimed at improving the energy efficiency of a building without these agreements having an impact on the level of government debt in the single methodology applicable to the European Union. The public authority can thus develop and finance projects through the mobilization of private capital. Energy services make it possible to mobilize private finances, not only for investment, but especially for the subsequent repurchase of receivables, which can increase the renovation rate (maximum leverage, minimum market distortions). Technical assistance in project preparation is provided by the Slovak Innovation and Energy Agency. In order to be able to carry out in-depth renovation of buildings with the help of guaranteed energy services, there is an intention to use combination of grant funding with repayable funding, specially in new ESIF period.

Important policy related to public buildings represent also the support for energy audits. Carrying out energy audits in public buildings helps to identify renovation measures with the greatest potential for savings and partially fulfils the function of building passport.

5. Public consultation process: To support the development of its long-term renovation strategy, each Member State shall carry out a public consultation on its long-term renovation strategy prior to submitting it to the Commission.

This section describes the participation process and summary of the results of its public consultation. What kind of participation activities were used, if there was an working group where stakeholders could participate in the preparation of draft version (how many sessions took an place), etc.

In order to develop a long-term renovation strategy and involve as many relevant entities as possible in its preparation, the Ministry of Transport and Construction of the Slovak Republic (responsible for long-term building renovation strategy) set up a working group whose members were representatives of individual ministries, civic associations), representatives of research institutes and professional associations and organizations, representatives of towns and municipalities in Slovakia, a total of 32 entities. The Ministry consulted with the members of the working group individual areas according to the thematic focus and a specific part of the strategy in person or in writing. The official meeting of working group took place only twice. Once, where the Ministry presented the intention, the concept and strategy requirements arising from Directive or national legislation. The Ministry also presented the cooperation with external think-tank organisation, who elaborated model for roadmap and investment needs. The second meeting of working group took place already after the draft of LTRS was prepared and few weeks before official public consultation.

As part of the standardized process, the LTRS was the subject of an intra-ministerial and inter-ministerial comment procedure. The material was also the subject of public comment through the publicly accessible web portal, which has a standardized form and the process of evaluating comments. Any entity, including the public, may submit a comment on any part of the submitted material via an electronic form, and the submitter is obliged to evaluate each comment submitted.

Pros and cons:

- *The stakeholders involved in working group were not able to sufficiently enter into draft preparation.*

6. Implementation experiences: describe the implementation experiences, barrier and good practices of previous Renovation strategies and identify possible bottlenecks.

This section describes if the objectives in your previous Renovation strategies were met, if proposed policies were implemented

The requirements and description of the policies defined in the previous strategy, which can be evaluated for their successful implementation, are based primarily on binding legislative measures. These are, for example, increased requirements for the energy performance of buildings, which require adjustments to legal and technical regulations, or the continuously prepared and approved Renovation Building of relevant buildings, which is prepared annually based on compliance with Article 5 of Directive 2012/27 / EU. The defined investment need was not met and it cannot be said that the required new forms of support would be implemented in the required amount. Many of the defined barriers and obstacles have not been actively removed.

7. Brief overview of social and economic benefits of implementing renovation policies

Implementing renovation strategy brings multiple benefits for building users and for country as well. Renovation of buildings extends the life of the building and safety in the use of buildings, reduces maintenance and energy costs, increase the market value of real estate and the improve appearance of the building. At the same time energy renovations support energy security of country and helps tackle the problem of energy poverty. Renovation, which includes the replacement of old solid fuel boiler with more effective and cleaner energy source, also decrease the air pollution, as the heating of household with solid fuels in one of the most important source of air pollution in Slovakia.

Renovation measures contributes to a better quality of the indoor environment, ensuring a higher level of well-being and comfort for users and improving health. A healthy indoor environment of the building has a demonstrably direct impact on the health of users and contributes significantly to reducing health care expenditures in the state. A good and healthy indoor environment in buildings has economic benefits also in the form increased productivity of employees.

At the macroeconomic level, several benefits can be seen from the refurbishment of buildings, in particular in terms of employment growth, labour mobilization linked to the need to improve skills, increased use of innovative construction technologies and processes, and the use of progressive construction products. Renovation and construction of buildings is a labour-intensive sector and, thanks to a wide supply chain, supports the activity of various sectors of the economy from small businesses to various types of subcontracting (multiplier effect). An investment in the renovation of buildings worth EUR 100 million can in Slovakia generate an additional GDP of EUR 130 mil., revenues of public finances (taxes, savings on social transfers) in the amount of EUR 31.3 mil. and create 3,500 jobs.

Annex III – Analysis of Polish LTRS

1. Overview of the national building stock: starting point of each strategy is an overview of the national building stock.

This section describes what kind of data are provided, which necessary information is missing, what sources and data they are based on.

The national building stock consists of 14.2 million buildings, of which almost 40% are single-family residential buildings. The data show a large variation in the energy efficiency of buildings, both according to their purpose and the year of commissioning. For all categories of buildings, a long-term trend of improving energy efficiency is observed, which has been contributed to by a gradual increase in technical requirements and technological progress. However, while buildings commissioned for use in the 21st century are characterized by relatively high energy efficiency, older building stock is characterized by a high energy demand and requires renovation. This applies in particular to single-family houses for which solid fuel boilers remain the primary source of heat. In the case of multi-family residential buildings, the latest surveys indicate that after 2020, still 30% of them will require thermal modernization. This share may additionally increase under influence of the upward trend in process of energy carriers. The review of the national building stock confirms that a large part of it is characterized by low energy efficiency and will require renovation in the coming years.

The exact structure of the wear and tear of energy in the various categories of buildings has not been established beyond consumption of energy in the households of single-family homes and multifamily buildings. The highest importance have solid fuels, especially coal and wood fuel. They were most often used for space heating (by 45.4% of households). These fuels were also used to heat water (25.6% of households), much less often to cook meals (3.2%). Consumption of solid fuel in households decreased by 7.2% in the period 2002-2018.

A very important energy carrier is heat from the network, which in 2018 was used to heat 40.4% of all apartments, mainly in large cities, where it was the dominant heating medium (58.3%). Moreover, in 31.5% of households, i.e. 78.2% of district heating consumers, domestic hot water was prepared with the use of district heat.

Natural gas was used in 55.7% of households, but more than half of its consumers (51.9%) used it only for cooking meals, and only 14.0% for heating apartments. In those areas of the country that are not reached by the natural gas network, liquid gas was widely used (34.0%), and it was used almost entirely for cooking meals (33.9%).

Firewood was used by 29.9% of households as the only renewable fuel massively used in households. They were usually burned in the same boilers and furnaces as hard coal, simultaneously with coal or alternatively. Apart from wood, farms also used other types of biomass, but their use was much less common than that of wood. Solar collectors were used by one household in 52, and heat pumps only by one in 200.

Electricity in households was commonly used, to a small extent for heating purposes (5.1%), due to high prices and cheaper substitutes. Electricity was used to cook meals and heat rooms rather as an additional carrier. On the other hand, a significant share (24%) of this energy carrier in the preparation

of domestic hot water resulted from the lack of access of many households to the heating and gas networks.

The review of the building stock was made, on the one hand, taking into account the following criteria: function, age structure and ownership form. The analysis was based on the data of the Central Statistical Office for residential buildings and collective housing (the results of the National Census of Population and Housing of 2011 updated with data on new buildings commissioned in 2012-2019) and the Central Office of Geodesy and Cartography (National

Category	Number of buildings, in thous.
multi-family residential buildings	553
single-family residential buildings	5 604
collective accommodation buildings	3.9
public buildings	420
production, utility and warehouse buildings	5 116
other non-residential	2 491
Together	14 189

Other indicators that were taken into account were the thermal properties of the building envelope and the method of heat supply. For this analysis, data from energy certificates prepared from the Central Register of Energy Performance of Buildings established in 2014 by the Act on the energy performance of buildings was used. The preparation of energy performance certificates applies to the sale or rental of buildings or residential premises and in the public sector for buildings with an area of more than 250 m², occupied by the judiciary, prosecutor's office and public administration bodies and in which customer service is provided.

On this basis, the characteristic values of the annual primary energy demand ratio E_p for residential buildings were calculated [(kWh / (m² · year))]:

<1994	1994-1998	1999-2008	2009-2013	2014-2016	2017-2018	2019-2020
SFH	263.7	147.9	143.5	126.3	109.1	89.3
MFH	258.9	139.0	110.0	142.7	97.5	84.9

and indicator of the annual demand for non-renewable primary energy of public buildings [kWh / (m² · year)]

	1994-1998	1999-2008	2009-2013	2014-2016	2017-2018	2019-2020
office	272,8	268,3	236,9	210,3	155,9	152,2
Public adm.	229,0	234,7	217,3	192,3	180,5	136,6
culture	232,2	182,7	200,8	250,7	109,2	164,0
health care	341,7	442,9	257,2	387,9	374,5	320,2
sport	370,4	214,8	232,1	165,9	164,2	146,5
justice	267,2	181,7	217,3	180,5	186,6	165,9
education	196,4	218,4	166,4	142,6	156,9	103,2

Data on the number of buildings by number and category of use are complete as of January 1, 2020. On the other hand, the energy performance indicators of buildings are limited to single-family and multi-family houses and selected categories of public buildings, the certificates of which have been centrally registered. This is a small fraction of the total population.

The quality of data provided above is determined by the number of entries into the central register of energy performance certificates, which is very small. For example number of certificates registered for public buildings being subject of mandatory certification amounts to 553, whereof number of all public buildings

2. Roadmap to decarbonised buildings stock by 2050: LTRS must include roadmaps with measurable progress indicators and indicative milestones

This section describes what indicators and milestones are set, how are indicators and targets defined, briefly explain the methodology behind the scenario modelling; describe whether the milestones are in a line with a target of highly decarbonised building stock by 2050

In order to define the recommended renovation scenario constituting the basis for the action plan until 2050, three scenarios for the renovation of buildings in Poland in the 2021-2050 perspective were considered, assuming the achievement of climate neutrality in Polish construction in 2050.

As there are no energy efficiency classes in Polish legislation, for the purposes of the scenario analysis, the ranges of building efficiency were determined, taking into account the primary energy demand ratio EP [kWh / (m² · year)]:

Up to 50	50 - 90	90 - 150	150 - 230	230 - 330	330 - 450	over 450
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Scenario for a quick and deep renovation

The first scenario assumes a broad, deep renovation of the building stock, which will start with the least energy-efficient buildings. This is the most ambitious and profitable plan.

This scenario assumes that by 2027 all buildings with EP index greater than 330 kWh / (m² year) will be modernized, and by 2035 all buildings with EP index greater than 230 kWh / (m² year) will be modernized. In turn, in 2045 all buildings will have an EP index of no more than 150 kWh / (m² · year).

According to the scenario under consideration, by 2050 65% of buildings will be brought to a passive standard, and 24% to an energy-saving standard. The remaining 11% of buildings, which cannot be modernized so deeply due to technical reasons, will be in the efficiency range of 90-150 kWh / (m² · year). In this scenario, the average annual renovation rate is around 3%.

Scenario of a phased renovation

The second scenario assumes extensive renovation of the building stock, with buildings in the worst condition being modernized in stages until the best performance ranges of buildings are achieved. The individual stages of modernization cover only part of the full scope of energy-saving works, which allows to spread over time reaching the target level of energy efficiency of the building gradually and avoid the accumulation of investment effort and aggregate demand for goods and services necessary for the investment. The process is planned from the outset taking into account the end result, so as to ensure consistency between the individual stages and avoid sunk costs.

This scenario assumes that by 2027 all buildings with EP index greater than 330 kWh / (m² year) will be modernized, and by 2035 all buildings with EP index greater than 230 kWh / (m² year) will be modernized. In turn, in 2045 all buildings will have an EP index of no more than 150 kWh / (m² · year). Thus, the pace of getting rid of the worst performance boundaries of buildings remains the same as in scenario 1, however buildings will only start to refurbish to EP levels lower than 90 kWh / (m² · year) after 2035.

According to the phased renovation scenario, by 2050, 63% of buildings will be brought to a passive standard, and 19% to an energy-saving standard. The remaining 18% of buildings, which cannot be modernized so deeply for technical or economic reasons, will be in the efficiency range of 90-150 kWh / (m² · year). The end effect of the scenario under consideration is slightly worse than that of the quick and deep renovation scenario.

In the staged renovation scenario, the average annual renovation rate is around 4%.

Recommended scenario

The recommended scenario assumes an approach that combines the advantages of the two previous scenarios. It includes the rapid implementation of the first stage of renovation of buildings from the worst energy efficiency ranges, combined with the popularization of deep renovation in the coming years, and then the dissemination of a high standard of renovation on a market scale.

This scenario assumes that by 2027 all buildings with EP index greater than 330 kWh / (m² year) will be modernized, and by 2035 all buildings with EP index greater than 230 kWh / (m² year) will be modernized. In turn, in 2045 all buildings will have an EP index of no more than 150 kWh / (m² · year). Thus, the pace of getting rid of the worst efficiency ranges of buildings remains unchanged, however, the increase in the number of passive and energy-efficient buildings will be observed already in 2027.

According to the recommended scenario, by 2050 66% of buildings will be brought to a passive standard, and 21% to an energy-saving standard. The remaining 13% of buildings, which cannot be modernized so deeply for technical or economic reasons, will be in the efficiency range of 90-150 kWh / (m² · year).

In this scenario, the average annual rate of renovation is about 4%, while the rate of deep renovation to the highest standard does not significantly exceed 3%, and this level is achieved only after 2035, which provides sufficient time to build appropriate competences and potential among suppliers of the necessary solutions technological.

3. Investment needs: to achieve the milestones, member state should prepare a list of investment needs

This section describes the methodology behind calculation, if the investment needs include all sector, if its divided into segments.

The implementation of the recommended scenario will require the mobilization of both private and public funds on a large scale. The total investment expenditure for the renovation of buildings in 2021-2050 (including thermal modernization and replacement of heat sources) will amount to € 430-520 billion. Assuming an even pace of renovation of the main categories of buildings (single- and multi-family residential buildings, public utility buildings), in the years 2021-2030 this expenditure will amount to approx. € 140-170 billion, with 76-78% of this amount going to residential buildings. The proportions of investment outlays between residential buildings and public utility buildings will remain in the years 2031-2050, while in the years 2031-2040 the scale of total investments will be the largest (€ 150-190 billion), and in the next decade it will return to levels similar to those in 2021- 2030 (€ 130-160 billion). Assuming that the intensity of support for the renovation of individual types of buildings in the years 2014-2019 is maintained, it means the need to mobilize public financing at the level of approx. € 40-50 billion in the years 2021-2030. This financing may include both direct subsidies from national and European funds, as well as tax breaks and financing investments in the public sector from the own resources of public institutions.

The key potential sources of funding for public intervention in the area of building renovation in the medium term (until 2030) include:

- Revenues from the sale of allowances in the EUETS system: approx. € 28.7 billion in 2021-2030, assuming the sale of 955 million emission allowances at the average price of € 30 / t,
- Modernization Fund: approx. € 4 billion in 2021-2030, assuming sale of 135 million emission allowances at an average price of € 30 / t,
- Facility for Reconstruction and Resilience: € 23.1 billion in grants and € 34.2 billion in loans in 2021-2023, of which 37% for climate and biodiversity activities,
- European Regional Development Fund and Cohesion Fund: a total of € 20.09 billion allocated to Objective 2 (More environmentally friendly, low-emission Europe) in 2021-2027, in line with the draft Partnership Agreement of January 2021,
- Just Transition Fund: € 4.234 billion in 2021-2027, in line with the draft Partnership Agreement of January 2021.

4. Existing and planned policies to meet the targets:

This section should consist of description of few existing or planned policies which can be set as a good practice, lessons learned or failures to be avoided related to goal of increasing the renovation depth and rate. Please pick max 10 policies and briefly describe them (each in one paragraph, or you can use a table format). May include general principles on how to successfully implement policies such as support programs, if there is a good example in your country.

Legislative (Strengthening information and legal certainty - reinforcing the quality and use of Energy Performance Certificates, requirements for energy performance of buildings (NZEB; renovations), etc.)

From December 31, 2020, regulations are in force in Poland that will allow for achieving a state in which all buildings designed, built and undergoing reconstruction or buildings, when changing their use, should be buildings with almost zero energy consumption. It is regulated in the Technical Conditions for the construction industry, where limit values of E_p and heat transfer coefficients through partitions for new buildings have been established. For modernized buildings, only heat transfer coefficients through partitions are used.

From October 1, 2017, a regulation on standards for boilers has been in force in Poland, eliminating obsolete coal and wood boilers from the Polish market.

From July 1, 2020, it is forbidden to sell the worst-quality coal dust on the market available to owners of individual heat sources in residential houses.

The Act on the energy performance of buildings is planned to introduce the following changes in 2021:

- in terms of adaptation to the EPBD: extending the scope of systems covered by the obligation to control, enabling universal access to the basic information contained in the energy performance certificates collected in the Central Register of Energy Performance of Buildings, introducing the obligation to install automation and control systems in appropriate buildings

- other changes: introducing the obligation to issue energy performance certificates for newly constructed buildings upon their commissioning, introducing mechanisms to guarantee the transmission of energy performance certificates in connection with the sale or rental of buildings or parts of buildings, making the obligation to conduct regular inspections of heating or air conditioning systems subject to changes affecting their energy efficiency, clarifying the regulations regarding the verification of energy performance certificates by the minister responsible for construction, spatial planning and development and housing, enabling the operation of energy performance certificates for buildings or parts of buildings and protocols on heating or air conditioning systems also in electronic form, introduction of energy classes on certificates.

- the energy performance certificates will contain the following data about certified buildings:

- a) the number of the certificate,
- b) address of the building, or of the part of the building (dwelling),
- c) issue date,
- d) validity period,

- e) final energy indicator
- f) primary energy indicator,
- g) share of RES in the yearly final energy demand
- 8) CO₂ emission value

The Central Register of Buildings Emissions (CEEB) was adopted on the basis of the Act of October 28, 2020 amending the Act on supporting thermo-modernization and renovation and certain other acts (Journal of Laws of 2020, item 2127). The main objectives of the act prepared by the Ministry of Climate and Environment are the fight against smog and energy poverty and the improvement of the energy efficiency of buildings. The act will result in the elimination of dust emissions from the so-called low emission, i.e. from the communal and housing sector (these are most often individual households, small local boiler houses, workshops and service facilities). The implementation of these goals is to be supported primarily by the launch of the Central Emission Register of Buildings and improvement of the operation of the Clean Air Program and the Stop Smog Program. The inventory is to cover about 5–6 million buildings, initially it will be 500 thousand buildings per year. The general inventory of buildings will be combined with the submission of written declarations on heat and combustion sources - by the end of 2021.

The CEEB is an IT tool for inventorying low-emission sources in buildings. This system will collect key information on the sources of emissions in the municipal and housing sector.

The system is also to enable the collection of data on the energy condition of buildings and information on forms of public aid (subsidies, preferential loans) granted for thermal modernization or replacement of boilers in buildings.

The criterion for entering a building into the system will be the power of the source, regardless of the legal form of use of the building. Therefore, CEEB will cover not only residential buildings, but also public buildings, including small local heating plants or small production plants, provided that the rated thermal power of the fuel combustion source used does not exceed 1 MW.

Finance (Mobilization of investments for building renovations – existing or planned support schemes, financial instruments, using public funding to leverage additional private-sector investment, tax incentives, dedicated financial products and business models for building renovation such as green mortgages, etc.)

Directions of changes in key public building renovation support programs favoring the improvement of energy efficiency and the transformation to a climate neutral economy

Thermomodernization relief: a tax relief introduced in 2020 consisting in the possibility of deducting from the personal income tax base of the costs of thermal modernization up to the amount of € 12,600, it is planned to:

- maintaining the nature of the tax relief as a broad instrument to support thermal modernization and heat source replacement in single-family buildings,
- introducing a requirement to take into account the next stage of renovation to a zero-emission standard in the long term,

- in the case of supporting photovoltaic installations - preferences for integrated investments, including also a heat source.
- introducing a requirement to take into account the next stage of renovation to a zero-emission standard in the long term,
- in the case of supporting photovoltaic installations - preferences for integrated investments, including also a heat source.

Clean Air and Stop Smog programs introduced in 2018: grant and loan programs for owners of single-family houses with an income not exceeding € 25,000 per year, it is planned to:

- systematic increase in the number of buildings modernized to a zero-emission standard in accordance with the recommended renovation scenario,
- until 2030: parallel support for mass replacement of heat sources and shallow modernization, provided that the investor takes into account the perspective of repeated thermal modernization to the zero-emission standard before 2050,
- for gradual management of funds from European Funds, including the National Reconstruction Plan, intended for increasing the energy efficiency of single-family buildings.

The Thermomodernization and Renovation Fund (FTiR), introduced in 1998: a loan subsidy program used mainly by housing communities and housing cooperatives.

The budget of the Thermomodernization and Renovation Fund (hereinafter referred to as "FTiR") is determined every year and its operation is continuous.

FTiR is one of the oldest, continuously functioning policies for supporting energy efficiency in Europe.

The support system for thermomodernization and renovation projects (renovation works related to thermo-modernization) is financed from national funds and operates on the basis of the provisions of the Act of 21 November 2008 on supporting thermo-modernization and renovation. These regulations define the principles of granting thermal modernization bonuses and renovation bonuses. The state-owned bank BGK is responsible for its implementation through agreements with commercial bank which provides the loan as mandatory part (minimum 50%) of the total thermomodernisation or renovation cost

For the **thermo-modernisation bonus** may apply owners or managers of:

- residential buildings,
- collective residence buildings,
- public utility buildings owned by local government units used to perform public tasks,
- local heating networks,
- local heat sources (up to 11,6 MW_t)

The bonus can be used by investors regardless of the legal status, with the exception of budgetary state units and local government budgetary units, i.e.:

- legal persons (including housing cooperatives and commercial companies),

- b) local government units,
- c) home owner's associations,
- d) housing co-operatives
- e) Social Housing Construction Companies,
- f) natural persons (including owners of single-family houses).

The thermo-modernization premium is due to the investor for the implementation of the thermo-modernization project and constitutes a repayment of the loan taken by the investor. Only investors using the loan are entitled to it. It cannot be used by investors who carry out a thermo-modernization project solely with their own funds.

The amount of the thermo-modernization bonus is:

- a) 16 percent costs of the thermos-modernization project, which brings at least 25% of final energy demand reduction, confirmed in the ex ante energy audit, the ex post energy audit is not required, if the planned measures have been implemented according to the assumption from the ex ante energy audit
- b) 21 percent costs of the thermal modernization project along with the installation of micro-installations of renewable energy sources (RES),
- c) additional support in the amount of 50% the cost of strengthening the large-panel building in the implementation of thermal modernization of buildings from the so-called "big plate" with their reinforcement.

Project co-financing under the **renovation bonus** may be applied by owners or managers of multi-family buildings whose use has begun:

- a) before August 14, 1961 or
- b) at least 20 years before the date of submitting the application for a repair premium to the crediting bank and:
- c) the building belongs to a social housing initiative or a social housing association
- d) the building was constructed with the use of a loan granted by BGK on the basis of loan applications submitted by 30 September 2009 or with the use of repayable financing within the meaning of the Act of 26 October 1995 on certain forms of support for housing construction.

The bonus can be used by investors regardless of the legal status, with the exception of budgetary state units and local government budgetary establishments, i.e.:

- a) legal persons (including housing cooperatives and commercial companies),
- b) local government units,
- c) home owner's associations,
- d) Social Housing Construction Companies,
- e) natural persons (including owners of multi-family houses).

The renovation premium is due to the investor for the renovation project and constitutes the repayment of the loan taken by the investor. Only investors using the loan are entitled to it. It cannot be used by investors who carry out renovation projects with their own funds only.

The amount of the renovation bonus is 15% of the cost of the renovation project, which brings at least 10% of final energy demand confirmed in the ex ante renovation audit. The ex post renovation audit is not required, if the planned measures have been implemented according to the assumption from the ex ante renovation audit

If the building is located in the region, which implements "Anti-Smog" regulations concerning use of fuels for heating purposes in buildings, the renovation bonus is:

- a) 50 percent renovation project costs for municipal buildings or
- b) 60 percent costs of the renovation project for historic municipal buildings.

If there are non-residential premises in a building which is the subject of a renovation project, the amount of the renovation bonus is the product of the amount determined as above and the ratio of the usable floor space of residential premises in the usable area of all premises in this building.

Since 1998 until October 2020, the FTiR served with thermomodernisation or renovation bonus 46 082 multifamily buildings (approximately 12% of multifamily buildings constructed until 1985)

The gradual redirection of FTiR to support deep renovation of multi-family houses (the amount of the bonus depends on the final class of the building), has following aims:

- linking the process of supporting thermomodernization of buildings with the installation of renewable energy in them, and dependent on the targeted energy class of the building
- support for the renovation of buildings which, for legal reasons (conservation protection), cannot be covered by standard thermal modernization
- gradual transfer to FTiR of some funds from European Funds, including the National Reconstruction Plan, intended for increasing the energy efficiency of multi-family buildings.

European Funds (including the National Reconstruction Plan) - also implemented through specialized support instruments:

- focusing on increasing the energy efficiency of residential and public buildings (including audits), including those aimed at fulfilling the exemplary role of the public sector in the field of energy efficiency, reducing the phenomenon of energy poverty, promoting comprehensive solutions, e.g. heating / cooling network connection, installation RES devices;
- supporting the improvement of energy efficiency in enterprises (including audit), including deep and comprehensive energy modernization of buildings in enterprises, replacement of devices with energy-saving ones along with the installation of renewable energy devices;
- coordination of building renovation programs with activities in the field of heating, including investments in system sources, i.e. as part of the European Funds, investments in system sources are planned in order to transform towards low-emission and obtain the status of effective heating systems, including the construction and modernization of units: high-

efficiency cogeneration and trigeneration, gas, also with decarbonised gases, renewable energy, energy recovery from waste and the use of waste heat;

- continuation of the existing and creation of new programs ensuring promotion, counselling, raising the awareness and knowledge of residents and entrepreneurs, local authorities in the field of ways to increase the energy efficiency of buildings and the use of renewable energy

Under all the above-mentioned programs and support instruments, it is necessary to ensure coherent support rules so as to avoid contradiction and "competition" of individual instruments (avoiding duplication of support tools or their contradictions). It is necessary that for a given building type there is one renovation program / instrument or that these activities are supported under individual programs and instruments, with similar, consistent levels of funding and conditions for receiving support, including uniform requirements for energy efficiency, climate effect and other building features with a uniform catalogue of eligible costs.

Therefore, it seems justified to gradually integrate funds for renovation of buildings under specialized, most effective support instruments, depending on the type of investment, e.g. FTiR in the field of renovation of multi-unit buildings and the Clean Air and Stop Smog Program in the field of renovation of single-family buildings. All support instruments, including those from European Funds, aimed at similar types of investments, should be consistent in terms of the conditions for granting support with the assumptions of the above-mentioned specialized programs.

Intelligent technologies area

- Support for the development of intelligent technologies. Implementation of intelligent energy management systems at the level of buildings and cities in order to optimize energy use, incl. by introducing the Smart Readiness Indicator (SRI) in order to raise awareness of the benefits of intelligent technologies and information and communication technologies in buildings,
- Legal and financial framework. Creation of legal regulations and financial instruments supporting the implementation and operation of smart technologies, in particular the installation of smart meters and smart metering systems,
- Support for research and development works on innovative technologies enabling the development of thermal modernization of buildings to the zero-emission, economically effective level, i.e. those for which NPV (net present value) will be greater than zero
- Support for the implementation of cooperation systems between designers of various industries in accordance with the idea of integrated design (BIM technology), including support for the development of tools to facilitate the design, optimization, modelling and use of energy-efficient buildings,
- Intelligent energy management in cities - increasing support towards monitoring and implementing energy management systems in building complexes and cities for optimal management of municipal economy and energy infrastructure, taking into account the possibility of energy transmission between buildings, Further support for the development and implementation of intelligent technologies belonging to the National Smart

Specialization 5 Smart and energy-efficient construction (including demonstration and pilot projects), in particular modular construction

- (prefab), green materials and technologies, low embodied emissions and recycled, hybrid technologies (integration of energy systems into the building structure / envelope), trigeneration (heat, cold and electricity generation), energy-saving building technologies.

The area of skills and education

- Including the professions of construction technician and renewable energy technician in the national forecast of labour requirements in order to monitor possible significant increase in staffing needs in this sector, as a result of the implementation of the strategy.
- Introducing the division into employees in construction and renovation of buildings according to the level of qualifications in statistics employed in construction.
- Reconstruction of the education system towards lifelong learning in order to strengthen the competence of construction sector workers in the field of thermal parameters of buildings, installation techniques and heat sources.
- Development and monitoring of regional and national balance of supply and demand for people working in renovation of buildings.
- Building competences for system innovations. Support for local government units in the development of competences in the field of planning, implementation and management of innovative projects related to deep modernization of buildings.

Technical support (*Increasing the capacity to prepare and implement projects and scaling up technical assistance, developing energy advisory services for citizens and businesses, creating one-stop-shops, etc.*)

The area of investor support in financing the renovation of built resources

Popularization of Comprehensive Investor Service (one stop shop formula):

- It is recommended to conduct a regional pilot of the Integrator network "one stop shop", including the following activities:
 - Development of the concept of a regional cooperation network of Integrator entities with competences and experience in the implementation of projects for the improvement of energy efficiency, i.e. institutions, in particular banks, the National Fund for Environmental Protection and Water Management, external experts, suppliers, contractors, designers, construction supervision, etc.
 - Standardization and verification of services provided by Integrators in the network,
 - Pilotage in one of the voivodships on the basis of a project co-financed from public funds, with the development of solutions for gradual transition to a system that maintains itself on the services provided in the "one stop shop" model.

Promotion of the ESCO formula

- Creation of a national cooperation platform for ESCO, including:
 - Identification of the necessary public and private partners of the ESCO platform,

- o Market needs research and analysis of the existing legal, technical and economic conditions,
- o Developing the goals and tasks of the platform for public and private stakeholders,
- o Creation of a knowledge centre on ESCO similar to ppp.gov.pl portal,
- o Implementation of the approach to the obligations of local governments resulting from energy effect contracts as extra-budgetary, which could significantly improve the operating conditions of ESCOs in this sector of the economy. To this end, use should be made of the Eurostat and EIB guidelines on the statistical classification of energy performance contracts.

Aggregation of projects

- Improving the energy efficiency of local government buildings and street lighting - creating municipal energy efficiency project exchanges, the aim of which is to match the needs of local governments in the field of building renovation and improvement of other municipal infrastructure with the offer of contractors, also in the form of ESCOs on local markets.
- Developing a procedure for identifying planned / unplanned energy efficiency improvement projects in public utility facilities and other buildings managed by local government units (e.g. municipal swimming pools, facilities of municipal companies, etc.).
- Developing a procedure for selecting potential partners for the implementation of projects for the improvement of energy efficiency in the EPC or ESCO formula.
- Implementation of a pilot project in a selected medium-sized commune with the use of public funds.

The area of supervision, consulting and informing the public

- The construction supervision should be strengthened in terms of human resources and finances (the task of the minister responsible for construction, spatial planning and development and housing) so that the number of compliance checks of parameters provided by manufacturers of building materials and construction installations can be significantly increased in relation to the number of products marketed construction.
- Activities in the area of information and incentive campaigns aimed at building users, encouraging changes in behavior leading to the reduction of energy consumption in buildings, should be continued and developed. Local authorities and entities that manage buildings should set a good example in this regard.
- It is necessary to continue the development of energy consultancy, supporting the planning and preparation of technical documentation necessary for the implementation of renovation investments. In particular, the process of preparing the implementation of projects related to thermal modernization of objects entered in the register of monuments or under conservation protection should be supported.

Policies and action on energy poverty

The STOP-SMOG program finances the replacement or liquidation of heat sources and thermal modernization in single-family residential buildings of energy poor people. As a rule, the applicant in the Program is the commune, which obtains up to 70% of the financing of the investment costs from the state budget.

Policies and action on public buildings

So far, the renovation of public buildings has been a permanent subject of co-financing from EU funds in the form of subsidies allocated under the Infrastructure and Environment Operational Program and Regional Operational Programs. This support is to be available in the form of partially returnable financial instruments.

5. Public consultation process: To support the development of its long-term renovation strategy, each Member State shall carry out a public consultation on its long-term renovation strategy prior to submitting it to the Commission.

This section describes the participation process and summary of the results of its public consultation. What kind of participation activities were used, if there was an working group where stakeholders could participate in the preparation of draft version (how many sessions took an place), etc.

The Polish renovation strategy was prepared based on the Ministry of Development's own analyzes and expertise prepared by the Wise Europa consortium, the National Energy Conservation Agency, and the National Energy Conservation Agency. The draft strategy was announced for public consultations on February 10, 2021 on the Ministry's website with a two-week deadline for submitting comments. 289 comments were received from the social partners of the process, who have been participating in dialogue with public partners for many years in the field of shaping the policy of renovating buildings in Poland. These include, among others: Association for Energy Billing Association Modern Buildings, Association of Employers Polish Glass Association of Producers and Importers of Heating Equipment (SPIUG) Polish Association of Sanitary Engineers and Technicians Institute of Building Technology, Association of Energy Auditors, National Institute of Architecture and Town Planning, Polish Chamber Construction Engineers Union of Employers - Material Producers Polish Association of Ecological Building PLGBC for Construction, Association of Producers of Glass and Rock Mineral Wool (MIWO), SME Chamber Lewiatan, Pol-lighting Association of Lighting Equipment Manufacturers, Lighting Europe, Rockwool, Institute of Urban and Regional Development, Association of Polish Poviats and individual experts. These comments were collected by employees of the Ministry, consolidated in order to exclude repetitions and analyzed with the participation of the authors of the expert opinion in terms of the feasibility and legitimacy of including their strategy. The Ministry conducted a dialogue with the authors of the comments before submitting them to the second draft strategy. As of 10th June 2020 public consultation is over. The draft Resolution of the Council of Ministers is prepared by the Ministry of Development under the name: Long-term Renovation Strategy Supporting the Renovation of the National Construction Resource.

6. Implementation experiences: describe the implementation experiences, barrier and good practices of previous Renovation strategies and identify possible bottlenecks.

This section describes if the objectives in your previous Renovation strategies were met, if proposed policies were implemented

The long-term renovation strategy presented in 2017 as an appendix to the fourth National Energy Efficiency Action Plan for Poland did not explicitly specify measures to contribute to the achievement of its assumptions. This document and the analyzes contained therein, however, contributed to the organization of knowledge and the identification of key areas requiring public intervention and the necessary improvements in the policy regarding the renovation of the building stock in Poland. Therefore, in 2017-2020, a number of actions were taken that led to the improvement of the support system for the long-term improvement of the energy efficiency of buildings, reduction of greenhouse gas emissions and improvement of air quality.

7. Brief overview of social and economic benefits of implementing renovation policies

Deep renovation of buildings will be profitable, especially in buildings with a poor energy standard and forced, in conditions of climate neutrality, to rely on their own zero-emission heat sources, due to the lack of access to the heating network. The simple payback time in these cases will be less than 10 years. In the case of buildings supplied from the heating network with a poor energy standard, the payback time will be approx. 15-20 years.

Overall, the economically viable renovation of buildings has the potential to reduce CO₂ emissions by more than 37 million tonnes per year, which is around 10% of the total annual greenhouse gas emissions in Poland.

Overall, the economically viable renovation has the potential to reduce dust emissions by around 89,000 tonnes. tonnes per year, which accounts for about a quarter of the total dust emissions in Poland.

Annex IV – Analysis of Hungarian LTRS

1. Overview of the national building stock: starting point of each strategy is an overview of the national building stock.

This section describes what kind of data are provided, which necessary information is missing, what sources and data they are based on.

Currently, there are more than 3.7 million dwellings in Hungary, with a total floor area of approximately 274 million m². The number of public buildings larger than 250 m² is around 24,000, totalling approximately 50 million m² of heated floor area. The building typology used in the Hungarian Long Term Renovation Strategy (LTRS) is based on the NBES2 (National Building Energy System 2, 2015 - ÉMI Nonprofit Ltd.), which has been supplemented by new data. The energy calculations of the sample buildings are based on the National Building Energy Performance Strategy (NBEPS) 2015 and the calculations of NBES2. The statistics for residential buildings are based on the 2011 and 2016 national censuses and have been corrected for 2020 demographic projections. The typology of public buildings was also based on the NBEPS and NBES2 typology methodologies, revised and modified according to the new regulatory environment and construction years.

For residential buildings, 27 building types are defined in the LTRS: 14 single-family or terraced houses and 13 condominiums; the classification into types was based on (1) year of construction, (2) floor area, (3) masonry type. In addition, the number of buildings or occupied dwellings within each type and the total occupied floor area are available. A survey was carried out in 2012 and 2011 to determine the renovation rate of residential buildings. Comparisons were made in four categories: detached houses, prefabricated buildings, small apartment buildings (4-10 apartments) and large apartment buildings (more than 10 apartments); insulation and window replacement were assessed.

For public buildings, in total 43 types of public buildings have been identified: 7 health, social and accommodation buildings, 7 administrative and office buildings, 3 commercial (e.g. store, shop, warehouse), 7 retail (e.g. store, shop, warehouse), 7 educational buildings (e.g. nursery, school, college, university), 7 hospitals, 5 sports facilities.

The strategy also includes, as required by Article 2a(1)(b) of Directive 2010/31/EU, the identification of the anticipated share of renovated buildings in 2020, as well as a building stock forecast and a projection of the evolution of the number of residential buildings in use until 2030. Two assessments were carried out to determine the rate of renovation of residential buildings, one in 2012 and one in 2020. Comparisons were made in four categories: detached houses, prefabricated buildings, small apartment buildings (4-10 apartments) and large apartment buildings (more than 10 apartments). The renovation rate of public buildings has been estimated on the basis of renovation projects financed by EU funds.

A major deficiency of the LTRS is that it does not include specific baseline data on energy consumption in buildings against which savings can be measured, nor does it set a specific energy savings target. It only states that the target for 2030 is to achieve a 20% saving in the energy consumption of the domestic residential building stock compared to the average consumption in 2018-2020 (see next section). How much this average consumption is and how much the 20% saving in PJ compares to it is not described in the LTRS.

Another shortcoming is that the LTRS does not exhibit the average specific primary energy consumption of each building type. This was included in the NBEPS 2015, but the LTRS gives only an average number for residential buildings and public buildings (according to the LTRS the final energy consumption of residential buildings averages between 205 and 225 kWh/m²/year, while that of public buildings is around 214 kWh/m²/year). However, the display of the values for each building type would be necessary, for further analyses, references. The values have been identified, as can be inferred from specific mentions in the LTRS, so it would be beneficial to have an official complete database of all these primary energy consumption values for each building type.

Although it is stated in the LTRS that an analysis of more than 400 renovation packages for different building types has identified the packages recommended for energy saving support, no further details are provided about the input data and methodology of this analysis.

2. Roadmap to decarbonised buildings stock by 2050: LTRS must include roadmaps with measurable progress indicators and indicative milestones

This section describes what indicators and milestones are set, how are indicators and targets defined, briefly explain the methodology behind the scenario modelling; describe whether the milestones are in a line with a target of highly decarbonised building stock by 2050

In developing the LTRS, Hungary will establish a monitoring system against a set of indicators to check the achievement of the strategic ambitions. This will allow for the continuous processing of feedback and, if necessary, the identification of new intervention points. Its final form will be the so-called **Building Renovation Monitoring System (BRMS)**. The online interface will be set up in line with the indicators in the Strategy. The programme will also be able to link, inter alia, with the State Public Buildings Register, the electronic applications of the National Building Register, in particular the e-certification system, and, for public buildings, with the Municipal Property Register and the Central Public Investment Control System (CIPCS). The BRMS will be able to measure and record five main **indicators** as a result of complex data collection:

1. number of buildings renovated per building type (number/type);
2. floor area of public buildings renovated (m²/type);
3. energy savings and CO₂ emissions savings (kWh; tco₂);
4. Financial resources spent on building renovation (Ft; Ft/kWh);
5. which policy measure is achieved with what result (for the results of points 1, 2 and 3) (Ft/kWh).

The BRMS, according to plans, starts to operate from 2023. If properly implemented, the BRMS could be an excellent tool to monitor progress of the milestones set out in the LTRS, allowing the measures to be adjusted and adapted to the needs of the time.

The Hungarian LTRS sets the following **indicative milestones** to monitor the achievement of the targets set by the Strategy:

1. Reducing carbon emissions from the energy use of buildings from average levels in 2018-2020

2030	20% (residential buildings) + 18% (public buildings)
2040	60%
2050	90%

2. Percentage of buildings meeting nearly zero energy demand (without buildings defined under Article 4(2) of Directive 2010/31/EU)

2030	20%
2040	60%
2050	90%

3. Reduction in the number of households to be supported (energy poor households) compared to the 2021 baseline

2030	50%
2040	80%
2050	100%

4. Reduction of final energy consumption in public buildings compared to 2018-2020 average

2030	18 %
2040	40%
2050	60%

The LTRS does not include scenario modelling, or any more detailed description of the above milestones. Therefore it is difficult to evaluate the methodology by which they have been defined. The targets are in line with a highly decarbonized building stock by 2050, but the details of implementation is a key to achievement. Nonetheless, more emphasis should be given to early delivery, as energy savings conveyed in the beginning of this 30-year period cumulate over the years.

3. Investment needs: to achieve the milestones, member state should prepare a list of investment needs

This section describes the methodology behind calculation, if the investment needs include all sector, if its divided into segments.

The Strategy sets out 35 policy measures. The investments needs are identified for each policy measure; therefore it is not particularly calculated on a sector basis. Details on the approach and methodology of calculations are not provided.

A total estimated cost is included in the strategy, according to which the total estimated cost of achieving climate neutrality in 2050 is in the order of about HUF 50 thousand billion, which implies the mobilisation of resources equivalent to 2.5% of GDP per year until 2050.

4. Existing and planned policies to meet the targets:

This section should consist of description of few existing or planned policies which can be set as a good practice, lessons learned or failures to be avoided related to goal of increasing the renovation depth and rate. Please pick max 10 policies and briefly describe them (each in one paragraph, or you can use a table format). May include general principles on how to successfully implement policies such as support programs, if there is a good example in your country.

The Strategy sets out 35 policy measures. The monitoring of the implementation of the measures will be ensured by the establishment of a so-called Building Renovation Monitoring System (BRMS). This will allow the continuous processing of feedback and, if necessary, the identification of new intervention points.

The measures are not described in details, only few information is available. Most of them are planned to start in 2023 as they require preparatory work. The following measures are identified by the LTRS itself as the most important plans:

- Developing an efficient, renewable, affordable, environmentally friendly and high security of supply policy programme for district heating in line with the EED Directive,
- Preparing an ESCO programme to improve energy efficiency in public and residential buildings,
- Long-term operation of a sector-neutral Energy Efficiency Obligation Scheme,
- Develop a background paper on renewable energy options,
- Mainstreaming climate protection in education,
- Establishing a comprehensive monitoring and evaluation framework for energy and climate policy and climate policy measures.

Legislative:

1. *Reinforcing the quality and use of Energy Performance Certificates:* The energy performance of the buildings subject to Government Decree 176/2008 (30.VI.) must be certified according to the same Government Decree, but currently the lack of this is not sanctioned. A system of sanctions for the lack of certificates and the necessary legal framework will be developed. In addition, companies advertising the lending of properties will be required to advertise only those rental properties for which the energy performance certificate or its main energy elements are

included in the advertisement. Expected impact of the measure is a higher level of tenant awareness of the rental property energy status and improved information on the tenant's knowledge of the energy performance of the building.

Another measure also targets EPCs. Hungary is currently revising its energy certification system and a system of strict pre-examination and pre-study requirements is being developed. Hungary is reviewing and tightening its system of comprehensive professional verification and sanctioning of energy performance certificates. It also provides for a mandatory review of existing energy certifiers through re-certification and a quality review of the certificates issued. The qualifications required to issue energy certificates will be reviewed.

2. *Introduction of Energy Performance Contracts (EPCo) for renovations and involvement of ESCOs in projects:* Current legal environment in Hungary does not favour the spread of ESCOs and EPCOs. Therefore there is a need for the development of specific legislation for ESCO services to allow for the development of a regulated market, including one or more contract templates that could also simplify such negotiations. Task for this measure includes preparing EPCo and ESCO model contracts and upload them to a dedicated online platform and to change the legislation allowing such contracts to be concluded. From the introduction of the measure it is expected that the legal basis for EPC contracting and the involvement of ESCO providers will increase market mobility and create opportunities for it, to finance renovation from energy savings.

Finance:

3. *Government incentive for Green Bond issuance - designing a programme.* The aim of the measure is to ensure that the domestic green bonds to be promoted to finance renovation are issued in accordance with the future EU Green Bond Standard, so that they can also reach foreign investors, as the EU standard will demonstrate a uniform quality guarantee. To kick-start green bond issuance by private actors financing renovation, public incentives - i.e. guarantees (see next point), interest rate subsidies or other targeted support - are needed in the first place.
4. *Developing the concept of a Green Finance Guarantee Facility.* It is not a specific measure in the LTRS with deadlines and responsible ministries. However, this is a long-awaited financial instrument in Hungary, and it is mentioned in the LTRS, therefore we include it here as well. In commercial banks' financing practices, credit risk decisions do not favour more environmentally sustainable investments over other investments. However, investments that also promote environmental sustainability, such as real estate energy renovations, have positive externalities compared to other investments (mainly through the reduction of GHG emissions related to energy use). As these positive externalities are not taken into account by market actors, without public incentives, fewer investments will be made than socially optimal. A public guarantee or interest rate subsidy can shift the supply of resources to a level that already creates an appropriate market equilibrium. The establishment of a dedicated Green Guarantee Facility in Hungary could significantly contribute to the expansion of commercial bank lending for renovation and the launch of green bond issues to finance renovation.

Technical support

5. *Support for vocational training in the energy sector and developing career guidance programmes and training in energy engineering.* The construction industry is the sector most affected by skills shortages in Hungary, which is both a major challenge and an essential for increasing the volume of energy efficiency investments. This is planned to be tackled with this measure. Following the situation assessment, a detailed action plan will be drawn up setting out the intervention points. The modification of the system will give priority to increasing the knowledge base on life-cycle thinking, digitalisation and advanced technical solutions. As a result, new teaching materials will be developed and integrated into the elements of the revised education system. Based on the relevant legislation in force on vocational education and training, the vocational education and training content will be developed and renewed in the cooperation system of vocational education and training in cooperation with the Sectoral Skills Councils coordinated by the Hungarian Chamber of Commerce and Industry. A situation report will be prepared with the involvement of stakeholders in the energy sector in order to identify precisely the areas of skill shortages that the sector is currently facing. As a result, Hungary will develop a training system to fill the shortage areas by adapting the current training structure in the identified shortage areas. For professions that cannot be trained in higher education institutions, free secondary education courses will be launched with the support of the state for the training institutions.
6. *One-stop-shop for users.* This measure is promising in its title, this is why it is included here, however, based on the description in the LTRS it is not planned to be a multifunctional OSS. According to the description of the measure, awareness-raising programmes will help the public and the business sector to learn about technical information on energy-efficient renovation and building use. The awareness programmes will be progressively extended to include advice on financial options. Financial advice will be professionally supported by the Central Bank of Hungary. The possibility of online administration will be developed, so that users can take part in counselling sessions using an online video-chat application, thus making the service widely available. However, specific services related to the implementation of energy renovations, as well as monitoring and follow-up will not be provided by this OSS.

Policies and action on energy poverty:

The expression "energy poverty" does not appear in the Hungarian LTRS. The only specific measure to help the so-called *households to be supported* is a programme of awareness-raising, information and advice campaigns, aimed at increasing the willingness to invest in energy efficiency by raising public awareness and influencing behaviour, with a greater focus on the households to be supported. It is to be launched in 2023, which, according to the LTRS, would be covered by the Energy Efficiency Obligation Scheme (obligated parties may choose to pay an energy efficiency fee as an alternative to compliance; the proceeds of the fee shall be used primarily to finance alternative policy measures to improve the energy efficiency of the households to be supported). However, such a consumer awareness campaign alone, without substantial energy investments, will not deliver results. A large proportion of the targeted households already have low energy consumption or are already reducing their energy consumption.

The strategy declares the so called "Overheads reduction programme" one of the major measures to tackle energy poverty. As of 2013, energy prices for the residential sector are set by the authorities, which must be applied by energy suppliers. However, it is precisely the most vulnerable who have not benefited from this support, because most of them heat their homes with firewood, which is not affected by the cuts.

Policies and action on **public buildings**:

7. *Creating and updating the Public Buildings Register.* The system collecting the energy performance and monthly energy consumption of public buildings will be an application providing a unified user interface, which is able to display descriptive data on public buildings with different functions stored in different databases (e.g. National Inventory, National Building Energy System, Real Estate Register, Central Address Register, etc.) in a unified environment. In addition, the single user interface will allow, among other things, the retrieval of operational data of public buildings, their spatial location, energy characteristics and energy consumption parameters, according to different search criteria.
8. *Introduction of a mandatory energy efficiency audit for public institutions.* An energy audit obligation is introduced for operators of heated or cooled buildings larger than 250 m² owned or used by public institutions. The purpose of the audit is to understand the energy characteristics related to the use of the building and to advise on energy efficient operation. With a proper audit the energy consumption of a public building can be reduced by 20-50%. The audit will have to be repeated every four years. The details of the regulation will be developed by the Ministry of Innovation and Technology.

5. Public consultation process: To support the development of its long-term renovation strategy, each Member State shall carry out a public consultation on its long-term renovation strategy prior to submitting it to the Commission.

This section describes the participation process and summary of the results of its public consultation. What kind of participation activities were used, if there was an working group where stakeholders could participate in the preparation of draft version (how many sessions took an place), etc.

The public consultation process was minimal and insufficient. The participation was not inclusive; the process only comprised one event: an online consultation organized by the Ministry of Innovation and Technology. On 4 August 2020, a professional consultation on the LTRS was held with the participation of relevant government stakeholders, professional organisations, academic institutions, market players and banks. The online event was not suitable for debating the strategy; some presentations were made to introduce the concept of the strategy, followed by some guided questions to the participants. After the event no information was available on the process and the content of the finalized LTRS. The draft text has not been made publicly available for comments and remarks.

6. Implementation experiences: describe the implementation experiences, barrier and good practices of previous Renovation strategies and identify possible bottlenecks.

This section describes if the objectives in your previous Renovation strategies were met, if proposed policies were implemented

The LTRS does not contain a proper evaluation of the previous National Building Renovation Strategy (NBRS). The NBRS included specific targets for the year 2020 to be achieved (i.e. 40 PJ primary energy savings, and 700,000 buildings to be renovated). However, the LTRS does not state anything about whether these targets have been achieved (presumably not).

The NBRS also contained 14 measures to be introduced in order to achieve the specified targets. The Annex of the LTRS describes certain measures that have been implemented, however, these are very difficult to match and compare with those included in the NBRS, as the structure is very different in the two documents. Information on the results of the implementation are very scarce; they are mostly unavailable. The LTRS includes numbers on the amount of projects that have been supported, the magnitude of support, etc; but it rarely shares information on the achievements. The following groups of actions and measures are included in the Annex of the LTRS describing the measures of the NBRS and their implementation:

a) **The legislative environment for increasing energy savings and reducing carbon emissions from buildings.**

Although several legislations are listed in the LTRS, which allegedly significantly tightened the construction, renovation and operation of buildings in terms of energy efficiency, many of them originate from the times before the NBRS was made (i.e. before 2015). Therefore they cannot be declared as achievements of the NBRS. Some modifications to existing legislation are also contained in the LTRS, but it is not described how they serve the cause of energy efficiency. In fact, there has been a significant step backwards in the legislation, regarding the Nearly Zero Energy Buildings regulation: the deadline for newbuilds to reach the NZEB criteria has been postponed. A last minute modification has been made, by which the deadline moved from January 1 2021 to July 1 2022.

b) **Support schemes for the impact of measures undertaken in the NBRS for the period 2014-2020**

This is the most well-developed part of the evaluation of the NBRS. Long lists are available on (1) grants for the residential sector, (2) loans to increase energy efficiency and renewable energy use in residential buildings, (3) energy grants to local authorities, (4) grants for public buildings. All of these were financed from EU funds, namely the Operational Programmes.

From 2015, non-refundable grants for energy savings for the general public were launched. These targeted different building types and segments, and the applicant had to have an energy investment with a self-financing margin in line with the conditions of the call. Approximately 315,000 dwellings were covered by these public subsidies between 2014 and 2019, almost 7-8% of the total number of dwellings. However neither the depth of these renovations, nor the achieved energy savings are specified in the Annex of the LTRS. Also, the number of covered dwellings is less than half of the NBRS target (the 700,000 buildings).

Between 2017 and 2019, 10,630 private individuals and 60 condominiums and housing cooperatives took advantage of the subsidised loan. No data is available on the results of these energy renovations.

In another funding scheme, the Operational Programme for Regional and Local Development (TOP), grants for the local government sector were launched during this period. The aim of these calls was to promote the transition to a low-carbon economy, with a particular focus on urban areas. The calls for proposals have been launched with an aid intensity of 100% for the above objectives, and their implementation is still ongoing. A total of 1596 successful applications were announced for the TOP energy tenders until 2020, with a total value of HUF 171 036 738 479. In the case of municipal institutions, infrastructure and buildings owned by the municipality, the use of renewable energy sources was possible for all TOP applications, but was a priority objective for the TOP 3.2.2-15 sub-programme. Within this framework, 46 successful applications were supported with a total amount of HUF 11 968 949 574. No information on energy savings is available in the LTRS.

Priority 5 of the Environment and Energy Efficiency Operational Programme mainly supported the development of energy efficiency in public buildings, the increase of renewable energy production and green electricity production. The aid intensity varied between 10-100% depending on the type of development and the applicant. Data on the number of successful applicants as well as the magnitude of the support in Hungarian Forints are included, however, nothing about the energy-related achievements are mentioned.

c) Public and residential energy saving programmes

In 2017, the National Energy Efficiency Network was set up to promote the energy efficient operation of public institutions, including municipalities. Public institutions are required to prepare an annual Energy Saving Action Plan with the help of the Hungarian Energy Authority and upload it to a central website. Article 90 of Act CX of 2019, amending the Act on Energy Efficiency, designated the Hungarian Chamber of Engineers to provide energy advice to businesses and the public. Both actions are excellent concepts, however, their implementation is not yet very successful. Again, no information is available on their achievements, in terms of energy savings.

d) Energy awareness raising campaigns.

In 2015-2019, several energy awareness raising campaigns took place in Hungary. No information is available on the implementation and results.

All in all, it can be said that due to the absence of relevant data on the results and achievements, the evaluation of the NBRS measures implemented cannot be relevant.

7. Brief overview of social and economic benefits of implementing renovation policies

The EPBD requires the inclusion of evidence-based estimates of expected energy savings and wider benefits, such as health, safety and air quality. In the Hungarian LTRS the part of the social and economic benefits is not very well developed. Social benefits have generally been identified and listed, however, no description is provided on the methodology of their assessments, not to mention estimates of energy savings.

The following social benefits have been identified in the Hungarian LTRS:

- Indoor air conditions and comfort, improvements in outdoor air quality and their health implications
- Improvements in electrical systems, gas installations and appliances, fire protection and their safety implications

Economic benefits have not been indicated at all.



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