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Green Deal for Buildings

Slovak Stakeholders' Roundtable

The deal's measures with implementation explanations and The Action Plan

Bratislava, Slovakia

2024

Tento projekt získal financovanie z programu Európskej únie pre výskum a inovácie Horizont 2020 na základe grantovej zmluvy č. 101032653

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Foreword

The construction and energy sectors are in the spotlight and facing major challenges like never before. With around 80% of existing buildings in the EU still in use in 2050 and 75% of buildings in the EU being energy inefficient, there is a need to retrofit them to zero-emission buildings. In particular, the introduction of innovation, digitalisation, the integration of renewable energy sources, the high energy intensity of buildings, the reduction of greenhouse gas emissions, low labour productivity in the construction sector, the shortage of skilled labour, the high cost of materials and securing the necessary private and public funding for the renovation and construction of buildings are significant challenges. To tackle them, cooperation is needed between all actors in the value chain, policy makers, financial and educational institutions.

The Green Deal for Buildings project reflects these challenges and has therefore brought together representatives from all relevant sectors and institutions. During ten roundtable meetings involving more than 80 stakeholders, 48 actions have been taken, the implementation of which will lead to the achievement of the objectives of the European Green Deal, better use of public financial resources with private capital participation, attracting sustainable energy investments in building renovation and reducing risks. The result will be a decarbonised building stock, urban infrastructure, and transport.

This agreement was presented at a ceremonial roundtable on 23 April 2024 in Bratislava, Slovakia, and is the culmination of a multi-year process of creation This roundtable will also serve to declare their importance and to get stakeholders to agree on future cooperation on their promotion and collaboration within the new European Coalition for Energy Efficiency Financing.

The partners of this project would like to thank the stakeholders who contributed most to the dialogue around the roundtable and expressed their support for the resulting Green Deal for Buildings. These stakeholders are:

Table 1 List of organisations that have expressed support for the Green Deal for Buildings

Organization name	**Short name used in the action plan**
Authorities – national and regional	
Ministry of Education, Research, Development and Youth of the Slovak Republic	MSVVM
Ministry of Transport of the SR	MD
Ministry of the Environment of the Slovak Republic	MZP
Ministry of Economy of the SR	MH
Bratislava self-governing region	BOD

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Organization name	Short name used in the action plan
Banskobystrica self-governing region	BBSK
Slovak Environmental Agency	SAZP
Union of Cities of Slovakia	UMS
Secondary and tertiary education institutions	
Secondary industrial school of construction and surveying, Bratislava	SPSSBA
Secondary industrial school O. Winkler, Lučenec	SPSLC
Secondary industrial school of construction and surveying, Košice	SPSSKE
Emil Belluš Secondary Industrial School of Construction, Trenčín	SPSSTN
Secondary vocational school of crafts and services, Poprad	SOSPP
Secondary vocational school of technologies and crafts, Bratislava	SOSBA
Secondary Vocational School of Construction, Nitra	SOSSNR
Technical secondary school, Prešov	SOSTPO
Technical University of Košice	FAT
University of Žilina in Žilina	ZU
Employers	
Strabag Pozemné stavitelstvo sro	STRABAGPS
Danucem Slovensko a.s	I will give it
Chemkostav as	CHEMKOSTAV
Proma sro	PROMO
BALA a.s	BALA
HORNEX a.s	HORNEX
Koga Bau sro	WHO

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Organization name	Short name used in the action plan
STRABAG sro	STRABAG
Metrostav as - organizational unit Bratislava	SUBWAY
VÁHOSTAV-SK as	VAHOSTAV
Employers' associations	
Association of Industrial Unions and Transport	APZD
Slovak Trade Union	SZZ
Professional associations, guilds, clusters and other stakeholders	
Slovak Association of Sustainable Energy	SAPI
Association of energy service providers	APES
Cluster of Energy Communities of Slovakia	COOKIE
Consumer Protection Society	SOS
Slovak Council for Green Buildings	SKGBC
Buildings for the Future	BPB
Institute for Passive Houses	IEPD
Guild of painters of Slovakia	CMS
Guild of Roofers of Slovakia	CS
Kempelen Institute of Intelligent Technologies	KINIT
Coordinator and partners of the project	
Association of Construction Entrepreneurs of Slovakia	ZSPS
Slovak Innovation and Energy Agency	SIEA
ViaEuropa Competence Centre Ltd	VIA
First Construction Savings and Loans (Prvá stavebná sporiteľňa), a.s	PSS

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Organization name	Short name used in the action plan
Institute of Education and Services, Ltd	UVS

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Executive Summary

Decarbonisation of buildings, improving their energy efficiency and carbon neutral construction in the European Union are key tools to achieve carbon neutrality by 2050. Almost 75% of buildings in Europe are inefficient and it is predicted that over 80% of existing buildings will still be in use in 2050. Since the member states of the European Union have committed to switch to a low-carbon economy, the European Union presented the European Green Deal, where the initiative *Renovation Wave for Europe* was announced. This initiative primarily envisages an increase in the building renovation rate from the current 1% per year (with deep renovation it is only 0.2%) to 3%. The costs of this renovation will be high and far exceed the possibilities of Slovakia's public finances, including funds provided by the European Union through various programs. Therefore, a mobilization of private investment is essential for achieving a climate-neutral economy and specifically for achieving ambitious goals in building renovation, as well as for financing the relevant innovations in the construction sector.

The **Green Deal for Buildings** presented here reflects on all these needs and is the result of broad consultations with stakeholders. These consultations focus on stakeholder dialogue with the aim of identifying possible joint activities and measures that would lead to competitiveness in obtaining sustainable investments for Slovakia and the use of emerging opportunities by Slovak regions and Slovak business entities.

This dialogue took place in the framework of Roundtables, which are organized in the period from 31 March 2022 to 31 May 2024. The Deal consist of four roadmaps, which focus on:

- **residential buildings**, including apartment blocks and family houses, private and public, including social housing and rental housing for young families;
- **non-residential buildings**, including educational buildings (schools, universities), administrative buildings, commercial buildings, cultural and historical buildings, private and public, also owned by municipalities;
- **industrial buildings** – non-residential buildings that are not included in the previous points (except for technological buildings) are part of measures to increase energy efficiency in industry;
- **city infrastructure and street lighting**, which is linked to the concepts and functions of smart buildings and smart cities.

The Green Deal for Buildings and Roadmaps focus on fulfilling the following strategic goals:

Strategic objective 1: Proposing a framework for increasing the energy efficiency of the use of public financial resources and the participation of private financial resources in the renovation of buildings, namely by:

- Developing proposals for legislative and non-legislative instruments to increase sustainable energy investments and increase the rate of renovation of buildings, including streamlining relevant policies;
- Developing and/or transferring successful strategies aimed at increasing private investments in energy efficiency, as well as increasing the efficiency of public resources spent on building renovation and increasing the share of renewable sources in the energy mix, including for decarbonizing the flexibility of energy systems;

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- Assessing support measures to attract new private sources of financing for energy efficiency projects in Slovakia, such as green bonds and other debt underwriting instruments, investments by institutional investors (pension funds), financing by commercial funds investing in energy efficiency portfolios (Deutsche Bank, EEEF and others) , but also innovative financing, for example crowdfunding, which could finance projects focused on local communities and innovative energy efficiency projects that could be further replicated and scaled up;
- Analysing the possibilities of extending the existing best practices implemented at the EU level and in Member States to Slovakia, specifically the results of the Horizon 2020 projects and best practice supported by the Sustainable Energy Investment Forum (SEIF) and the Working Group of Financial Institutions for Energy Efficiency (EEFIG).

Strategic goal 2: Proposing a framework for increasing the competitive ability of Slovakia, its regions and especially the construction sector to attract private investments in sustainable energy investments and renovation of buildings, namely by:

- Developing proposals for financial support for innovations in the construction sector aimed at:
    - Increasing labour productivity, safety on construction sites, for example, the industrialization of craft work with the use of robotization, automation and other cutting-edge innovations, which, among other things, lead to improved working conditions for employees, which makes it possible to attract young people with higher ambitions and talents to the industry;
    - Building an ecosystem for innovations that go beyond the capabilities of companies doing business on the Slovak market and represent a significant risk at the inception stage of implementing these innovations;
    - Increasing the quality of project preparation and construction works, including digitization in the construction sector;
- Developing proposals to increase the share of public investments in science and research, especially applied research, in the field of dual green and digital growth in the overall financing of science and research by the Government of the Slovak Republic, including operational programs;
- Analysing the needs of vocational education to ensure the necessary skills, knowledge and competences for renovation of buildings, implementation of renewable energy sources and decarbonisation of flexibility in energy systems;
- Preparing proposals to support building owners and communities in cities and municipalities in renovation of buildings to the level of buildings with a positive energy balance and zero emission buildings, including community projects aimed at decarbonizing energy in buildings;
- Preparing proposals for using the experience of other Member States in promoting a common methodology for assessing building renovation projects and sustainable energy projects with the aim of creating larger packages of bankable projects that will increase the attractiveness of buildings renovation for private investors.

Strategic objective 3: Proposing measures aimed at reducing the risks of private investments in the renovation of buildings and sustainable energy projects, namely by:

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- Supporting Slovakia's participation in initiatives supported by the European Commission and private investors aimed at exchanging data on implemented projects, financial operations to eliminate the risk of achieving the target energy efficiency of buildings, etc.;
- Transposition of relevant EEFIG recommendations;
- Proposing measures for the effective implementation of the EU taxonomy by financial institutions and the energy and construction sectors.

Proposals for action to achieve these strategic objectives are based on stakeholder dialogue. 11 roundtables and one ceremonial roundtable were organised. The first kick-off meeting was held on 31 March 2022 in Bratislava, the second meeting was held on 23 June 2022, the third meeting was held on 29 September 2022, the fourth meeting was held on 8 December 2022, the fifth meeting was held on 26 January 2023, the sixth meeting was held on 2 March 2023, the seventh on 27 April 2023, the eighth on 29 June 2023, the ninth on 28 September 2023, the tenth on 25 January 2024, the ceremonial roundtable on 23 April 2024 and the twelfth on 30-31 May 2024. All meetings were held as face-to-face meeting or combined with online access. The roundtable meetings were prepared in the framework of a broader structured expert discussion supported by the activity of 3 expert groups:

- **Construction and the value chain;**
- **Sustainable energy;**
- **Financing of sustainable energy investments**.

The presented text of the Green Deal for Buildings focuses on the following 48 measures:

- **15 cross-sector measures to achieve strategic objective 1:**
  - Measure a.1: National strategy for financing sustainability;
  - Measure a.2: Platform for financing sustainable energy investments and building renovation;
  - Measure a.3: Financial blending (small PPP projects) for financing sustainable energy investments and building renovation;
  - Measure a.4: Smart energy services platform (prosumer platform);
  - Measure a.5: Support for participatory financing of community projects;
  - Measure a.6: Strategy and scheme to support households when energy price fluctuations threaten households with energy poverty or when market is manipulated by oligopolies on the domestic or global market;
  - Measure a.7: Support scheme for the establishment of energy communities;
  - Measure a.8: Raising public awareness, development and dissemination of skills, knowledge, competences related to the implementation of new smart energy service solutions;
  - Measure a.9: One-stop-shop support for building renovation;
  - Measure a.10: Developing financial innovations to secure the necessary investments in building renovation;
  - Measure a.11: Implementation of individual building renovation plans;
  - Measure a.12: Implementation of a digital building passport;
  - Measure a.13: Implementation of Minimum Energy Performance Standards (MEPS) for building renovation;
  - Measure a.14: Promote and monetize the multiple benefits of building renovation;
  - Measure a.15: Removal of the EU taxonomy exemption for national governments;

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- **14 common actions to achieve strategic objective 2:**
  - Measure b.1: Shift societal priorities towards innovation for climate neutrality;
  - Measure b.2: Promote innovation to increase labour productivity in the construction sector and industrialise construction production;
  - Measure b.3: Support the creation of an ecosystem for the use of modular technology in the construction of new buildings and the renovation of existing buildings;
  - Measure b.4: Promoting Twin Green and Digital Growth in the construction sector;
  - Measure b.5: Supporting building owners and communities in cities and municipalities in the renovation of buildings to the level of positive energy balance buildings and buildings from community-based projects aimed at decarbonising energy in buildings;
  - Measure b.6: Smart Cities Research and Development Programme;
  - Measure b.7: A strategy for further and continuing education in the energy and building sectors for the implementation of innovations, including funding;
  - Measure b.8: Updating existing and creating new fields of study to adapt the fields to technical progress and the needs of the transformation of the building sector;
  - Measure b.9: Support scholarships for pupils in disciplines that are in short supply in the country and are needed to cope with the current changes resulting from European agreements;
  - Measure b.10: State support for the creation of new educational programmes for pupils and adults;
  - Measure b.11: State support for companies' involvement in the training process;
  - Measure b.12: Provision of additional training for educators on the new requirements;
  - Measure b.13: Making the teaching profession more attractive and creating the conditions for a significant increase in the interest of young people and professionals in the teaching profession;
  - Measure b.14: Change in the method and amount of financing of schools and material and technical provision, so as to create a network of schools with a smaller number of schools, which will be supra-regional and specialised in the construction sector, so that they are provided with the required material and technical provision;
- **5 common actions to achieve strategic objective 3:**
  - Measure c.1: Participation of Slovak investors in building renovation and other sustainable energy investments in the DEEP (De-risking Energy Efficiency Platform);
  - Measure c.2: Implement the EEFIG Underwriting Toolkit;
  - Measure c.3: Improve the flow of building energy performance information aimed at more efficient pricing of building retrofit financing products;
  - Measure c.4: Replicate successful practices for developing a market for sustainable energy investments in building retrofits to achieve critical mass for meeting Fit-for-55 and 2050 targets;
  - Measure c.5: Standardisation of processes for approving building renovation projects or common methodology for approving project financing;
- **5 specific measures on the renovation of residential buildings:**
  - Measure bd.1: National plan for sustainability financing of the residential sector;
  - Measure bd.2: Development of rental housing;
  - Measure bd.3: Plurality of renovation financing;
  - Measure bd.4: Legal certainty for green procurement for renovation of residential buildings;
  - Measure bd.5: Reduction of VAT on RES as amended by the EED for final consumers;

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- **3 specific measures for the renovation of non-residential buildings:**
  - Measure nd.1: Procurement for renovation of non-residential buildings;
  - Measure nd.2: Establishment of a one-stop-shop centre (OSSC) to support the renovation of non-residential buildings;
  - Measure nd.3: Promoting innovation in the RES sector to increase the sustainability of RES technologies for use in commercial and office buildings;
- **3 specific measures on the renovation of industrial buildings:**
  - Measure pb.1: Initiate cooperation between companies in the field of increasing energy efficiency and the use of renewable energy sources in companies;
  - Action pb.2: Develop conditions for industrial energy communities;
  - Measure pb.3: Promote innovation in the RES sector aimed at increasing the sustainability of RES technologies for use in industry;
- **3 specific measures on sustainable urban infrastructure and e-mobility:**
  - Measure mi.1: Sustainable Mobility Plans;
  - Measure mi.2: New requirements for urban infrastructure and non-urban road infrastructure;
  - Measure mi.3: Development of Positive Energy Districts (PEDs).

The 12th meeting of the roundtable was dedicated to finalizing Action Plan attached in Section 9 and to the discussion on continuing the stakeholder dialogue started by the GreenDeal4Buildings project within the Stakeholders' Group of the Slovak Hub linked to the European Energy Efficiency Financing Alliance. The Stakeholders' Group will continue the dialogue on elaborating and implementing the agreed measures of the Green Deal for Buildings.

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1 Introduction

a) Context of the Green Deal for Buildings

Decarbonising buildings, improving their performance and carbon neutral construction in the European Union are key tools to achieve carbon neutrality by 2050. Almost 75% of buildings in Europe are inefficient and over 80% of existing buildings are projected to still be in use in 2050. Moreover, buildings account for a large share of final energy consumption. Greater attention to buildings, their condition and indoor environmental conditions has been brought about by the COVID-19 pandemic, and Russia's aggression in Ukraine has only underlined the need and urgency to construct and renovate buildings that are as energy efficient as possible.

With European Union member states committed to moving to a low carbon economy, the European Union has introduced the European Green Deal, which launched the Renovation Wave for Europe initiative. In particular, this initiative foresees an increase in the rate of renovation of buildings from the current 1% per year (only 0.2% for deep renovation) to 3%. This will be achieved in particular by adhering to principles such as the priority of energy efficiency, the price sustainability of buildings, decarbonisation and the integration of RES, life-cycle considerations and circularity, strict health and environmental standards, jointly addressing the simultaneous green and digital transformation, and respect for aesthetics and architectural quality. The Green Deal for Buildings project aims to put these principles into practice and, in particular, to set the financial conditions for the implementation of the Renovation Wave for Europe.

In the last decade, there has been a shift towards sustainable investments. A sustainable investment is an investment in one or more economic activities that can be described as environmentally sustainable according to the EU Taxonomy[1]. This redirection will lead to massive shifts of investment and financial resources to competitive regions, industries and business entities that are able to succeed in sustainable investment. This development will affect business entities in the value chain of buildings and energy solutions, i.e. including suppliers of building materials, products and services.

ESG reporting rules should also be mentioned in connection with sustainable investments. They take into account environmental, social and management aspects. Such assessment was made as a result of the rapid degradation of the environment. The EU reflected on this by adopting Directive 2014/95/EU the Non-Financial Reporting Directive (NFRD), which set the basic rules for the disclosure of non-financial and other information by large companies. It has currently prepared a new Corporate Sustainability Reporting Directive (CSRD), which identifies more obliged companies, introduces the obligation to audit according to ESG principles and describes more specific reporting requirements. In the future, reporting according to ESG will condition the availability of financing and thus the competitiveness of industries.

In connection with ESG reporting, there is a risk of fragmentation in its preparation. Unprepared reporting according to CSRD can significantly reduce capacities in the construction sector, especially in large enterprises, and thus create a bottleneck in the generation of energy savings. This requires the unification of the construction sector.

[1] Regulation (EU) 2020/852

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Climate-neutral construction brings various challenges and there are many obstacles on the way to it. This requires innovations not only technological, but also social. Achieving climate neutrality is a turning point that requires a fundamental reassessment of social priorities and their reflection in the state budget and the allocation of EU funds in operational programs. At the same time, it is necessary to transform the construction sector in order to meet increasingly demanding requirements and follow trends. Climate-neutral construction requires the implementation of digital technologies to be one of the priorities, but it is currently slow and hinders the introduction of further innovations in the construction sector. The productivity of work in construction production, which must be fundamentally increased, is also problematic. This will be helped by the industrialization of construction production, robotization, autonomous systems or a modular system, which can be used not only in new buildings, but is already gaining ground in the renovation of buildings. For a better use of modular systems, it is necessary to build the entire ecosystem and to innovate processes, technologies and construction products. The transition from NZEB buildings to energy-plus buildings (ZEBs) and from smart buildings to smart neighbourhoods will also be important.

All the mentioned trends are part of the EU legislative package *Fit For 55*, which aims to provide a comprehensive and balanced framework for achieving the EU's climate goals, the harmonization of EU legislation in the field of climate and energy by 2030. *Fit For 55* refers to the EU's goal to reduce by 2030 net greenhouse gas emissions by at least 55%. This package contains, among other things, a proposal for the revision of the directive on the energy performance of buildings, by which it wants to introduce into the legislation of the member states measures such as minimum energy efficiency standards, a new standard for new buildings and a more ambitious vision of buildings with zero emissions, improved long-term building renovation strategies (National plans for building renovation), increased reliability, quality and digitization of energy certificates, definition of in-depth renovation of buildings, introduction of building renovation passports and better integration of energy systems.

In this context, human capital will be a critical factor. Knowledge and skills must be adapted to new requirements and trends by innovating the education and qualification process. Around 1 million new and replacement workers will be needed by 2025 to ensure the continuity of construction production. Large investments will be needed in the innovation of human capital, as well as the improvement of the teaching process and a better connection between study and practice.

The Green Deal for Buildings project reflects on all the needs that are necessary for the transition to an efficient and carbon-neutral construction sector, the financing of which will be sustainable and stable.

b) Objectives and scope of the stakeholders‘ dialogue for achieving the agreement

The Green Deal for Buildings focuses on **stakeholder dialogue** with the aim of identifying possible joint activities and measures that would lead to competitiveness in obtaining sustainable investments (the concept of sustainable investments is explained below) for Slovakia and **the use of emerging opportunities** by Slovak regions and Slovak business entities.

This dialogue took place within the framework of **round tables** , which were organized in the period from 31 March 2022 to May 2024. The Green Deal consists of **four roadmaps** , which are aimed at:

- residential buildings, including apartment blocks and family houses, private and public, including social apartments and rental apartments for young families;

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- non-residential buildings, including educational buildings (schools, universities), administrative buildings, commercial buildings, cultural and historical buildings, private and public, also owned by municipalities;
- industrial buildings - non-residential buildings that are not included in the previous points, with the exception of technological buildings that are part of measures to increase energy efficiency in industry;
- urban infrastructure and street lighting, which is linked to the concepts and functions of smart buildings and smart cities.

The work of the round table in Slovakia is **part of the initiative of the European Commission** , which launched Sustainable Investment Forums and round tables within all EU member states. Therefore, the round table in Slovakia can use the experience in other EU member states and **the transfer of know-how** from a large number of projects implemented throughout Europe. For example:

- successful technical solutions;
- successful support solutions and financial innovations;
- small and large regional building renovation projects, construction of new buildings, including affordable social and rental housing.

The round table included **expert groups** that were supposed to help with the expert discussion on the topics they are focused on, to lighten the dialogue around the round table and help a more effective discussion on the proposals that, after the support of the stakeholders, were included in the road maps forming the Green Deal for Buildings. These expert groups met before or as part of the roundtable meetings. Ad-hoc meetings and workshops were organized on some topics. All members were welcome to attend these meetings at their discretion and as their workload permitted. The following expert groups were created:

- **Construction and the value chain**;
- **Sustainable energy**;
- **Financing of sustainable energy investments**.

The dialogue of stakeholders within the round table was structured into clusters of supporting topics, which were created under the supervision of individual expert groups. Some clusters were cross-sectional and a wider professional discussion was organized on their topics.

These clusters were divided between expert groups according to Figure 1 (group membership is represented by a letter in the code and in colour).

The stakeholder dialogue was structured into groups of clusters according to Figure 2 (each cluster is marked with a code that is explained below in Table 2).

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Figure 1 Distribution of clusters among expert groups

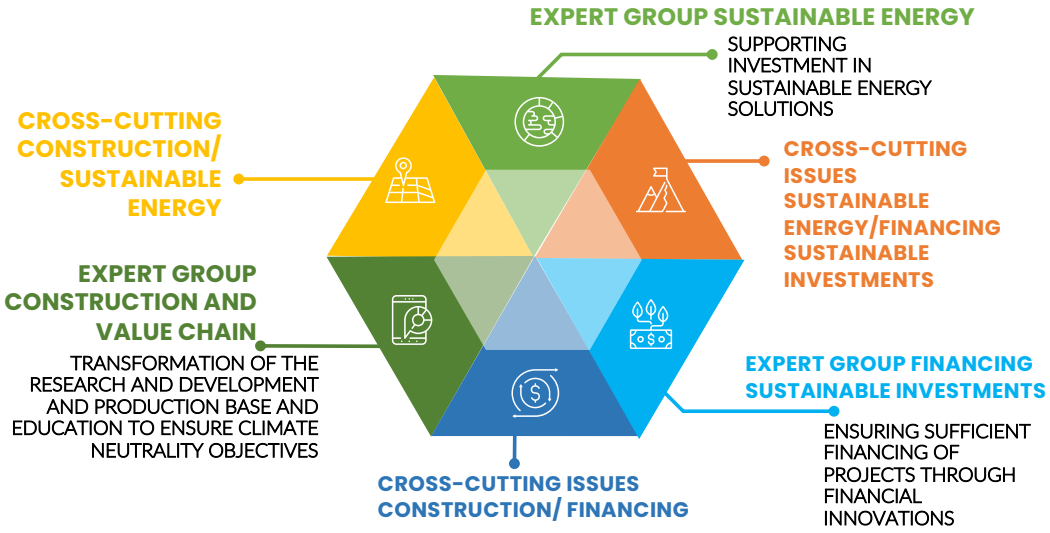

Figure 2 Structure of clusters of stakeholder dialogue themes

Table 2 Structure of clusters of stakeholder dialogue themes

E1: Energy positive districts, E2 Consumers in the energy market, E3: Energy Services for Consumers and SMEs, E4: Sustainability of renewable energy and fuel technologies, E5: Legislation and policy instruments.	F1: Platform for financing sustainable green investments and renovation of buildings to the EPB standard, F2: EU taxonomy for sustainable investments and ESG implementation in the private sector, F3: Standardization of evaluation of sustainable investment projects; F4: Reducing the risks of sustainable energy investments, F5: Legislative changes to support sustainable energy solutions.	S1: Support for applied research and innovation development, S2: Supporting SMEs in implementing innovation, S3: Financing of education and training at all levels for the implementation of innovation, S4: Necessary changes in policies and legislative conditions to support innovation, S5: Financing and support of Smart Cities lighthouse projects, smart energy services, integration of energy sectors, new electricity market design and its interconnection with buildings.
FS1: Cooperation in the implementation of ESG and SFDR (Sustainable Finance Disclosure Regulation), ES1: Technical screening criteria for the Regulation (EU) 2020/852, EF1: Financial blending in sustainable energy investments.		

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The project is focused on sustainable investments in energy solutions in buildings (residential, non-residential, industrial) and in urban infrastructure (primally related to smart buildings and smart cities infrastructure).

Sustainable investment is an investment in one or more economic activities that can be described as environmentally sustainable according to Regulation (EU) 2020/852. Pursuant to Article 3 of this regulation, those are activities that:

- they contribute significantly to one or more environmental objectives (explained below); *and at the same time*
- they do not significantly interfere with the fulfilment of any of these environmental objectives; *and at the same time*
- are carried out in accordance with the minimum guarantees and meet the technical review criteria issued by the European Commission on the basis of Article 10-15 of this decision.

Environmental objectives include:

- climate change mitigation;
- adaptation to climate change;
- transition to a circular economy;
- pollution prevention and control;
- sustainable use and protection of water and marine resources;
- protection and restoration of biodiversity and ecosystems.

These requirements **include the following areas of economic activities**, which represent more than 80% of greenhouse gas emissions:

- electricity production;
- transportation;
- forestry;
- buildings (new, renovation of existing ones, value chain);
- information and communication technologies;
- manufacturing and processing of materials (including components, aluminium, steel, concrete and plastics);
- energy efficiency in energy solutions.

These requirements will be further developed and expanded to include social sustainability requirements and requirements for management and decision-making in economic activities (governance).

The main purpose and consequence of these measures is the redirection of investments and financial resources (not only those provided by the European Commission, but also other public and private resources) to sustainable investments.

This redirection will lead to massive transfers of investments and financial resources to **competitive regions, industries and business entities** that are able to succeed in the field of sustainable investments. This development will affect business entities in the value chain of buildings and energy solutions, i.e. including suppliers of building materials, products and services.

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The project does not include economic activities with temporary exceptions from technical criteria such as: electricity production from the nuclear sources, energy production from natural gas and gas mixing from low- or carbon-free gases, e.g. hydrogen. The use of hydrogen includes only obtaining hydrogen from renewable sources, i.e. green hydrogen.

The round table was chosen as a format for stakeholder dialogue in order to provide a chance for the widest possible range of stakeholders to express themselves on the discussed topics.

The goal of the dialogue was to find connections between stakeholders in the field of obtaining sustainable energy investments (as defined above) and to create effective alliances and cooperations in their implementation by implementing joint steps, activities, projects and measures. For this reason, the dialogue focused on:

- discussion on possible **cooperation in supporting the goals of the European Green Deal**[2] in the areas of:
  - financing of sustainable investments;
  - buildings (new as well as renovation of existing buildings);
  - education;
  - clean and affordable energy;
  - transportation (in connection with urban infrastructure in smart cities);
  - climate-sustainable business activities;
- identification **of specific joint activities, steps and projects**;
- creation of effective **coalitions, consortia and other forms of cooperation** for the implementation of these joint activities, steps and projects;
- identification of specific measures in the area of policies and legislation necessary to successfully fulfil the objectives of the European Green Deal[4];
- agreement on the texts of **the road maps** , which will be part of the Green Agreement for buildings and contain the results of this stakeholder dialogue.

The main motivation for the dialogue around the round table was the necessity of stakeholder cooperation to fulfil the goals of the European Green Deal [4], which far exceed the boundaries of the activities of individual stakeholders and extend across several sectors of business activities as well as individual social groups (regulators, state and public administration, governments of cities and municipalities , educational institutions, business entities, employees, the public).

c) Structure of the Green Deal for Buildings

The Green Deal for Buildings with four roadmaps and action plans is a strategic material and one of the main outputs of the activities and dialogue of the members of the Round Table. As part of the round table stakeholder dialogue, topics were identified as the basis for the creation of strategic road maps, which try to determine the direction to achieve the acceleration of the pace of building renovation, its effective and innovative financing and the support of the use of sustainable energy in buildings. The road maps cover the period from 2025 to 2035 with a view to 2050.

[2] COM(2019) 640 final

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The structure of this document is divided into 3 basic parts. The first part consists of analytical data, the second application part consists of cross-sectional and specific measures of travel maps. The final part consists of a draft strategy for the implementation of the Green Deal for Buildings.

In the introductory part, we focus on the analysis of the current state in the context of the current Smart financing tools for smart buildings. Proposals for measures are based on stakeholder dialogue. The goal and scope of the stakeholder dialogue is more precisely defined here. It took place within the framework of round tables.

In accordance with the plan, a total of 12 round table meetings were organized in Slovakia.

- Round table No. 1 - 31.3.2022: personal participation
- Round table No. 2 - 23.6.2022: personal participation
- Round table No. 3 – 29.9.2022: personal participation
- Round table No. 4 - 8 December 2022: personal participation
- Round table No. 5 – 26 January 2023: personal participation
- Round table No. 6 - 2.3.2023: personal participation
- Round table No. 7 - 27.4.2023: personal participation
- Round table No. 8 - 29.6.2023: personal participation
- Round table no. 9 - 28.9.2023, personal participation + stream
- Round table no. 10 -25.1.2024: personal participation + stream
- Round table no. 11 Ceremonial Round Table – 23 April 2024: personal participation + stream
- Round table no. 12 - 30.5. – 31.5.2024: personal participation

All meetings were held face-to-face or in a combined manner. During the meetings, 48 Green Deal measures for buildings were identified. On 23 April 2024, a ceremonial plenary meeting of the round table took place in Bratislava, where the proposed measures of the Green Deal for Buildings and other plans for their implementation were officially presented and confirmed.

The round table also included expert groups, which were supposed to help the discussion on relevant topics. Individual topics, which are specific in their focus, were discussed within these expert groups. The following expert groups were created:

- construction and value chain;
- sustainable energy;
- financing of sustainable energy investments.

The stakeholder dialogue within the round table is structured into clusters of supporting topics, which are created under the supervision of individual expert groups. We described its structure in the introductory part of this document.

The main elements of the Green Deal for Buildings are based on a thorough analysis of the current status quo in Slovakia in the context of the European Green Deal. We draw on the state and structure of the stock of buildings and urban infrastructure in Slovakia, as the role of buildings and urban infrastructure plays a major role in reducing global greenhouse gas emissions. The sector of buildings has the largest energy consumption (both primary and final) in Slovakia. This sector is now responsible for approximately 40% of global energy consumption and associated greenhouse gas production. It therefore plays a key role in reducing global emissions.

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The analysis is guided by the national goals and aspirations for green transformation in buildings and urban infrastructure. Current trends and recent developments in the studied area and the resulting main starting points are also identified. The partners identified the trends and mega trends that are most relevant for the implementation of the European Green Deal and agreed on the foundations for the roundtable.

These foundations were used to formulate realistic and feasible visions as a starting point for a broader dialogue on the construction sector in Slovakia and its value chain for the period to 2030 and beyond to 2050.

The first part includes the vision of the deal and its roadmaps, the goals and priorities of the roadmaps of the Green Deal for Buildings. It includes the proposed vision to 2035 and 2050 and the strategic objectives of the deal and roadmaps and selected priorities of the roadmaps.

The structure of the stakeholder dialogue is based on clusters of supporting topics, which are developed under the responsibility of individual expert groups. Some of the clusters are cross-cutting and a broader expert roundtable discussion has been organised on their topics and proposals for common, cross-cutting actions to achieve the strategic objectives of the Green Deal for Buildings have been identified. The procedures here are uniform, we first define the issues, themes and concepts related to the measure in expert groups. Based on the conclusions of the expert groups, the project team elaborated concrete measures and actions to achieve the agreed objectives, which were received by all involved stakeholders for comments. These drafts were also published on the project website to solicit further suggestions and comments. The draft measures were then discussed at roundtable meetings. Stakeholders eventually voted to support the recommendations.

The second part of the document consists of a proposal and description of common actions to achieve the strategic objectives of the Green Deal for Buildings, followed by the four sections of the actions, in which specific actions are defined and proposed. These sections focus on:

1. specific measures of the roadmap for the renovation of **residential buildings**, including apartment blocks and family houses, private and public, including social apartments and rental apartments for young families;
2. specific measures of the roadmap for the renovation of **non-residential buildings,** including educational buildings (schools, universities), administrative buildings, commercial buildings, cultural and historical buildings, private and public, also owned by municipalities;
3. specific measures of the roadmap for the renovation of **industrial buildings** - non-residential buildings that are not included in the previous points, with the exception of technological buildings that are part of measures to increase energy efficiency in industry;
4. specific measures of the roadmap for sustainable urban infrastructure and E-mobility for **urban infrastructure** , which is connected to the concepts and functions of smart buildings and smart cities.

The final part consists of a proposal for the implementation strategy of the Green Deal for Buildings and further progress with a proposal for the activities of the action plan, a timetable and interested parties who will further lead the efforts to implement the measures.

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An integral part is also the list of stakeholders who are key in the creation of this document and whose dialogue led to the design and adoption of individual measures of the Green Deal for Buildings roadmaps.

2 High-level Assumptions of the Green Deal for Buildings

a) Role of Buildings in achieving the objectives of the European Green Deal[3]

Indeed, buildings have the greatest potential of all sectors to reduce global CO_2 emissions. To achieve climate neutrality by 2050 and meet the targets of the European Green Deal[4], a renovation rate of 2% per year is needed, which represents a significant challenge for all parties involved. In line with the 2020 Long-Term Strategy for Building Renovation[5], in which the Slovak Republic has established a framework of public priorities for energy efficiency in buildings and signaled the long-term vision of the state, the draft measures, legislative environment and conditions that should help to further advance the renovation of the building stock supported by a skilled workforce. The policies and measures set out here should fulfil the vision of decarbonising the building stock by 2050.

Here are some terms related to the renovation of buildings, which are also mentioned in the legislation and technical regulations of the Slovak Republic and are related to the texts of the directives of the European Parliament.

Energy performance of a building (EPB): the amount of energy required to meet all the energy needs associated with the standardised use of a building, in particular the amount of energy required for heating and hot water preparation, for cooling and ventilation and for lighting (according to Article 3(1) of the Act[6]).
Energy efficiency (EE): a process that contributes to increasing energy efficiency or reducing energy intensity in the conversion, distribution or consumption of energy, taking into account technical, economic or operational changes or changes in the behaviour of end-users and final consumers (as defined in Article 2(f) of the Act[7]).
Public building: a building owned by the government, a higher territorial unit, a municipality or a public institution (according to Section 4c(3) of the Act[8]).
Renovated building: an existing building on which changes have been made to the building structure and technical equipment of the building which, before the end of their operational life, achieve compliance with the essential requirements for buildings and prolong the service life of the building or parts of the building, normally without interrupting the use of the building, where the renovation may be total or partial in terms of extent (according to STN 73 0540-2+Z1+Z2 Thermal protection of buildings. Thermal properties of building structures and buildings. Part 2: Functional requirements (73 0540), No 3.5).

[3] Communication from the European Commission COM(2019) 640 final
[4] Communication from the European Commission COM(2019) 640 final
[5] Long-term strategy for the renovation of the building stock, Ministry of the Transport of the Slovak Republic
[6] Act No. 555/2005 Coll. on the energy performance of buildings and on amending and supplementing certain acts, as amended
[7] Act No. 321/2014 Coll. on Energy Efficiency and on Amendments and Additions to Certain Acts
[8] Act No. 555/2005 Coll. on the energy performance of buildings and on amending and supplementing certain acts, as amended

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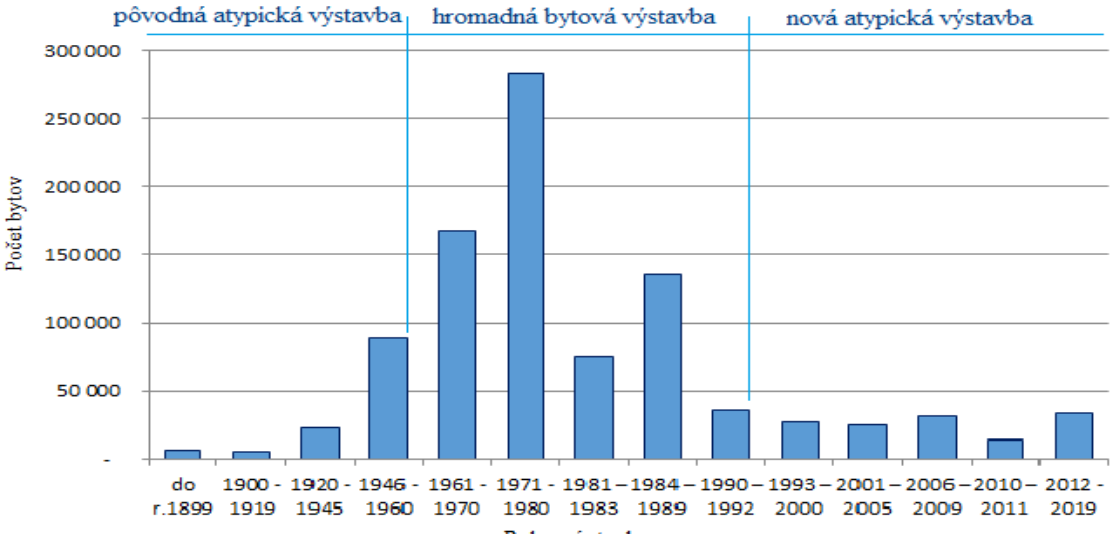
Major renovation of a building: structural alterations to an existing building which involve intervention in its envelope of more than 25 % of its surface area, in particular by insulating the envelope and the roof and replacing the original window openings (according to Section 2(7) of the Act[9]).
Substantial refurbishment: refurbishment of the technical system of a building, the investment cost of which is greater than 50 % of the investment cost of acquiring new comparable technical equipment for the building. (according to Article 2(9) of the Act[10]).
Deep renovation: is a major renovation of a building and a major refurbishment of the technical equipment of a building, which achieves the energy class rating required for the building category, taking into account the life cycle of the individual building elements. A building element means in particular a technical system of a building or a building structure forming part of the building envelope (according to Article 2(8) of the Act[11]).

The final energy consumption in buildings is largely made up of consumption for heating, hot water preparation and, in recent years, also for cooling and ventilation. In buildings, it is influenced by the design and technical solution. Statistical analyses show that the year of completion is the third most influential factor in terms of energy consumption, particularly with regard to the development of the thermal performance requirements of the building envelope. Therefore, the number of existing buildings and their age should also be taken as a basis for the proposed measures. For a comprehensive overview of the situation in the area, we have used the data processed within the framework of the Long-Term Strategy for the Renewal of the Building Stock of 2020[12] and the results of the statistical processing of the 2011 Census of Population, Houses and Flats (hereinafter referred to as the 2011 Census) and the database of buildings of the Technical and Testing Institute of Construction, n.o. (hereinafter referred to as TSÚS).



Graph 1 Number of dwellings in residential buildings. Source: the VTS - Aspects of cost-optimal measures for ensuring energy performance of buildings/TSUS (hereinafter referred to as "VTS") and the database of the Slovak Statistical Office (hereinafter referred to as "SSO")

[9] Same as previous
[10] Same as previous
[11] Same as previous
[12] Long-term strategy for the renovation of the building stock, Ministry of the Transport of the Slovak Republic

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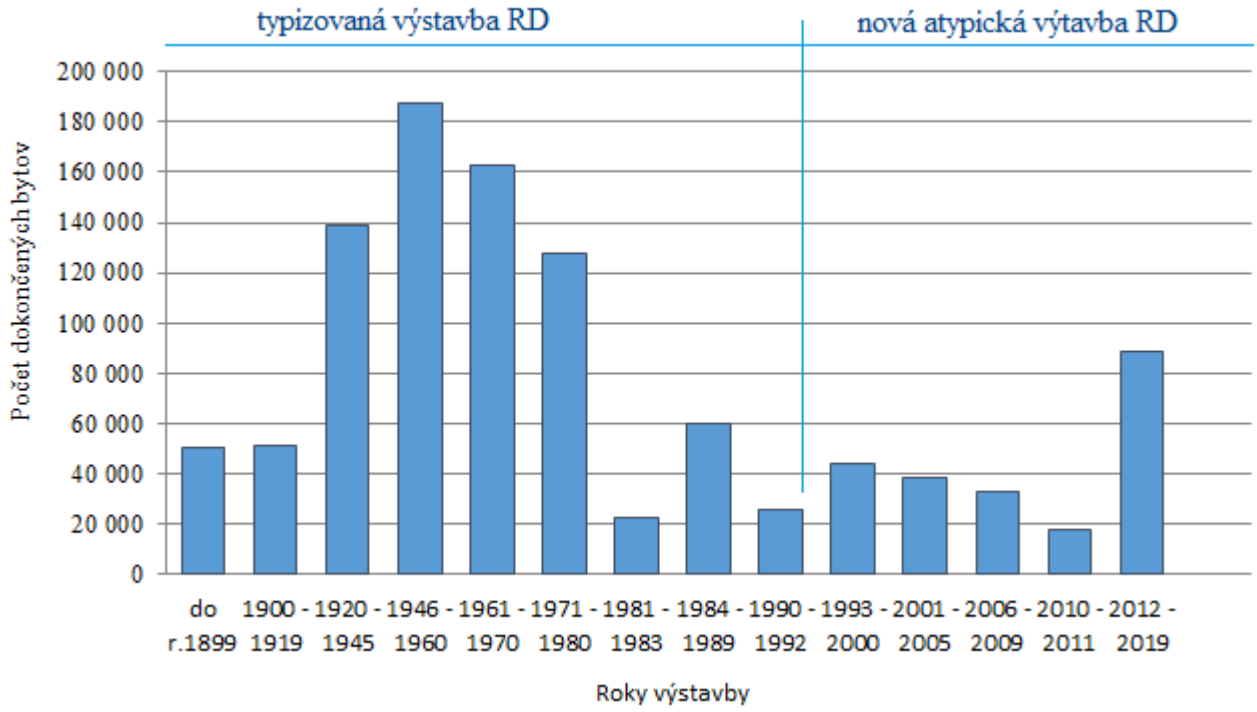
Building stock is made up of residential buildings, which can be divided into apartment buildings and single-family houses, and non-residential buildings such as central government buildings (hereinafter referred to as "CGBs"), public buildings (According to the law, for the purposes of determining policies and activities under the renovation strategy, a public building is a building owned by the government, a higher territorial unit, a municipality or a public institution) and other non-residential buildings.

Residential development in the past has been mainly influenced by the process and affordability within mass housing developments. Buildings over 30 years old were constructed as part of mass housing developments in prefabricated construction systems. It is almost 70% of the flats in apartment buildings. In 1993, this construction of prefabricated apartment buildings ceased. This is also shown in the charts.

The construction of **single family houses** is and has been more variable. The following chart shows the number of dwellings in detached houses according to the Statistical Office of the Slovak Republic.



Graph 2 Number of dwellings in single family houses according to statistical data, SSO

Summary data on houses and apartments from the SODB 2011

Description	Single family houses	Apartment buildings	Together
Number of houses	969 360	64 846	1 034 206
Number of apartments	1 008 795	931 605	1 940 400
Of which Number of occupied apartments	856 147	877 993	1 734 140

Table 3 Summary data on houses and apartments from the SODB 2011

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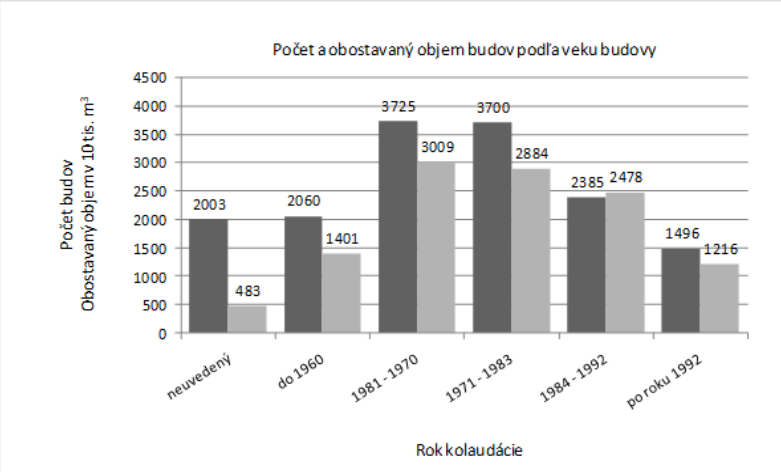
Non-residential buildings in the Slovak Republic were owned by the government until 1989. Gradually, new construction started and existing non-residential buildings were transferred to private ownership. Non-residential buildings include central government buildings, public buildings and other non-residential buildings. Non-residential buildings owned by the government and local authorities account for 54,8 % of the built-up volume of non-residential buildings identified so far. The extent of residential buildings and non-residential buildings is shown in the table below.



Graph 3 Built volume of non-residential buildings owned by the state and local governments and their number by age Source: Report of the Slovak Republic to the Commission (EU). Reference buildings. Determination of cost-optimal levels of minimum EHB requirements, 2013/VTS

Overview of the building stock

Total building stock	To year 1950	1951 to 1960	1961 to 1970	1971 to 1980	1981 to 1990	1991 to 2000	Total
	mil. m^3 of built-up volume of buildings						
Non-residential buildings	20,95	14,29	22,86	53,33	63,81	34,01	209,25
Residential buildings	44,11	29,52	47,00	88,82	87,51	32,76	329,72
Buildings and halls for production and services	55,96	41,45	64,28	117,00	143,83	58,11	480,63
Total	121,02	85,26	134,14	259,15	295,15	124,88	1019,60

Table 4 Overview of the building stock Source: Conception of the building stock renovation with emphasis on the housing stock, MVVP SR/VVÚPS-NOVA, 1999, supplemented for the years 1998-2000 ÚEOS - Komercia, a.s., Bratislava

Despite the good experience with the renovation of buildings, especially with the insulation of building envelopes and roofs and the replacement of openings in apartment buildings, the need for a change in approach was clearly defined. The need to change the scope of building renovation, to accelerate the pace of renovation of the existing housing and non-residential stock, focusing on so-called deep building renovation, with the aim of achieving a highly energy efficient and decarbonised building stock. Support must also be directed towards the renovation of technical systems and the installation of building automation and control systems, the introduction of high-efficiency alternative systems, the use of passive elements and passive technologies.

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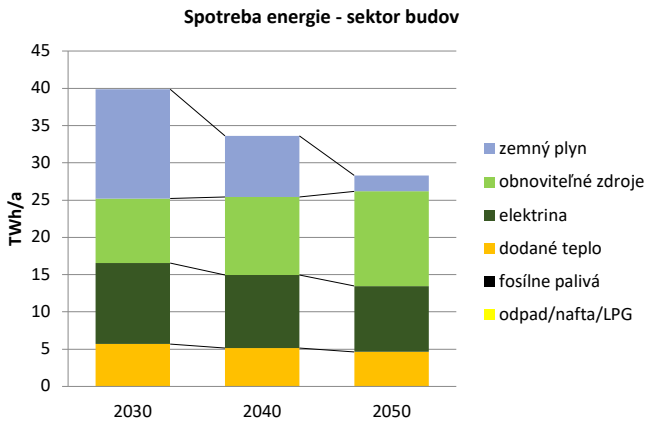
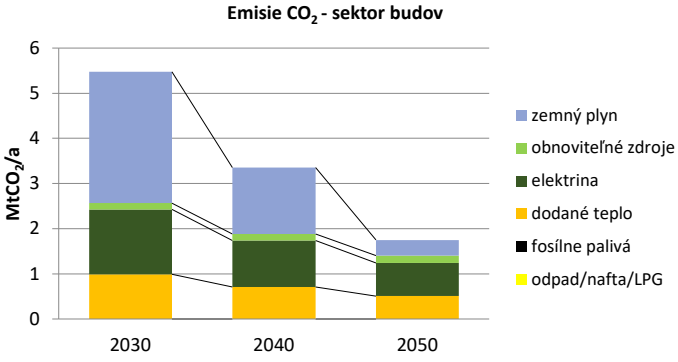
The building sector makes the second largest contribution after industry to the fulfilment of the mandatory goal of energy efficiency and energy savings for public buildings according to Directive 2012/27/EU established in accordance with the notification report. The intentions were clearly set, aiming to speed up the renovation rate **with the growth of the number of buildings with deep renovation**. The measures proposed so far in accordance with the Long-Term Building Stock Renovation Strategy together with financial instruments are essential for achieving a low- to zero-emission building stock by 2050.

Directive (EU) 2018/844 of the European Parliament and of the Council on the energy performance of buildings, which amends Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, introduces **the obligation of each member state to set indicative milestones for the years 2030 , 2040 and 2050** with regard to **the long-term goal by 2050** of **achieving a reduction of greenhouse gas emissions in the Union by 80 to 95% compared to the values from 1990.** Slovakia has the highest decarbonization targets, which are expected to reduce at least 90% compared to 1990, which would mean **achieving climate neutrality in 2050**[13].

Achieving the long-term objective of reducing greenhouse gas emissions in the Union by 80-95% compared to 1990 levels means setting a target at national level for the buildings sector in the range of 0.7-2.8 MtCO2. For the purposes of determining the national trajectory, a mean value of 8 MtCO2 was considered. The graphs present the share of individual fuels in energy consumption in buildings as well as the amount of CO2 emissions.



Graph 4 Building sector - estimated energy consumption (TWh)



Graph 5 Building sector - estimated CO2 emissions (MtCO2)

[13] NUS SR, p. 5 (Low Carbon Development Strategy of the Slovak Republic until 2030 with a view to 2050)

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Table 5 Building sector - estimated energy consumption (TWh) - indicative milestones

Energy consumption (TWh)	2030	2040	2050
waste/diesel/LPG	0.0		
solid fossil fuels	0.0		
supplied heat	5,7	5.1	4.6
electricity	10.9	9.8	8,9
renewable resources	8.7	10.5	12.7
natural gas	14.7	8.2	2.1
TOTAL	**39.9**	**33.6**	**28.3**
% compared to 1990	57%	47%	40%

Table 6 Building sector - estimated CO2 emissions (MtCO2) - indicative milestones

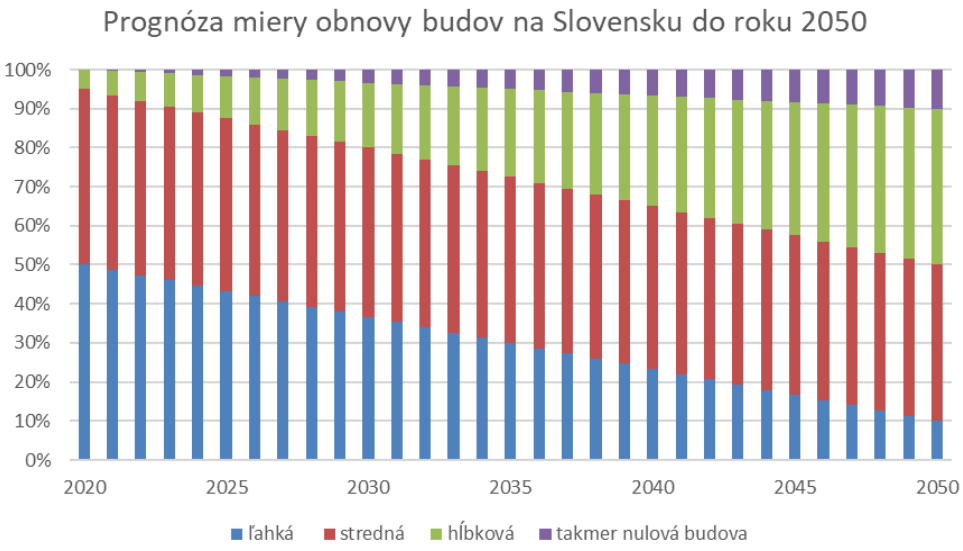
CO_2 emissions	2030	2040	2050
waste/diesel/LPG	0.0		
solid fossil fuels	0.0	0.0	0.0
supplied heat	1.0	0.7	0.5
electricity	1.4	1.0	0.7
renewable resources	0.1	0.1	0.2
natural gas	2.9	1.5	0.3
TOTAL	**5.5**	**3,4**	**1.8**
% compared to 1990	39%	24%	13%

Source: The Buildings Performance Institute Europe (BPIE), Assistance with development of long-term renovation strategy for buildings in Slovakia

Energy consumption in buildings should be reduced by 40% compared to 2020 by 2050, while emissions will decrease by 79% compared to 2020 and 87% compared to 1990.

Slovakia will have to focus mainly on fulfilling several essential prerequisites:

- Electricity and heat supplies will be decarbonized by 50% by 2050
- Direct consumption of solid fossil fuels, waste, LPG and gas oil and diesel to end by 2030
- The level of carbon emissions in the gas will be reduced by 25% by 2050
- Renewable energy sources in buildings will grow +10% every 5 years
- The net impact of new buildings on the level of emissions by 2050 will be zero[14]



Graph 6 Forecast of the building renovation rate in Slovakia by 2050 (Source: BPIE, Final Report). Explanation to the graph: In blue colour – shallow renovation, red colour - medium level renovation, green colour – deep renovation (according to the definition before revised EPBD), violet colour – nZEB.

[14] Long-term strategy for the renovation of the building stock p.31

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The ambitious deep renovation targets and the significant increase in the rate of renovation are also highlighted in Graph 6. with the share of deep renovation in completed building renovations in 2050 expected to reach 40%.

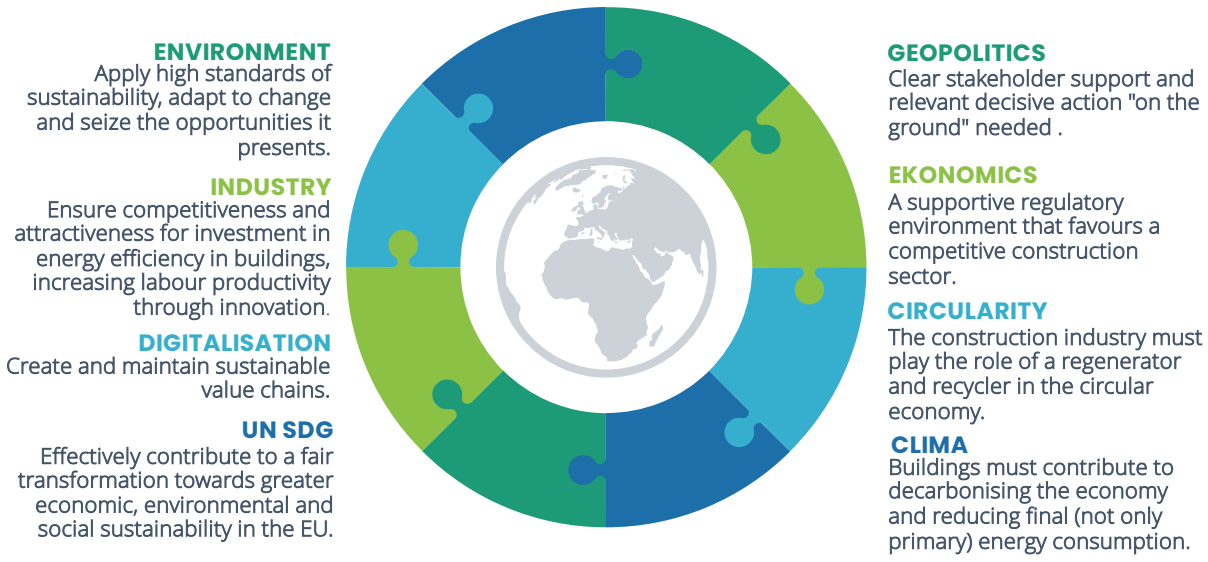
Table 7 Types of renovation according to the amount of primary energy savings achieved

	Type of renovation		
	Light, shallow	Medium	Deep
Primary energy savings %	3 - 30	30- 60	over 60

Meeting the requirements of the EEB is currently conditioned by the in-depth renovation of buildings, that is, not only the renovation of the building envelope, but also the renovation of the technical system such as the heating system, the hot water preparation system, as well as ventilation, including the use of heat recovery, cooling, lighting and the use of control and automation systems. For residential and non-residential buildings undergoing major renovation, this also includes the obligation to put in place the infrastructure necessary for charging electric vehicles.

b) Current trends and latest developments in the monitored area and the resulting high-level assumptions

The preparation of the roundtable started with an analysis of recent developments in the European Union in a global context, identifying trends and mega-trends that are most relevant for the implementation of the European Green Deal. Based on these analyses, the partners agreed on the starting points for the Round Table. These starting points were used to formulate realistic and achievable visions as a starting point for a broader dialogue on goals for the period up to 2030 and beyond to 2050:



- **Geopolitics**
  The world has become more prosperous and complex, with a fragmented and volatile geopolitical environment. There is high economic and political integration in most regions, but there is greater

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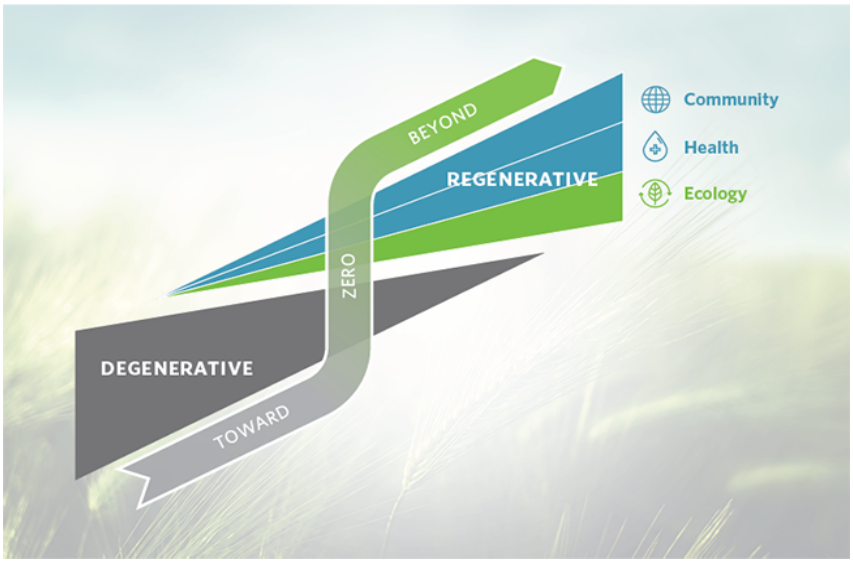
fragmentation between individual regions. The persistent imbalance lies in the use of resources and the reluctance to compensate it affects global policies and incentives for investments that are rebranded to sustainable economic activities, including decarbonized energy. The EU remains a global leader in this process. Russia's aggression in Ukraine has shown that the policy *of détente* and *appeasement* has failed, which leads to a fundamental rethinking of globalization as the main engine of politics in the global context. This policy is no longer able to fulfill the goals of peaceful development and as such has disappeared in the creation of new cooperating blocs based on common values and development goals. New economic alliances will mirror political changes. This will create new value chains whose task will be to ensure the independence of these new economic alliances from authoritarian regimes, countries identified as sponsors of terrorism and their allies. This process was accelerated **by the breakdown of value chains as a result of measures responding to the Covid-19 pandemic** and the need to build new ones. The sanctions regimes against these countries require the prudence of economic entities so that their **value chains do not intersect with countries that may be affected by sanctions from the point of view of their regimes and to avoid stranded assets in these countries** and secure their business for the future. In order to fulfil these challenges, **clear support from stakeholders and relevant vigorous steps "in the field" are necessary**;

- **Economy**

  The EU has carved out its own distinct but competitive place in a fragmenting global economy. What is needed is **a supportive regulatory environment** that favours a competitive industry, including a construction sector with efficient, well-maintained, state-of-the-art and structured assets in Slovakia. The challenge was further exposed by the Covid-19 pandemic, which sent the economy into sharp decline, and although it has begun its long journey to recovery, **the economy as we know it is a thing of the past**[15]. The recovery will evolve into a different economy. The pandemic has accelerated current trends in the economy and society, including **the increasing use of technology, including digital technologies, remote work and automation**. Further development will be characterized by **a shift to sustainable activities** and associated sustainable investments;



- **Circularity**

  The EU economy is becoming circular and its goal is to recycle all types of waste into new raw materials. The Slovak economy and the construction sector within it must fulfil the role of **regenerator and recycler in the circular economy** with the ability to ensure the regenerative cycle

[15] Proceedings of the virtual panel discussion at the European Central Bank Forum on Central Banking on 12 November 2020

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of buildings, transforming used materials, components, construction products and possible waste into valuable new resources that can be used again in the construction of new buildings;

- **Climate**
  Climate change continues to transform our planet. The climate emergency is a reality and **buildings must contribute to the decarbonisation of the economy** and the reduction of final (not only primary) energy consumption. In construction, this requires **the prevention of greenhouse gas emissions** at the level of materials and building products (through sustainable design) in order to minimize their environmental footprint. This should be followed by the low impact of construction activity on the environment and the construction of buildings with zero energy requirements or energy positive buildings. The same standard must be achieved **in the energy renovation of existing buildings**. The transition to **renewable energy sources is accelerating in the EU**. This will inevitably have an impact on value chains (many subcontractors are already switching to 100% share of climate solutions from 2025). Further development will be characterized by decentralization of energy production, smart solutions for energy systems in buildings, which will combine energy efficiency measures with distributed production of electricity from renewable sources, various forms of energy storage, including electro mobility, integration of energy sectors (buildings, mobility, industry) with the goal **of creating decarbonized flexibility in energy systems**;
- **Environment**
  Europeans place the protection of human health and the environment at the top of their uncompromising political agenda. This requires **high sustainability standards to be applied in the construction sector, as well as throughout the building value chain** . This will be reflected in the European debate on **the inclusion of greenhouse emissions from buildings in the ETS** and in the new EU regulation on construction products. The building value chain will have to **adapt to these changes and take advantage of the opportunities** they offer;
- **Industry**
  Industry is becoming more integrated and collaborative within EU-wide networks. This is the result of the so-called 4th Industrial Revolution (4PR) characterized by the gradual application of new technological solutions in areas such as artificial intelligence, robotics, the Internet of Things (IoT), machine-to-machine communication (M2M), big data analysis, 3-D printing, nanotechnology, science on materials and energy storage. The Slovak construction sector and relevant industries are lagging behind in the adoption of these technologies compared to the other most advanced regions. This affects its **competitiveness and consequently its attractiveness for investments in the energy efficiency of buildings** in Slovakia. In order to obtain financial resources for financing energy efficiency portfolios in the building sector, the key is to increase the competitiveness of the construction sector and, for the most part, **to increase labour productivity** through process, technological and material innovations. Even though the construction sector is just starting to implement 4PR, other sectors have long advanced in using the results of the 5th industrial revolution, which is characterized by the symbiosis of man with the cybernetic organism and **a new concept of the framework for managing society and public affairs**.
- **Digitization**
  Digitization is completely changing the way we work, communicate, innovate, produce and consume, and has brought unprecedented transparency to value chains. The transitional period of preparation for digitization **has been shortened from 10 to 5 years** - we only have time until around 2026 to adapt. The Slovak construction and energy sectors must adapt to these changes in order to maintain **sustainable value chains**, which define its ability to stay on the market and compete with new actors who bring revolutionary innovations to the market. This requires **building the necessary skills and knowledge** within the sector;

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- **UN Strategic Development Goals**
  The UN Sustainable Development Goals are becoming the core of European business models. These models **create business opportunities in the construction sector** as market shares increase for those who provide solutions to these challenges. This should effectively contribute **to a just transformation** for greater economic, environmental and social sustainability in the EU. *The European Green Deal* is an integral part of the European Commission's current strategy for implementing the United Nations 2030 Agenda and the Sustainable Development Goals. Buildings are key to this strategy.

Some of the premises on which the Green Deal for Buildings and its roadmaps are built have not been analysed and their reality has not been tested. The Green Deal for buildings did not have such an intention, it cannot confirm their irreversibility, but for the future of energy transformation and Slovakia, these starting points are crucial. Therefore, it is necessary to mention them. These starting points include:

- Slovakia will retain the ability to fulfil obligations resulting from EU membership and divergent tendencies will not lead to *Slovexit*;
- Slovak finances will maintain the integrity sufficient to maintain membership in the Eurozone.

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3 Strategic Objectives and Priorities of the Agreement and its Roadmaps

The Green Deal for Buildings and roadmaps focus on fulfilling the following strategic objectives:

Strategic objective 1

To propose a framework for increasing the efficiency of the use of public financial resources and the participation of private financial resources in the renovation of buildings, namely:

- By processing proposals for legislative and non-legislative instruments to increase sustainable energy investments and increase the rate of renovation of buildings, including the streamlining of relevant policies;
- By processing and/or transferring successful strategies aimed at increasing private investments in energy efficiency, as well as increasing the efficiency of public resources spent on the renovation of buildings and increasing the share of renewable sources in the energy mix, including for the decarbonization of the flexibility of energy systems;
- By assessing support measures to attract new private sources of financing for energy efficiency projects in Slovakia, such as green bonds and other debt underwriting instruments, investments by institutional investors (pension funds), financing by commercial funds investing in energy efficiency portfolios (Deutsche Bank, EEEF and others), but also innovative financing, for example crowdfunding that could finance projects aimed at local communities and innovative energy efficiency projects that would they could further replicate and expand;
- By analysing the possibilities of extending the existing best practices implemented at the EU level and in the member countries to Slovakia, specifically the results of the Horizon 2020 projects and supported by the Sustainable Energy Investment Forum (SEIF) and the Working Group of Financial Institutions for Energy Efficiency (EEFIG).

Strategic objective 2

To propose a framework for increasing the competitive ability of Slovakia, its regions and especially the construction sector to attract private investments in sustainable energy investments and renovation of buildings, namely:

- By processing proposals for financial support of innovations in the construction sector aimed at:
    - Increasing labor productivity, safety on construction sites, for example, the industrialization of craftsmen's work with the use of **robotization, automation and other cutting-edge innovations,** which, among other things, lead to **improved working conditions** for employees, which makes it possible to attract young people with higher ambitions and talents to the sector;
    - Building **an ecosystem for innovations** that go beyond the scope of companies doing business on the Slovak market and represent a significant risk at the stage of introducing these innovations into practice, for example, modular construction and the use of modules in the renovation of buildings, new technologies and materials for the construction sector with the aim of reducing the carbon footprint of

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buildings, improving air quality, safer indoor environment of buildings and increase circulation (circularity) of buildings, etc.;
    - Increasing the quality of project preparation and construction works, including digitization of the construction sector;
- By processing proposals to increase the share of public investments in science and research, especially applied research in the field of dual green and digital growth, in the overall financing of science, research, development and business by the Government of the Slovak Republic, including operational programs;
- By analyzing the needs of professional education in order to ensure the necessary skills, knowledge and competences for the renovation of buildings, the implementation of renewable energy sources and the decarbonisation of flexibility in energy systems;
- By preparing proposals to support building owners and communities in cities and towns in the renovation of buildings to the level of buildings with a positive energy balance and buildings of community projects aimed at decarbonizing energy in buildings;
- By preparing proposals for using the experience of other member countries in promoting a unified methodology for assessing building renovation projects and sustainable energy projects with the aim of creating larger packages of financeable projects that will increase the attractiveness of private investors;

Strategic goal 3

To propose measures aimed at reducing the risks of private investments in the renovation of buildings and sustainable energy projects, namely:

- By supporting Slovakia's participation in initiatives supported by the European Commission and private investors aimed at exchanging data on implemented projects, financial operations to eliminate the risk in achieving the target energy efficiency of buildings, etc.;
- By transposing the relevant EEFIG recommendations;
- By proposing measures for the effective implementation of the EU taxonomy by financial institutions and the energy and construction sectors.

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4 Cross-sectoral measures to achieve the strategic goals of the Green Deal for Buildings

a) Joint measures to achieve strategic goal no. 1

NATIONAL STRATEGY FOR FINANCING SUSTAINABILITY

The EU is committed to achieving ambitious climate and energy targets by 2030 in line with the UN 2030 Agenda, the Sustainable Development Goals (SDGs) and the Paris Agreement. The EU's long-term strategy is to achieve zero net greenhouse gas (GHG) emissions by 2050. EU Strategy for Sustainable Financing. The action plan sets out three objectives:

- redirect capital flows towards sustainable investments;
- incorporating sustainability into risk management;
- promote transparency and a long-term approach.

Measure a.1: National strategy for financing sustainability

Description of the measure:

The transformation aimed at ensuring sustainability from the point of view of the European Green Deal and Fit for 55[16] cannot be achieved without good availability of financing and a new financial ecosystem specifically focused and systematically supporting development in this area. This new financial ecosystem includes both public and private financing.

That is why the European Commission already adopted in March 2018 a comprehensive EU entry plan on how to link finance with sustainability, the so-called "Action Plan - Financing Sustainable Growth". It thus followed up, among other things, on the activities of the global financial system connected mainly with the initiative of the so-called “Working group for the disclosure of financial information related to the climate" (so-called TCFD) established at the Financial Stability Board of the G20 group of countries.

The action plan pursued three goals, which were further elaborated into 10 key actions:

1. Redirect capital flows to sustainable investments to achieve sustainable growth supporting the inclusion;
2. Manage financial risks arising from climate change, resource depletion, environmental degradation and social issues; and
3. Support transparency and long-term financial and economic activities.

Since the release of the 2018 Action Plan, there has been a massive development at EU level of this new EU sustainable finance ecosystem across all of the above objectives and actions, with the key adoption of the EU Taxonomy Regulation in 2020. Furthermore, there is, among other things, the gradual issuance of detailed technical screening criteria, which already from 1.1.2022 identify uniformly in the internal market the so-called "environmentally sustainable" economic activities and investments, as well as those that "do no significant harm" to the environment (the "do no significant harm" rule, DNSH). The Commission's focus on sustainable finance was then underlined in July 2021 by the adoption of the Sustainable Economy Financing Strategy. All of the above and other measures are thus intended to enable investors to reorient investments towards more sustainable technologies and activities and will be crucial to making Europe climate neutral by 2050. These EU strategies, plans, legislation and technical guidelines, together with the parallel fundamental turn of the global financial world towards climate risk management in particular, are already beginning to be reflected in all areas of EU national economies, including energy and energy saving projects.

[16] COM(2019) 640 final a COM(2021) 550 final

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For the success of Slovakia in this transformation, it is essential to develop a comprehensive strategy at the national level that will build on these activities and, following the example of some EU Member States, implement measures that will ensure the transfer of public and private funding to areas that are critical for this transformation. This funding must ensure the full cycle from research and development of innovations, education, support for the implementation of these innovations in critical sectors (e.g. energy, construction, new industries focused on climate-neutral economic activities), as well as in society as a whole, ensuring the necessary social innovation and adaptation of society while ensuring equitable transformation and social inclusion.

PLATFORM FOR FINANCING SUSTAINABLE ENERGY INVESTMENTS AND BUILDING RENOVATION

The ambitious Paris climate agreement also underlines the importance of energy efficiency. Investing in energy efficiency has proven to be one of the most cost-effective ways to support the transition to a low-carbon economy. Not only does this help the EU turn its climate ambitions into concrete action on climate change, but it also brings a number of significant benefits to European citizens and societies in terms of the environment, health, security of supply, lower energy bills, more jobs and sustainable growth.

To realise the full potential of energy efficiency, public funding will not be sufficient and private funding will have to be unlocked. In this context, energy policy should create more favourable investment conditions, promote demand for energy efficiency and make it easier for consumers to invest in it.

The aim of the platform is to stimulate discussion among the financial community, policy makers and clients (individuals or legal entities) on energy efficiency, to identify examples of best practices to reduce the riskiness of sustainable energy investments, successful approaches to increase the volume of financeable sustainable energy investment projects (including aggregation of smaller projects into larger units), and to facilitate their wider application in financial practice.

Measure a.2: Platform for financing sustainable energy investments and building renovation

Description of the measure:

The Stakeholder Roundtable agreed to create a **Financial Platform for Financing Sustainable Energy Investments**, which will include key stakeholders such as financial institutions, the Ministry of Finance of the Slovak Republic, cities and others. This platform will offer a comprehensive solution that would enable banks, financial intermediaries, energy service companies or other investment aggregators to deploy attractive sustainable energy finance products to a large number of end beneficiaries in Slovakia, including regions that are underserved by commercial funds.

The platform will help facilitate the financing of sustainable energy investment portfolios by:

- private financing available from global ESCOs, capital markets (Green Bonds) and other private financial sources (institutional investors, global commercial funds, crowdfunding, etc.);
- investments from the new EUInvest instrument;
- a risk-sharing mechanism to mitigate the risk of portfolios of sustainable investments in buildings and to make lending terms more attractive to final beneficiaries;
- technical expertise and assistance in the implementation of loan programmes developed in cooperation with the European Investment Advisory Centre - including through programmes such as ELENA, JASPERS, fi-compass or their successors under the European Commission's new programming period.

A number of sectors in Slovakia, including SMEs, energy production and transport, have suffered from limited access to funding. The project will use an ex-ante evaluation provided by the Ministry of Finance of the Slovak Republic in cooperation with the European Investment Bank Group in 2014 to discuss the identified barriers to

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the effective use of funding for energy efficiency investments in cities. This will help to discuss and fine-tune stakeholder engagement with the Slovak authorities for the new 2021-2027 period and outline measures that would increase the effectiveness of funding in delivering energy efficiency in buildings, street lighting and transport infrastructure.

From successful European initiatives, the platform will assess for replication and use of existing tools, for example:

- use of the eQuad platform;
- implementation of the Framework for Underwriting Sustainable Energy Investment in Buildings, which was developed in cooperation with the Energy Efficiency Financial Institutions Group (EEFIG) on the initiative of the European Commission;
- replicating successful green mortgage initiatives;
- use of ICPE protocols on a uniform methodology for the assessment of building renovation projects in order to aggregate them into large units while reducing transaction costs.

The platform will explore the benefits of using the SEAF and eQuad project results which help European project managers (ESCOs, engineering firms and construction companies) to access adequate project financing while reducing initial due diligence costs.

For ESCOs, engineering and construction companies in Slovakia, eQuad could provide third-party assessment, performance insurance, project certification and due diligence that facilitates and accelerates the financing of energy efficiency projects.

There are many underserved regions in Slovakia with a myriad of small and medium-sized projects. If a financier (be it a bank, institutional investor, bond market, etc.) had to consider each project individually, the transaction costs would make these projects impossible (not to mention commercially unattractive/uncompetitive). Therefore, an aggregation methodology with multi-faceted tools is needed to standardize the project evaluation process and create large, aggregated project packages that function as large projects (critical mass projects) with feasible transaction costs that can be implemented within reasonable timeframes, which would support the motivation of building owners (or project owners in general) to implement energy efficiency projects.

The availability of a large pool of bankable projects is essential for the success **of the European Green Deal initiative**[17]**.** Streamlining transactions and increasing the reliability of projected energy savings will create a market for standardized energy efficiency projects, including energy renovation of buildings, renovation of public lighting, district heating and transport infrastructure, specifically linked to the infrastructure of smart neighbourhoods and cities. The platform will therefore consider successful initiatives for replication in Slovakia, for example using the results of the **Investor Confidence Project Europe** and other relevant European and/or regional initiatives.

The financial platform will include:

- **Finance Lab**, which will be composed of stakeholders from sustainable energy investment and building renovation finance, administration and project development, and will implement standardisation in the evaluation of sustainable energy investment and building renovation projects during the first years, including tools to reduce transaction costs and aggregate projects into large units. It will also establish cooperation with the European Sustainable Energy Investment and Building Renewal Investor Platforms and develop a structured identification of potential projects or plans that could be financed by the solutions identified in the Finance Lab;
- **Legislative working group** to work on a legal framework that will encourage further investment in sustainable energy and the renovation of buildings and new buildings with positive energy balance and smart energy solutions;
- **Coordination group for technical assistance** to support the use of existing funding instruments, e.g. ELENA, JASPERS, eQuad, LAUNCH, PROPEL and others.

[17] COM(2019) 640 final

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- **Crowd-funding** investment platform for renewable energy and energy efficiency;
- **ESG** workshop to support the implementation of the EU taxonomy and the prevention of **greenwashing.**

FINANCIAL BLENDING (SMALL PPP PROJECTS)

The PPP market in Slovakia may have an impact on the ability to deliver the ambitious building renovation programme envisaged by the European Green Deal for Buildings and related actions by the European Commission and Member States. Investments will be made in different ways, mainly through public funding (European, national) and through alternative financial instruments designed to stimulate private funding such as EPCs and PPPs.

Measure a.3: Financial blending (small PPP projects) for financing sustainable energy investments and building renovation

Description of the measure:

Develop standardised principles for PPPs (Public-Private Partnerships) and EPCs (Energy Performance Contracting) in the field of energy renovation of public buildings (so-called Small PPP projects).

These principles should define:

- Efficient PPP and EPC procurement process with reduced transaction costs and procurement periods and quality documentation. This documentation would ensure the competitiveness of the PPP and EPC market and would increase the level of infrastructure investment in Slovakia in the long term;
- Introduce a better allocation of public expenditure by objectively assessing the procurement method chosen to deliver the investment. In the long term, decision support tools in the form of Value for Money (VFM) will objectify the public debate on PPPs and lead to more consistent support at the political level.

These principles will lead to a standardised procurement process and contractual arrangements for both EPC and PPP projects. EPC contracts can become an attractive alternative to energy savings for existing public buildings.

In the long term, this standardisation is expected to contribute to improving the infrastructure and public buildings sector with the involvement of the private sector in a sustainable way. For the private sector, the infrastructure and public buildings sector will provide more predictable, inspiring and attractive investments.

PLATFORM FOR SMART ENERGY SERVICES

The blurring of the boundaries between the physical, digital and biological worlds that underpins the Fourth Industrial Revolution (4IR) is coming to the energy sector, rendering obsolete the traditional model of centralised production, where energy flows in one direction from production to passive ratepayers. Everyone will be able to both produce and consume energy.

The same convergence is changing sectors such as manufacturing, tourism or media. The processes of production, distribution and consumption have merged with digital technologies and telecommunications. This has changed the way we enjoy mobility and content such as music, movies, news and information. In the same way, in future markets, people will not buy energy, but an electric car that has energy, or a house that has heat, because energy will be sold as a secondary product that will be part of primary products. Similarly, services such as Airbnb have changed the way we rent rooms, people could trade their excess supply through peer-to-peer markets thanks to the growing supply of increasingly cost-effective distributed energy resource options that provide choices about how much and when to consume and even produce electricity.

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By their nature, these energy sources are often locally dispersed and intermittent in terms of production flow. The future of energy systems is therefore a **high deployment (up to 100%) of VRES** (Variable Renewable Energy Sources), which will **require flexibility** if interconnected.

The energy services sector needs to be further developed to ensure **sectoral integration, energy efficiency and demand response coordination, energy storage/hybrid systems, e-mobility and VRES** that gain flexibility on the demand side. This sector can make a significant contribution to balancing the intermittent energy supply from VRES.

The potential to gain flexibility from consumers in commercial and residential buildings will grow steadily over the next decade with the wider adoption of electric heating systems, electric vehicles and smart devices that can be controlled remotely. At present, appliances represent only a small source of flexibility. However, the loads from EVs and heat pumps are large enough to play a significant role in flexibility systems in the coming years.

Advances in low-cost technologies will be key to harnessing the potential of demand-side flexibility. With the proliferation of sensors and other devices, an expanding range of machines, devices, vehicles and other equipment can be incorporated into low-cost flexibility plans. By 2025, there will be 100 billion connected devices globally, with the greatest growth expected in vehicles, connected wearables, home devices and building sensors.[18]

At the same time, advances in artificial intelligence (AI) and other technologies will enable the efficient management of large portfolios of consumers through real-time monitoring, predictive analytics, planning and forecasting of energy market developments and transactions supported by TLD and smart contract technologies.

Measure a.4: Platform for smart energy services (prosumer platform)

Description of the measure:

Establish a **prosumer platform** to facilitate cooperation between market participants on both the supply and demand side. This platform is expected to bring together people, assets and data to create entirely new ways of designing, delivering and consuming smart energy services and relevant products.

Relevant activities will include:

- Sharing data, know-how, best practices, innovative solutions, case studies, new business and financial models;
- Standardisation of contractual arrangements between different actors;
- Networking to reach the top professionals and operators in the market;
- Development of supply and use of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- Collaborative materialisation on the supply and demand side of the market.

The platform will facilitate adaptation to customer expectations, trigger smart energy improvements, pursue collaborative innovation and new organisational forms. Whether consumers or businesses, customers are increasingly at the epicentre of smart energy services that aim to improve the way customers are served. New technologies will make buildings and energy assets more resilient, while data and analytics will change the way they are operated and maintained.

In addition, it will create market development activities by facilitating the development of offers and effective demand for services that combine energy efficiency with other energy services, technologies and non-energy benefits.

[18] Business Wire, 2.3.2017

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Consideration of the market players (established and new) that will be invited to participate in the work on the platform over time will be based on a consideration of the capabilities that need to be brought together: technology, data, energy systems, wired and wireless infrastructure, equipment, and commercial understanding of traditional and new contracts. Emerging players in the market will include industrial manufacturers in power electronics, energy management systems, energy storage systems or advanced metering and control equipment, technology companies, automotive companies, construction companies, telecommunications companies, start-ups and scale-ups with cutting-edge innovations that help drive the development of smart energy systems. As the 4IR moves forward in the energy sector, the platform will help drive the deployment of new technologies that create entirely new ways of meeting existing needs and significantly disrupt existing value chains.

Platform will include:

- **Energy lab**, which will facilitate the design of new complex solutions;
- **Market Group**, which will test legislative conditions against the needs of market participants;
- **Educational platform** that will focus on the dissemination of knowledge and skills related to the implementation of new smart energy service solutions**.**

PARTICIPATIVE FINANCING

In recent years, with the increasing demand for financing from SMEs, along with the changing trend of business models, a new way of financing projects has become widespread through so-called participative financing, which is an alternative to financing with traditional banking products. This type of financing has, among other things, great potential for financing community projects for the clean energy transition.

This financing can take different forms:

- **Civic energy communities** – a group of citizens initiates a project and is the majority owner;
- **Crowdfunding for a project** – citizens participate in the financing of a project that is managed by a private company without citizen participation in decision-making:
    - Crowdfunding **loans**;
    - Crowdfunding **equity** – the financing provided is converted into equity (with or without voting rights);
- **Community project** – a project that is under the control of local actors (local government and/or citizens and SMEs).

Participative financing brings with it **many advantages**, such as the possibility to diversify investments, the attractiveness in terms of profit and risk, the possibility to mobilise investments in a very short period of time, and such investments are not dependent on the performance of the financial market. For this type of investment to function optimally, it requires an adequate **legislative solution and supervision by an independent regulator**. Participative financing has been operating for some time in several countries of the European Union. In Germany, citizens and farmers own 42% of the renewable energy sources, which are often installed collectively; in the Netherlands, this proportion is as high as 50%. In France, the participatory form is used for 36% of renewable energy projects co-financed by public funds. Slovakia should start working on the legislative and technical conditions for this form of collective investment as soon as possible.

A good model for a potential participative financing platform could be, for example, a platform for financing community projects, different versions of which are already successfully operating in several EU countries. The principle of such a platform is that citizens have the opportunity to invest part of

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their savings in projects in their community (building cycle paths, parks, recreation centres, social housing, renovation of public buildings such as hospitals, schools...), and these projects are led by local governments and last for e.g. 1 to 10 years. Interested parties can invest whatever amount they deem appropriate - even €1 or €2,000. In this way, citizens can safely invest in projects that are in their personal interest and can monitor the performance of these projects as they progress. Everyone can get involved in local events and support projects that enable the development of the local community. Investing in such projects is also not limited to the residents of the community or municipality in which the project is implemented.

Measure a.5: Support for participative financing of community projects
Description of the measure: Develop and enforce legislative conditions for participative financing, including conditions for independent oversight by the regulator. Participative financing in the form of community projects is ideal for financing clean energy transformation projects, complementing projects financed by traditional banking products, thanks to its advantages. Citizen and local government participation in renewable energy transition projects has already practically demonstrated significant added value in the form of greater acceptance of renewable energy by residents and greater access to additional private capital, leading to more consumer choice and greater citizen participation in the clean energy transition. As these are community-based projects, citizens are thus able to directly decide on the priorities of these projects and, once completed, are the direct beneficiaries of the associated benefits. And, with the right legislation in place, they can directly oversee their progress thanks to the high level of transparency.

ENERGY POVERTY

Households are increasingly struggling with fluctuating energy prices, leading to instability and rising costs. Today, energy poverty is increasingly discussed in Slovakia, the Czech Republic and other Central and Eastern European countries, as well as outside the EU. Yet, unlike in Western European countries, policymakers have not yet sufficiently addressed the problem. The biggest shortcomings are the lack of a conceptual framework, starting with national definitions and detailed descriptions of energy poverty, as well as the absence of strategies and action plans aimed at reducing its incidence and impact on households. In addition, there is a lack of general awareness of the problem among both professionals and the public. Many high-ranking decision-makers are also in denial about the existence of energy poverty in their countries.

Surprisingly for many, even in Norway, a country considered "energy rich" with cheap hydro and wind power and oil resources, energy poverty is a relevant topic due to socio-economic problems. In general, energy is cheap and widespread in relation to purchasing power, but in many households belonging to vulnerable groups, a cold winter can put a strain on the budget. A study on energy poverty in Norway pointed out that 'the human body has been used as a bank account', with people having to follow strict diets and live in uncomfortable temperatures to save money, causing long-term physical and mental health problems for the inhabitants of affected households.

The European Parliament has adopted EPBD III, which sets out the basic principles and requirements leading to a significant reduction in the energy consumption of buildings in the EU. Eventually, Member States must implement EPBD III in their legislation and develop a set of measures to achieve savings in final energy consumption. Consequently, various support schemes have been introduced to help households implement energy saving measures regarding energy losses in buildings.

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Energy poverty takes two basic forms. The first is the unavailability of energy resources, which particularly threatens households in less developed countries. Households in Slovakia are unlikely to be affected by this form, but they will be threatened by the second form of energy poverty, caused by the lack of available finances to cover the energy consumption of a building. In recent decades, comfort levels (and consequently energy consumption) in households have increased. The number of appliances has also increased and, in general, a higher standard of quality is required than ever before (constant temperature, humidity and other air conditioning). To meet all these requirements, higher energy costs have to be paid.

Energy poverty has still not been fully recognised as a problem in all EU member states. This means that some European countries still do not have a definition of energy poverty and/or adequate policies and measures to address it. Energy poverty also has many different definitions, which are not standardised on a European scale. **"Energy poverty" generally refers to "a situation where individuals or households are unable to adequately heat or use other required energy services in their homes at an affordable price."** Lawmakers and academics emphasize the need to uncover the underlying factors that increase the risk of energy poverty. To this end, the concept of energy vulnerability has been developed, which refers to the risk of not having socially and materially adequate levels of energy services in the home. Energy poverty can take different forms, such as '"double energy poverty" and "temporary energy poverty":

- **"Temporary energy poverty"** is a growing phenomenon that has intensified in Europe in recent years due to waves of extreme cold and heat and rising energy prices. This situation concerns households that spend more than 10% of their disposable income on energy expenditure at certain consumption peaks, and these situations are now more common in middle- and upper-class households;
- **"Double energy poverty"** in winter and summer is directly linked to the effects of climate change. Many people are beginning to dread the arrival of both winter and summer because they struggle to afford the energy to keep their homes at a comfortable temperature during both seasons.

Measure a.6: Strategy and scheme to support households when energy price fluctuations threaten them with energy poverty or market manipulation by oligopolies on the domestic or global market

Description of the measure:

According to EU principles, energy prices should reflect the true cost of energy to give end-users more incentives to conserve, and the energy market should work to allocate energy to activities that add the most value. The price of carbon fuels and gas on today's market is a manipulative price and, as European Energy Commissioner Kadri Simon has said, gas is, moreover, being used as a weapon by Russia. In 2021, the EU is facing an energy crisis, not least because the use of renewable energy sources in the EU is lagging far behind (Slovakia is at the tail end of the EU's renewable energy deployment). This situation has resulted in a fierce competition in 2022 between carbon-based energy commodities seeking to regain their position or even to profit from a rigged market and the aggression against Ukraine. This has led to a sharp rise in energy prices for consumers, especially for heat and hot water preparation, although the increase in electricity and gas prices for families has not been as significant as in the unregulated sector.

Such fluctuations on the energy market will continue to occur in the future, as the process of decarbonising energy will be a lengthy one and energy market volatility will not disappear even with the reduction of carbon fuels use. It is therefore necessary to develop instruments to mitigate the impact on households in order to protect them from '"temporary energy poverty"'. Such measures and direct interventions in the energy market are certainly

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less costly than the impact of inflation on the economy and the technical recession resulting from the fight against it, as we are currently witnessing.

These instruments should be complementary to those for combating "long-term energy poverty", which is structural in nature and requires the permanent attention of the responsible authorities.

ENERGY COMMUNITIES

Energy communities are **citizen-led initiatives** that allow citizens to take control of local energy production and consumption. They help **decentralise energy systems** where the grid is owned by local residents with solar and wind farms set up in fields or solar panels installed on rooftops. This way, locals consume the clean and renewable energy they produce at home, and each household becomes a player in the energy sector. Citizens actively participate in the decision-making process and participate in the local community economy, as these projects stimulate local employment. The energy communities thus organise collective and citizen-driven energy actions that help to pave the way for the clean energy transition while bringing citizens to the forefront. They also help to increase public acceptance of renewable energy projects and facilitate the attraction of private investment in the clean energy transition.

The concept of energy communities also **offers a solution to energy poverty**, one of the biggest problems of our time. Particularly in areas where energy poverty is a serious problem, it can be solved through the flexibility that energy communities offer to the power system through demand response and energy storage, while at the same time improving their energy efficiency and reducing energy bills.

In May 2019, the EU introduced the concept of energy communities as "Citizens Energy Communities" and "Renewable Energy Communities" in its legislation through the "**Clean Energy for All Europeans**" package. The Revised Renewable Energy Directive II (REDII) and the Internal Electricity Market Directive (IEMD) contain provisions that create a supportive EU legal framework for community ownership. With these provisions, EU legislation has for the first time recognised the role of community ownership of energy in meeting its climate and energy objectives and signalled a significant **shift in the role of citizens from passive consumers to active participants in the energy transition**.

Energy communities around the world can take any legal form, such as an association, cooperative, partnership, non-profit organisation or small/medium enterprise. This makes it easier for citizens, along with other market participants, to come together and invest jointly in energy assets. This in turn helps to contribute to a more decarbonised and flexible energy system, as energy communities can act as a single entity and have access to all relevant energy markets on the same terms as other market participants.

The European Parliament has granted funding to the European Commission to set up two projects to contribute to the dissemination of best practice and to provide technical assistance for the development of specific energy community initiatives across the EU:

- The Energy Community Documentation Database, established in April 2022, aims to assist local actors and citizens who want to establish a citizen energy community or a renewable energy community in urban areas through technical and administrative advice and support for their development;
- Launched in June 2022, the Rural Energy Communities Advisory Centre aims to assist citizens, rural actors and local authorities in establishing citizen energy communities or renewable

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energy communities in rural areas through technical and administrative advice and to support their development.

Through the "Clean Energy for All Europeans" package adopted in 2019, the EU has introduced the concept of energy communities into its legislation, notably as **citizen energy communities and renewable energy communities**.

In particular, the directive on common **rules for the internal electricity market** ((EU) 2019/944) contains new rules that allow for the active participation of consumers, individually or through citizen energy communities, in all markets, either by generating, consuming, sharing or selling electricity, or by providing flexibility services through demand response and storage. The aim of the Directive is to improve the use of energy communities and to facilitate citizens' effective integration into the electricity system as active participants.

In addition, the revised renewable energy directive (2018/2001/EU) aims to strengthen the role of self-consumers of renewable energy and renewable energy communities. EU countries should therefore ensure that they can participate in available support schemes on an equal basis with large players.

Empowering renewable energy communities in the production, consumption, storage and sale of renewable energy will also help to increase energy efficiency in households, promote the use of renewable energy, while contributing to the fight against poverty through reduced energy consumption and lower tariffs for supply. After all, citizens and farmers in Germany own up to 42% of renewable energy sources, which are often installed collectively, and in the Netherlands this proportion is up to 50%.

Measure a.7: Support scheme for the establishment of energy communities
Description of the measure: Prepare and implement a support scheme to incentivise the creation of energy communities in order to reduce Slovakia's lagging behind in the use of renewable energy sources and to achieve a citizen-owned renewable energy capacity on par with EU members such as Germany or the Netherlands, which are facing similar challenges in decarbonising energy sources and reducing dependence on gas from Russia. The scheme should also encourage the participation of energy communities in the flexibility market by implementing smart energy solutions combining energy efficiency with distributed renewable electricity sources, energy storage/hybrid systems, electro mobility (EV charging stations) and demand response.

Measure a.8: Raising public awareness, development and dissemination of skills, knowledge, competences related to the implementation of new smart energy service solutions
Description of the measure: Support programmes to disseminate skills, knowledge and competences related to the implementation of new smart energy service solutions aimed at consumers (prosumers, e.g. from energy communities) as well as the necessary experts to implement them. The overall objective of this measure is to establish further training and qualification schemes for craftsmen, installers, technicians, specialists, operators/owners/consumers in the field of smart solutions for building energy systems aimed at balancing energy consumption peaks, developing and exploiting the flexibility provided by buildings to facilitate the implementation of innovative solutions to realise the REpowerEU objectives in the buildings sector and other recent measures to reduce the EU's dependence on Russian natural gas, including to

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address the recent extreme energy price rises, as well as to address the instability of energy markets in the future by increasing the flexibility of energy systems and limiting energy consumption during peaks.

As part of its implementation, new programmes need to be developed for all types of professionals involved in the value chain to focus on these areas:

- Skills to carry out deep renovation of buildings;
- Skills for new and existing positive energy buildings (PEBs) and bridging the gap towards zero-emission buildings (ZEBs);
- Skills in the integration of renewable energy sources and efficient heating and cooling technologies, including the introduction of heat pumps;
- Plumbing skills for heating and cooling upgrades in renovation projects;
- Digital skills supporting higher energy efficiency of buildings, especially through more intensive use of building information modelling;
- Skills in the field of upgrading smart buildings to increase their energy efficiency (based on the smart readiness indicator) with a focus on sensors, building controls and building management systems.

The goal of its implementation would, for example, be the creation of a system of assessment and certification of acquired skills and knowledge for professionals and the development of 7 training programs for craftsmen, installers, technicians, specialists, operators/owners/customers in the field of:

- Planning intelligent energy solutions in buildings based on revolutionary innovations in this field;
- Installations of distributed production of electricity from renewable sources;
- Installation of energy storage solutions in buildings;
- Smart organization and coordination of energy assets in buildings combining energy efficiency with demand response, distributed electricity generation from renewable sources, energy storage/hybrid solutions, e-mobility (hereinafter "EE/DEG/EST/EM");
- Testing of installed smart energy solutions in buildings combining EE/DEG/EST/EM;
- Maintenance of smart energy solutions in buildings combining EE/DEG/EST/EM;
- Operation of smart energy solutions combining EE/DEG/EST/EM.

For the development and success of the new market design as well as smart energy solutions, it is essential to find public support for these significant changes by raising public awareness of the reasons for these changes, the benefits for consumers and prosumers with the participation of all relevant stakeholders.

SUPPORT INSTRUMENTS FOR THE RENOVATION OF BUILDINGS

Achieving the goal of at least doubling the rate of energy renovation of buildings by 2030 and increasing the level of energy savings achieved by this renovation, in the light of existing EU legislation as well as the changes expected by the revision of some key EU measures, is a challenge that the segmented building sector cannot meet. Barriers to in-depth renovation linked to the lack of coordination between the different market actors need to be addressed. Partnerships and consortia of these actors could provide business models and models for long-term cooperation between companies and/or craftsmen to enable large-scale renovation, including the transition to efficient heating and cooling based on renewable sources, by reducing risks and transaction costs for society.

In addition, a significant barrier to increased renovation rates in the public sector is the creation and long-term maintenance of financial and technical capacity among public authorities to develop projects. Small and medium-sized local governments often do not have sufficient resources to dedicate staff to develop a pipeline of projects. Facilitation focal points at regional and national level would therefore be needed that can support a larger number of public project promoters in designing and implementing ambitious large-scale public sector renewal projects and leveraging existing solutions.

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Measure a.9: One-stop-shop support for building renovation

Description of the measure:

Establish and operate regional/national contact points/centres , with the aim of accelerating the wave of renovations in the private (family houses, apartment buildings, commercial buildings, industrial buildings, etc.) and public sector (e.g. office buildings, social housing, schools, facilities for free time, etc.), which offer a comprehensive service from technical, financial to legal advice, procurement and quality assurance of works.

These contact points should offer a comprehensive package of services, which should include:

- **In the area of renovation of public buildings** :
  - Approaches to reduce complexity and simplify decision-making for public authorities to stimulate demand for building renovation and energy efficiency improvements;
  - Approaches to the proactive identification and mobilization of public buildings for complex energy renovations;
  - Supporting the use of cost-effective deep renovation of buildings with highly ambitious energy savings in line with the European decarbonisation target;
  - Legal assistance to facilitate and prioritize the aggregation of building renovation projects (belonging to one or more public entities) in order to increase the level of overall renovation and attract private investors;
  - Development of efficient procurement processes to ensure that renovation projects are carried out at a rapid pace, enabling renovation projects to be linked and ensuring high quality renovation works (including ambitious energy savings);
  - Financial engineering support to facilitate the use of financial instruments and market instruments such as EnPC, refinancing models, green/white certificates, mandatory energy efficiency schemes and to increase the combined financing of public and private sources and the use of EU funding sources such as InvestEU, the Recovery and Resilience Instrument and the European Structural and Investment Funds, including REACT-EU and the Just Transition Mechanism;
  - Approaches to the involvement of relevant actors in the value chain, e.g. construction companies, architects, engineers, urban planners, financiers, etc.;
- **In the area of renovation of privately owned buildings** :
  - Reducing complexity, simplifying decision-making for homeowners to stimulate demand for building renovations and energy efficiency improvements;
  - Coordination and/or optimization of services required in investment processes of energy efficiency of buildings;
  - Connecting all relevant actors in the value chain (e.g. construction companies, architects, engineers, urban planners, financiers, etc.);
  - Streamlining access to various support measures, especially if there is support for specific target groups (e.g. energy-poor households);
  - Improve awareness and trust in such integrated services through clear accountability, quality assurance and dedicated consumer protection policies.

These contact points/centres will have the task of:

- Create a self-sufficient **business model** :
  - integration of services through specialized operators (new public or public/private entity or mandated private operators) and/or through improved coordination between existing local actors;
  - which will be prospectively economically viable and aimed at self-sufficiency in the medium to long-term horizon, i.e. ultimately operation without subsidies to cover operating costs;
- Provide **methods and support** :
  - for the development of professional knowledge and organizational innovations necessary for the development of projects;

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- reduction of costs and repayment time through standardized approaches (e.g. optimized business processes, standardized contractual arrangements, promotion of proposed services using trademarks, etc.);
- ensuring cost efficiency and price transparency of services provided to owners of apartments, family houses and other buildings mentioned above;
- streamlining standards and procedures into consistent and transparent processes that investors can rely on and overall improve financing conditions;

- Promote the results, in particular:
  - mainstream innovative technical and organizational solutions adapted to local contexts;
  - in helping to improve the legal and regulatory environment.

The round table discussed various steps that could lead to the creation of such support systems and the possibilities of entrusting their actors with promoting the financing of innovations in the uncompetitive and deficit banking financial market in Slovakia, which does not motivate local banks to increase the financing of sustainable energy investments through innovations.

For example, according to MDVSR data, €13.2 billion will be needed to restore buildings. until 2030. €720 million is allocated in the Operational Program Slovakia 2021-2027 within measure 2.1.2 and in the Recovery and Resilience Program, €734 million is allocated for the renovation of buildings. If Slovakia were to proceed with financial blending following the example of Belgium during this period, it would have €10.2 billion available for this period up to €15.3 billion, which would fully or largely cover the investment needs for the renovation of buildings by the end of this decade. This fact clearly points to lost opportunities in building renovation.

In the next budget period, such innovations will be necessary given that the intensity of EU funding will decrease.

Measure a.10: Development of financial innovations to ensure the necessary investments in the renovation of buildings

Description of the measure:

The EU and member states should "join the wave of renovation of public and private buildings". We are facing a climate emergency that requires achieving a significant level of renovation of the building stock to the level of zero-emission buildings and active energy nodes (i.e., buildings that have a positive energy balance and are able to store and supply electricity to the grid). Investments in the clean energy fund of buildings can support the transition to a low-carbon economy in Slovakia and advance the decarbonization of the economy to the desired levels by 2050.

To achieve these goals, it is essential to increase the financing of energy sustainable investments in public buildings such as hospitals, schools and offices, but also in privately owned buildings. However, as, among other things, the stress test carried out by the ECB in 2022 showed, banks in the region did not achieve the necessary level of income from climate-neutral, or low-carbon industries, and they cannot yet define and implement strategies to manage climate risks. To a large extent, this results from the lack of bank products offered on the retail and corporate banking market and almost no innovative activity by banks to bring to this market products that would respond to the needs in the area of decarbonization of buildings and solve obstacles in financing their energy renovation.

Therefore, it is necessary to develop and implement financial innovations for financing the renovation of buildings, which will complement the existing consumer loans (purposeful and non-purposeful) and construction loans linked to building savings, which are the only, or predominantly available forms of financing in Slovakia. It is also highly expedient to replicate successful approaches to financing the renovation of buildings in other EU member countries, for example in Belgium, France, the Netherlands, Germany and Italy.

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Specifically, the development of financial instruments should focus, for example, on the following financing instruments:

- Financial instruments:
  - financial forfaiting – transfer of liabilities, e.g. resulting from contracts for guaranteed energy service to a financial intermediary;
  - structured PPP program for EnPC;
  - joint public-private fund based on debt subscription (Public-Private Debt Fund);
  - one-stop financing;
  - preferential loans (so-called soft loans);
  - participatory financing: crowdfunding loan, crowdfunding equity, community energy projects;
  - mezzanine financing;
  - financing through energy bills (on-bill financing) using green bonds;
  - green mortgages;
- Tax instruments:
  - Transferable tax credits (Super Ecobonus);
  - Financing from local taxes (On-tax financing).

Changes are also needed in the legislation enabling the implementation of these financial innovations, e.g.:

- PPP in the field of building renovation;
- PPP in the field of guaranteed energy service;
- tax financing instruments;
- transfer of the burden of the deep renovation loan from the owner to the property (addresses the financing of the deep renovation of houses and apartments owned by low-income persons, persons suffering from energy poverty and elderly persons).

The round table discussed various steps that could lead to the creation of such support systems and the possibilities of entrusting their actors with promoting the financing of innovations in the uncompetitive and deficit banking financial market in Slovakia, which does not motivate local banks to increase the financing of sustainable energy investments through innovations.

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In the next budget period, such innovations will be necessary given that the intensity of EU funding will decrease and no tenders for the implementation of the European Agreement in this area are planned by the current European Commission.

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transition to a low-carbon economy in Slovakia and advance the decarbonization of the economy to the desired levels by 2050.

To achieve these goals, it is essential to increase the financing of energy sustainable investments in public buildings such as hospitals, schools and offices, but also in privately owned buildings. However, as, among other things, the stress test carried out by the ECB in 2022 showed, banks in the region did not achieve the necessary level of income from climate-neutral, or low-carbon industries, and they cannot yet define and implement strategies to manage climate risks. To a large extent, this results from the lack of bank products offered on the retail and corporate banking market and almost no innovative activity by banks to bring to this market products that would respond to the needs in the area of decarbonization of buildings and solve obstacles in financing their energy renovation.

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- tax financing instruments;
- transfer of the burden of the deep renovation loan from the owner to the property (addresses the financing of the deep renovation of houses and apartments owned by low-income persons, persons suffering from energy poverty and elderly persons).

Legislation and policy instruments determine the requirements and the pace at which it is necessary to adapt to them. At the same time as the requirements are adopted, the policy makers must support their fulfillment. Even now, most new buildings should meet the building standard with almost zero energy needs. In the future, however, this standard will not be enough to achieve carbon neutrality, and buildings will have to be built and renovated to the standard of energy-plus buildings or buildings with zero emissions - zero-emission buildings (ZEB).

Individual renovation roadmaps for buildings and the building's digital passports are among the topics discussed . The concept of individual building renovation roadmaps for family houses was presented by the Buildings Performance Institute Europe (BPIE). This topic was also developed by the

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special three-year H2020 iBROAD project completed in June 2020. Slovakia several opportunities for replicating systems developed in other countries such as Belgium, France and Germany, which also include other types of buildings.

An individual building renovation roadmap presents the renovation as a home improvement plan, not just as a technical intervention. It is based on the needs and specific situations of the user (e.g., age, financial situation, household structure, etc.) and outlines each step and defines the steps in implementing the proposed measures. In this way, the owners can understand the project much better and thus accept it.

This could be the starting point for the implementing individual recovery plans in Slovakia. In the future, such plans could be a tool for tracking the beneficiaries of investments that are part of the ETS. The proposal for the inclusion of buildings in the ETS was approved in the European Green Deal after several years of analysis of the potential of this measure to increase the energy efficiency of buildings.

The initial motivation for the introduction of individual building renovation plans was the efficiency of public financing provided in the form of one-time subsidies and grants for the gradual improvement of the energy efficiency of family homes. Individual building renovation roadmaps would systematize the support provided to building owners and facilitate their stepwise energy renovation according to ZEB standards using different funding sources. They will also support owners in making informed renovation decisions and encourage them to achieve higher levels of energy efficiency based on their individual needs.

The individual building renovation plan is connected to another important tool, namely **the building's digital passport** . Digital passports of buildings will play an important role in connecting buildings to energy networks, for example smart networks, and will complement the "smart" readiness of the building and their connectivity. At the same time, they will be buildings' digital stamp for registering existing buildings, which will supply surpluses of produced energy, to trading systems. In the new buildings, there will be similar digital communicators that will use BIM/digital twin of the building/digital twin of a set of buildings/neighborhood to optimize energy consumption, smart orchestration of various energy devices in the building and involvement of various appliances in energy services combining energy efficiency with local sources of electricity energy from renewable sources, energy storage/hybrid systems, smart charging of electric vehicles, management of the flexibility necessary for energy systems with high by the share of renewable energy sources. From this point of view, it is important that the emerging digital passports also ensure interoperability at the information level.

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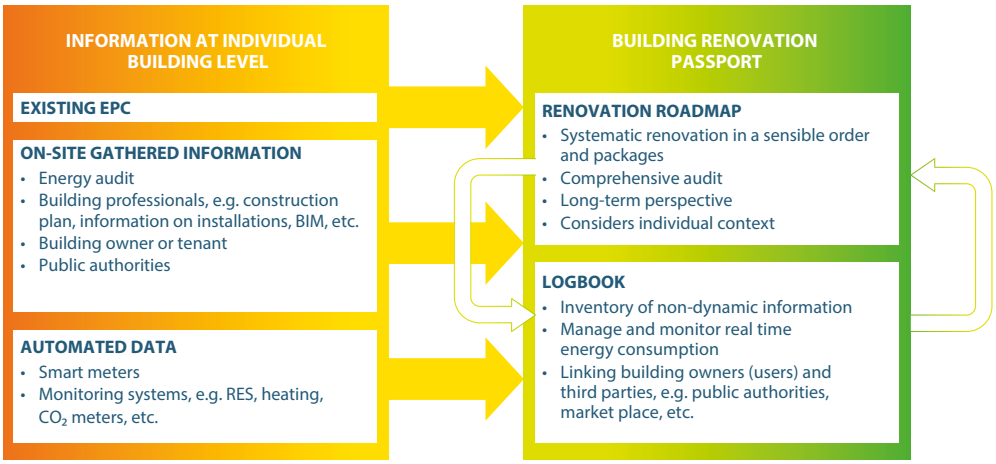
Measure a.11: Implementation of individual building restoration plans

Description of the measure:



Implement individual renovation roadmaps for buildings that will use public funds for stepwise renovation and increase energy efficiency, in order to ensure the efficient use of public funds and an optimal progress in the renovation of the building towards the minimum level of nZEB and/or ZEB.

These individual plans should also take into account the possibilities of private financing, which can complement the public financing of a stepwise renovation of the building, since the efficiency of investments in energy renovation of buildings is a necessity to attract private investment in renovation.

The implementation of individual renovation roadmaps should be linked with implementing digital building passports (the link is shown in the attached image), which will increase their transparency in delivering renovation as well as in the use of provided public and private funds.

Measure a.12: Implementation of the building's digital passport

Description of the measure:

In order to fulfill the goals towards climate neutrality, it is necessary to move from energy certificates (EPC) to a holistic approach of the building passport concept. Providing accessible and high-quality information will enable optimized maintenance, renewal and general maintenance planning. It will reduce the flows of energy and materials, extend the life of the building and support the principles of the circular economy.

In order to accelerate the decarbonization of the building stock, the carbon footprint as a "hidden" characteristic of buildings must be appropriately reflected in the decision-making of stakeholders and their exchange of data and information with others. In this, the "digital passport of the building" has an important role: an extensive, constantly updated repository of real estate information that accompanies the entire life cycle of the building and enables sharing of data and information with the stakeholders within value chain.

As part of a building's digital passport, energy consumption and other primary data can be collected, evaluated and analyzed to determine the actual emissions of greenhouse gases and other pollutants during operation. The inventory of material and energy equipment will support a life cycle approach. Also, the LCA results based on the life cycle can be "stored" in the building passport and updated during/after the renovation.

The Digital Building Passport acts as a 'one-stop-shop' data and information hub that supports building owners and their service providers in building use and management by facilitating recording, linking, transferring and sharing building data and information between stakeholders across phases of the building life cycle. This not only contributes to a better understanding of the design, composition, management, operation and end-of-life of buildings, but also increases transparency and trust, improves political and financial decision-making and enables the optimal use of resources.

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Stakeholders who benefit include, but are not limited to building owners, built environment professionals, investors and financial institutions, energy service providers, certifiers, material suppliers and public authorities. Therefore, the round table recommends the implementation of digital passports and as a priority for buildings without a digital twin (in this case, the digital passport is already part of the building's information system).

A building passport is a secure tool that should allow building owners to retain control over data and who has access to it, while some data may need to be kept confidential. The data can be stored in the building passport and/or can be placed in another repository to which the building passport is connected.

Currently, most digital building passports are voluntary. Some are market-driven, others are government-driven. The current revision of EU legislation (EPBD) introduces obligation to implement digital building passports. The European approach clearly ensures implementation and creates a harmonized approach. First of all, governments should set an example by making it mandatory for public buildings to have a digital building passport and then introduce it to other building typologies and market segments.

Digital building passports will play an important role in connecting buildings to energy networks, for example smart networks, and will complement the "smart" readiness of buildings for their connection. At the same time, they will be a digital stamp for the registration of existing buildings, which will supply surpluses of produced energy, to trading systems. From this point of view, it is important that the emerging digital passports also ensure interoperability at the information level.

Measure a.13: Implementation of Minimum Energy Performance Standards (MEPS) for building renovation

Description of the measure:

Demand creation in the form of government-mandated minimum energy performance requirements for buildings by local authorities or requirements for buildings that are rented commercially is a highly effective means of increasing building renovation rates, as seen in the Netherlands, France and the UK. Renovating public buildings has a good return on investment over time and both private and public resources are available, making it a viable requirement for local governments. A large stock of public buildings can help expand both the supply chain and available finance.

In the private sector, it is recommended to combine minimum energy efficiency requirements with appropriate and clearly defined tax incentives, such as the Italian 110% tax reduction or the German KfW loan scheme. This will make renovation of buildings easier, create local jobs and stimulate local economies. Building renovation alone generates significant taxes through job creation and regional commercial growth. Indeed, according to the modelling, it is possible to deduct 110% of the actual costs of building renovation and the government would still see a net increase in total tax revenue from the projects due to a significant increase in economic activity, spending and job creation. The same applies to support grant payments (which must be designed to be complementary rather than competitive with the private sector). Grant payments are more than returned to the government through increased tax revenue.

Measure a.14: Support and monetization of several benefits of building renovation

Description of the measure:

Implement multiple renovation benefits into building renovation contracts, including non-energy benefits (e.g. health benefits, mobility, etc.), which are one of the key aspects of demand generation. This applies to commercial, residential and public projects. Energy efficiency projects have been shown to have multiple benefits that often have real financial and strategic value to the project owner. However, in the traditional development and evaluation of energy efficiency projects, these have not been identified – the focus is more on return on investment and repayment periods. The multiple benefits of energy efficiency, particularly those related to

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health, education and social care, as well as productivity and ways to achieve them, need to be highlighted. A change in energy audit standards and training in energy management/engineering will also be needed. When communicating about energy efficiency, multiple and strategic benefits should be emphasized. Furthermore, there is a clear link between multiple benefits and the motivation to invest in building renovation.

Multiple benefits occur at several levels including:

- Consumer level: stimulating demand for building renovation can be supported by focusing on residents' priorities and needs: improving their comfort, the health of their families and reducing costs. Communication and marketing are key to ensure the link between building energy renovation and comfort/health;
- City/region perspective: reducing energy poverty, creating jobs, reducing CO_2, social cohesion and urban renewal are some of the other benefits. One-stop shops or centers are a practical solution to support decision-making, marketing and technical advice.
- From the investor's point of view, standardized methods of measuring and quantifying environmental, social and economic performance are key.

Measure a.15: Cancellation of the exemption from the EU taxonomy for the governments of the EU member states

Description of the measure:

The latest analysis by the European Commission and the ECB showed that the EU continues to invest more in activities based on the use of carbon sources of energy and fuels. Basically, there is still no evident shift towards the financing of sustainable business activities in the sense of the EU taxonomy. The exemption from the EU taxonomy for the governments of the member states also plays a significant role in this. This allows support and government investment to go mainly to activities based on the use of carbon sources of energy and fuels. This also includes other measures related to the energy crisis, the completion of which is planned for the period when the use of such sources of energy and fuels is no longer expected. This effectively not only artificially prolongs the use of carbon resources and fuels, but even increases their use and builds additional capacities, which are redundant even from the current point of view.

The aim of this measure is to formulate a recommendation to the European Commission for the cancellation of the exception in question and stricter assessment of financial support and subsidies in areas that do not meet the requirements of the EU taxonomy. The central principle of the European Commission should be the credo of the European Green Agreement and related measures, which establish the principle that **governments and the public sector should lead by example in the transformation to clean energy** .

b) Joint measures to achieve strategic goal no. 2

FINANCING THE DEVELOPMENT AND IMPLEMENTATION OF INNOVATIONS FOCUSED ON THE ENERGY TRANSFORMATION OF BUILDINGS AND COMPETITIVENESS OF THE CONSTRUCTION SECTOR

When publishing the recent forecast, the European Commission identified **the construction sector as the key for achieving climate neutrality by 2050** .

However, in order for the construction industry in Slovakia to successfully play this role, it is necessary **to change the priorities of the whole society and the priorities of the government** in the area of research and development towards applied research and development of innovations in the construction sector, and the governmental support must be shifted to this sector for implementing these innovations in practice.

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Since housing costs have already exceeded the bearing limit and its negative impact on social harmony and energy poverty has become a significant threat, **increasing labor productivity in the construction sector is the highest priority** to improve the situation towards affordable housing. It should be emphasized that the increase in the prices of construction materials and products, which was accelerated even more by the Russian aggression in Ukraine, will continue. Russia and Ukraine are the 2nd and 3rd largest exporters of steel, Ukraine and Belarus provided 40% of reinforcing steel for Europe. Rising energy prices make energy-intensive construction products (bricks, cement, ceramic products, etc.) more expensive. Therefore, efforts must be focused on increasing labor productivity through the industrialization of construction production using modular construction, which is already successfully penetrating even the large-scale projects of deep renovation of buildings. The technologies such as 3D-printing, robotization, using artificial intelligence and autonomous systems are contributing to this process. These innovations are dependent on the implementation of digital technologies in the construction industry, which lags significantly in Slovakia and threatens the transformation of the construction industry into a climate-neutral sector.

Residential and office buildings occupy the largest part of the built-up area in the EU, with a share of up to 75%, and are therefore key to the green transformation. A key area for green transformation is volume and space requirements/needs for future buildings. In addition, the design, construction and end-of-life phases are also important. Last but not least, daily operations - heating, ventilation and the use of building-related equipment - also have an impact on the environment, as residential and commercial activities account for 12% of greenhouse gas emissions in Europe. Buildings have a long lifespan and it is predicted that 85 to 95% of current buildings in Europe will still be in normal operation in 2050. Because of this, circularity is also an important aspect, which includes reconstruction, modernization and demolition of buildings.

Population aging , changing household structures and urbanization are causing changes in the patterns of demand for living space. In the near future, **the challenges of society will be** affordable housing, energy poverty and limited capacity to implement digital technologies, while digitalization represents the possibility of accelerating the green transformation of the construction sector.

Its first and most obvious advantage is the improvement of system management efficiency, for example in the form of more efficient operation of buildings and construction processes. The second advantage is the improvement of monitoring and tracking of the impact of materials on the environment, including life cycle analysis and the possibility of reducing the impact on the environment through various measures, for example by installing solar panels. A third advantage is the possibility of using information and communication technologies to make more intensive and efficient use of space in buildings, for example by sharing office space that would otherwise remain empty, thereby reducing the need for new construction. The fourth and not the last advantage is the possibility of a complete replacement of space needs through virtualization - an example can be online shopping and banking, which reduces the demand for spaces for physical interaction with customers.

In order to achieve a targeted change in today's situation, a strategic change in priorities is needed in the support of research, development of innovations and entrepreneurship towards the construction sector, in its entirety, including operational programs.

The proposed measures focus both on the supply side (construction sector) and on the demand side (owners of buildings, dwellings, including cities).

Measure b.1: Changing societal priorities towards climate neutrality innovations
Description of the measure:

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Achieving climate neutrality is a turning point that requires a fundamental reassessment of social priorities and their reflection in the state budget and the allocation of EU funds in operational programs. The share of investment and non-investment expenditures to achieve climate neutrality should be greater than 60% and should grow year-on-year so the government should set an example for the private sector, including the financial sector and industries regulated by the EU taxonomy. Investments in the carbon economy, including in science, research, development, investment support (direct or indirect) and the use of carbon fuels should be dampened.

Measure b.2: Support for innovations to increase labor productivity in the construction sector and industrialize construction production

Description of the measure:

Prepare and implement an innovation program to increase labor productivity in the construction industry by rebuilding the industry around innovation in materials, building products, equipment and processes, as well as by leveraging the digitization of the industry. These are the key factors driving new business models ensuring sustainable housing valuations (through ownership or rental). It accelerates this process by progressively applying new technological breakthroughs in areas such as artificial intelligence, robotics, the Internet of Things (IoT), machine-to-machine (M2M) communication, big data analytics, 3-D printing, nanotechnology, materials science, and energy storage.

In the medium term, these innovations should lead to a "supply-side breakthrough" with long-term increases in efficiency and productivity [19], which will enable a fair valuation of the costs of construction and living in buildings with a positive energy balance and zero emissions (resulting from the energy renovation of existing buildings or the construction of new ones). Although the research field is aware of the possibilities that these innovations can bring, there is little knowledge on the ground and little appetite to continue to innovate within the building construction and renovation value chain. Conventional approaches will not be enough, as underlined by the European Green Deal[20], which emphasizes experimentation and working across sectors and disciplines in the area of innovation that supports the achievement of its goals.

Measure b.3: Support the creation of an ecosystem for the use of modular technology for the construction of new buildings and the renovation of existing buildings

Description of the measure:

One of the innovations that lead to an increase in labor productivity in the construction sector is modular construction, which is successfully implemented in the construction of new highly energy-efficient buildings as well as in the renovation of existing buildings, which also achieves high levels of energy efficiency. However, modular construction also successfully faces other current challenges, including the challenges of energy transformation and the need to increase circularity in the construction industry.

Modular construction is a process where buildings are manufactured off-site in factories, under strict quality control, but using the same building codes and standards as conventional construction methods. These structures are produced in modules or small parts that are transported to the construction site and assembled.

Modular construction is a sustainable, efficient, cost-effective and innovative technique to consider when designing a project. The advantages of this construction method include:

- Modular building projects are completed **30-50% of the time faster** than projects with conventional construction methods. Modular construction can take place at the same time as work on the construction site and the foundation of the building;

[19] Klaus Schwab: *The Fourth Industrial Revolution: what it means, how to respond* , World Economic Forum, Davos 2016
[20] Commission Communication COM(2019) 640 final: *The European Green Deal*

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- 60-90% of the construction work is carried out in a closed factory environment, thereby **mitigating the impact of adverse weather** . With conventional construction methods, work often has to be completely stopped on days with adverse weather conditions;
- Off-site construction enables **more effective enforcement of quality and safety guidelines**. Building materials are protected from the weather during all phases of construction, which is a frequent cause of imperfections in outdoor projects. Modular buildings are finished to the same regulations, codes and materials as conventional buildings;
- The production of modules enables the industrialization of craft work with the use **of robotization, automation, digitization and other cutting-edge innovations** that, among other things, lead to **improved working conditions** for employees, which makes it possible to attract young people with higher ambitions and also talents to the industry;
- Many modular buildings **can be dismantled and repurposed** for new purposes, reducing the demand for raw materials and energy consumption needed for construction. Although the project used permanent modular construction, the renewal of materials and modules is easier than in a conventional building;
- **Waste is eliminated** through recycling and inventory control. Building materials are also protected from weather conditions as everything is stored in the factory. Modular construction also makes it easier for construction workers to prevent waste because there is more control over project conditions;
- Manufacturer-controlled settings allow materials to remain dry during all stages of construction. Therefore, the level of trapped moisture in new constructions is reduced, thereby **improving air quality**. This helps control mold, mites and other organisms that thrive on moisture;
- Working indoors allows **a safer environment**, reduces risks and dangers occurring on construction sites. With conventional construction methods, work must often be carried out at heights or in awkward positions where accidents are more likely;
- Modular buildings are generally **stronger** than site-built structures because each module is designed to withstand shipping and lifting. Once connected, the modules are securely connected to the whole integrated assembly;
- Since approximately 80% of the work is done off-site, the modular construction allows entrepreneurs (building owners) **to continue working during renovations**, reducing business interruption. The modular construction also reduced the disruption of buildings around the construction site;
- **Greater environmental sustainability** is ensured by the fact that, in addition to reducing waste, modular construction leads the market in the use of ecological materials. A wider range of materials is available when the construction process can be completed in controlled factory conditions;
- **Affordability** is a key feature of modular construction. When many similar pieces are produced at once, cost and time savings are achieved with economies of scale. Modular construction is particularly useful for projects with many identical buildings, as the modules can be manufactured in series;
- **It improves the acoustic properties** of the building as the modules are designed as independent units and can be soundproofed to block noise when assembled.

However, modular construction requires a strong material and technical background, which requires high initial costs. Also, the risk in the process of developing the local market is high. For this reason, **support for building the necessary ecosystem using EU funds** for the transformation to climate neutrality from operational programs is essential, as well as support for the involvement of Slovak institutions in European projects aimed at the development of modular construction.

Measure b.4: Support of dual green and digital growth (Twin Green and Digital Growth) in the construction sector

Description of the measure:

It is necessary to cope with the serious challenges of society, such as affordable housing, energy poverty and limited capacity to implement digital technologies, while digitalization represents the possibility of accelerating the green transformation of the construction sector.

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The digitization of the green transformation process in the construction space is based on 5 basic pillars:

- Low-carbon and durable construction, which is an important driver of greening in new buildings. Green architecture, engineering and construction require information about the so-called gray energy contained in buildings (i.e. energy associated with the production of building materials). Many properties of the materials and components used must be taken into account, such as their energy efficiency, repairability and end-of-life disposal. Building design and construction methods must integrate resistance to extreme events to avoid premature deterioration and loss of building functionality. Digital tools can help solve these problems already at the design stage. For example, BIM (Building Information Model/Management) can analyze the long-term consequences of design decisions and can help reduce a building's environmental impact during the construction and operation phases. One-stop shops can support users in complex decision-making processes and provide related services such as financing;
- Building renovation is key to making existing buildings greener. By preserving as many original structural elements as possible, the gray energy contained in the building material is also preserved. Thermal and sound insulation and airtightness of the building envelope are crucial for deep renovations. Another key element is the introduction of new and efficient space heating and cooling systems with intelligent technologies for the automation of building control systems. Digital tools, such as digital building passports, can facilitate the renewal of buildings and the recyclability of materials from old buildings;
- Reduced energy consumption during operation, especially during energy peaks, can provide a stabilizing function for the overall energy system. Heating, cooling, ventilation and lighting systems can be adaptively controlled to reduce energy consumption while maintaining the same level of comfort for the occupants. Building automation and control systems are based on sensors that recognize building users and their requirements and help actively manage energy-consuming appliances.
- Low carbon heating and cooling reduces emissions and pollution during the building's use phase. Electrification (e.g. using heat pumps instead of oil or gas heating) is the key to sustainable heating. In addition, photovoltaics added or integrated into a building is a renewable source of electricity with high potential for the future.
- Reduced demand for construction space reduces the impact of building construction and operation on the environment. Possibilities for reducing the area of buildings include reducing the space needs and increasing the intensity of use of existing buildings. Digital platforms can enable more fluid sharing of space. Last but not least, the possibilities of reducing the need for space are also provided by small houses and apartments.

The development of solutions within the above-defined pillars must be supported by a structured innovation support program with the aim of accelerating the green transformation and utilizing the synergies of green and digital growth.

Measure b.5: Support of building owners and communities in cities and municipalities in renovating buildings to the level of buildings with zero emissions and buildings with a positive energy balance by community projects (using crowdfunding) aimed at decarbonizing energy in buildings

Description of the measure:

Building owners, such as municipalities and cities entrusted with a significant stock of public buildings and apartment building owners (housing associations), play a key role in making the energy transition happen with a unique mandate for their assets and a unique power to convene actors along the value chain. However, these owners have acquired property that they have very limited (if any) financial resources to maintain. Therefore, the financial and technical capacity for the developing projects is currently a significant obstacle to an increased rate of renovation in both the public and private sectors.

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The European Green Deal Renovation Wave[2] aims to double the rate of building renovation by 2030, which also requires large-scale investment in the public and private building stock. In addition, Member States must set out measures in their long-term renovation strategies to ensure a highly energy-efficient and decarbonised national building stock and to facilitate the cost-effective transformation of existing buildings into zero-energy buildings[21]. In line with REPowerEU's plan[22] to phase out the EU's dependence on fossil fuel imports, the public sector is being encouraged to play a key role in reducing its energy consumption through building renovations.

It is necessary to create a financing scheme for the renovation of buildings to highly energy-efficient buildings, which will support building owners in obtaining finance to offset the initial costs of energy renovation of buildings to the plus energy standard and zero-emission building standard.

Measure b.6: Smart Cities research and development program

Description of the measure:

One of the ways to acquire know-how is the replication of innovations created by European projects in the field of Smart Cities, which are supported by transnational donors, including the EU research and innovation programs Horizon 2020 and Horizon Europe. Slovakia lags far behind other member states in participating in such projects under Horizon 2020, and the situation has worsened with the transition to Horizon Europe. The main reasons include the lack of support for national programs in this area and the lack of political support for project proposals.

To overcome this situation, it is necessary to create a support scheme for the area of Smart Cities at the level of operational programs, including support for the participation of Slovak cities in European projects.

PROFESSIONAL AND CONTINUING EDUCATION STRATEGY FOR THE IMPLEMENTATION OF INNOVATIONS

The materialization of the objectives *of the European Green Deal* results in a high pressure on the demand for construction works and services. After **the stagnation of labor productivity** in the construction industry for the last 10 years and even its decline in recent years (not only in Slovakia, but in the entire EU), the price of housing continues to unsustainably increase housing costs for consumers with a negative social impact. Therefore, the construction sector must improve its labor productivity **by rebuilding the sector around innovations** mentioned in previous sections. The implementation of innovations is therefore critical from the point of view of competitiveness of the construction sector to obtain investments, as well as the attractiveness of investments in the renovation and decarbonization of the building stock.

In the medium term, these innovations should lead to an expansion of the supply with a long-term increase in efficiency and productivity, which will enable a fair valuation of living in energy-active buildings (resulting from the energy renovation of existing buildings or the construction of new ones). Although the research field is aware of the possibilities that these innovations can bring, there is little knowledge on the ground and little drive to continue to innovate within the construction value chain. **Conventional approaches will not be sufficient**, and *the European Green Deal* emphasizes

[21]Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (europa.eu), amended by Directive (EU) 2018/ of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency
[22]Communication from the Commission of 8 March 2022 to the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions, REPowerEU: Joint European Action for more affordable, secure and sustainable energy, COM(2022) 108 final

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experimentation and working across sectors and disciplines in the areas of innovation that support the achievement of its goals.

These changes depend to a large extent on the availability of professionals and young talents in the construction sector with the necessary skills, knowledge and competences. In a survey conducted for the status quo analysis of DoubleDecker's Build Up Skills project, **100% of companies said they lacked workers** in one or more key areas. Although the result for individual professions, or groups of professions, is considerably different, it can be concluded that the lack of workers in the sector is felt to be acute. This is a consequence of retirement of the older generations, for which the construction sector had no replacement. Sufficiently strong generation of middle-aged craftsmen was not created, because there were not enough young people entering the sector in the last 20 years.

On the other hand, according to a study by the Trexima company for the needs of the state administration, only 9% of high school and university graduates in the field of construction, geodesy and cartography find employment in the construction sector, and the rest go to other industries. Although the figure of 9% was often questioned by the schools during the discussions, even the generally accepted amount of 20-30% is still not enough to rebuilding human resources in the construction sector. This trend is similar abroad and is not specific to Slovakia.

In addition, it should be noted that the demographic development in Slovakia does not allow for a further increase in the number of new pupils in the high schools, as the average number of new pupils entering schools is constantly decreasing and the average age of the population increases.

It follows from this that the main problem of the construction sector is the low ability to retain young people in the industry, especially graduates of secondary vocational schools, according to the statistics of the company Trexima.

Therefore, the extensive sources of employment growth in the construction sector have been exhausted and no increase in employment can be expected in the future without qualitative changes in the construction techniques used and new professions created by them, which will be attractive to young people.

The increase in labor productivity depends on implementing innovations. These innovations are also necessary for the adaptation of the construction industry to changes in the supply sectors, which have already mastered the introduction of Industry 4.0 concepts and successfully progressed in the implementation of Industry 5.0 concepts, the basic pillars of which are:

- Full digitization of the sector;
- Symbiosis of man and robots in the workplace;
- Focusing solutions on people;
- Environmental and social sustainability.

The construction industry has so far been little affected by innovations compared to other industries, such as electrical industry, IT, automotive industry, which have radically changed the functioning of the sector, the quality and the way they meet the needs of customers, at a decreasing nominal price or only a small increase compared to a substantial increase in value for the consumer.

The main reasons for this resistance to innovation were the outdoor nature of the work being carried out and the fact that most of the actual construction takes place on the site that the building will occupy.

At the same time, the construction sector will have to face important challenges already in the short term:

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- **Urbanization** – the trend of people moving to cities will continue to be strong as people are attracted by the promise of better services, accommodation and job opportunities compared to rural areas. Around 500,000 new buildings per year will need to be built in the EU by 2050, which will **increase the pressure on the speed and scale of construction**. Demographic developments characterized by the aging of the population will continue to have a major impact on the development of the construction sector as the requirements on buildings will change. More medical facilities will be needed and the requirements for public transport and its supporting infrastructure will change .
- **The lack of labor** will continue to be very noticeable, and **the solution cannot be to hope that there will be more people interested in a career in the construction sector**, but to accelerate the introduction of robotization and automation, supported by the complete digitization of the sector .
- **The changing demands of consumers**, who will expect the construction sector to follow the path of other consumer-oriented industries, which create networked capacities capable of mass-producing products with a low price and a high ability to meet specific customer requirements (**mass customization**).
- **Increasing requirements for the decarbonisation** of buildings, which must adapt to the transformation to a high share (gradually up to 100%) of energy from renewable sources, the requirements for zero-emission buildings, for the energy self-sufficiency of buildings and their contribution to balancing energy networks at the level of neighborhoods and towns.

The need to meet these challenges is leading to changes in the construction industry towards industrial building production, which will be largely off-site construction, with buildings being assembled on site. Industrial construction manufacturing combines attributes from: nD BIM, CDE and digital twins. It encompasses five key trends:

(1) Big data, AI and predictive analytics;

(2) Robotics and automation;

(3) Prefabrication and off-site construction;

(4) Internet of Things (IoT);

(5) Additive manufacturing techniques (3D printing).

For this reason, many new (new or old in the industry but new to construction) technologies are beginning to make their way into the construction sector and their clusters are enabling further developments in construction techniques.

For this reason, the role of continuing education will increase and it is only logical that **the cooperation and symbiosis of formal and continuing education can bring an effective tool** to ensure qualified professionals for the construction sector with the required skills, knowledge and competences. Continuing education can be a tool to quickly recognize future requirements for skills, knowledge and competences. Its flexibility allows you to quickly create the necessary training programs that will fill the emerging gaps in the labor market. Close cooperation between employers and secondary vocational schools will transfer these signals on new requirements of the construction sector to new vocational education and training programs. This cooperation will increase the quality of preparing for vocations, from which employers will clearly benefit.

The biggest **obstacle** to introducing innovative concepts of education is insufficient **funding** of vocational education schools by the state. It is not sufficient to provide the required modern technical equipment. This insufficient funding is an insurmountable obstacle in the development of education

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from the point of view of needs in the horizon of 2035. It should be remembered that education and preparation for employment is, among other things, guaranteed by the Constitution of the Slovak Republic. If we put this fact in connection with the repeatedly unspent resources from European funds, it is difficult to explain why schools do not have everything they need, even in the sector that is key to achieving climate neutrality by 2050.

It is necessary to emphasize once again that **insufficient funding** limits the schools' ability **to ensure the currently necessary material and technical support** and to keep up with current changes. Modern technical devices are an essential part of the educational process in the construction sector, they allow students to gain practical experience and familiarize themselves with current technologies and procedures.

The next biggest obstacle related to the financing vocational education in secondary schools is **the lack of teaching and professional staff** due to low interest in working in education sector because **insufficient financial remuneration.** These are the factors that prevent schools from recruiting qualified teachers, professional trainers, but also school directors. Insufficient financial remuneration discourages experienced professionals from working in education sector and they respond to more financially attractive job opportunities. This has an impact on the quality of teaching and training.

Based on these results, the Green Deal for Buildings adopted the following recommendations addressed to the Government of the Slovak Republic and regional governments, which are responsible for secondary vocational education schools:

Measure b.7: Strategy of further and continuing education in the energy and construction sectors for the implementation of innovations, including financing

Description of the measure:

Develop a strategy and new educational programs for continuing vocational education and continuing education at the secondary level for workers from the energy and construction sectors, i.e. for workers after their initial, compulsory education and vocational training or after entering working life. This may include retraining professionals from other sectors with skills transferable to the construction industry.

The proposed strategy must contribute to a better understanding between different disciplines and professional groups by promoting the vision of the building as a system.

The aim of this strategy will be to increase the number of qualified construction professionals at all levels of the building construction and renovation, operation and maintenance value chain. It is necessary to increase efforts in the area of increasing the qualification and retraining of professionals in the field of critical skills necessary for example to successfully understand buildings with zero energy demand (and a positive energy balance), increasing the number of ambitious renovation interventions, introducing efficient heating and cooling based on renewable sources, especially thermal pumps, and for the phasing out of fossil fuel boilers as outlined in the REPowerEU plan to phase out the EU's dependence on imports fossil fuels, and at the same time to achieve a holistic vision of decarbonizing the building stock.

The strategy and new programs should focus on the following areas:

- Skills for carrying out deep renovation of buildings, including through modular and industrialized solutions;
- Skills for new and existing near-zero-energy (and positive energy balance) buildings and bridging the gap towards zero-emission buildings (ZEBs);
- Skills for the integration of renewable energy and efficient heating and cooling technologies, especially heat pumps; skills for installers in the area of modernizing heating and cooling in renovation projects;
- Skills related to life-cycle carbon (through global warming potential assessment), circular construction and resource efficiency, and use of the tiered framework;

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- Digital skills supporting higher energy efficiency of buildings, especially through better use of BIM;
- Skills to upgrade smart buildings to higher energy efficiency (based on the Smart Readiness Indicator), particularly focusing on sensors, controls and building management systems.

This strategy and new programs should also include the training of trainers and secondary school teachers, as well as the development of mechanisms ensuring the recognition of trained professionals.

The construction sector is becoming a sector in which there will be rapid changes in the requirements for skills, knowledge and competences. For this reason, continuing education will play an important role that has no parallel in the past when the construction industry resisted change and innovation.

Lifelong education in this sector must be systematic, its stability, quality and availability must be increased. For this reason, the intervention of the state and its financial support for all forms of lifelong education is essential.

Measure b.8: Updating existing and creating new study fields with the aim of adapting the fields to technical progress and the needs of the transformation of the construction sector

Description of the measure:

The transformation of the construction sector towards industrial building production, which will be largely carried out off-site with buildings being assembled on site, places new demands on skills, knowledge and competences. Industrial construction manufacturing encompasses five key trends:

Big data, AI and predictive analytics;
Robotics and automation;
Prefabrication and off-site construction;
Internet of Things (IoT);
Additive manufacturing techniques (3D printing).

For this reason, it is necessary to revise existing curricula and develop new curricula to meet new roles in existing professions and entirely new emerging professions in the construction sector. Examples of these professions and new roles include:

- information manager;
- robot operator;
- digital collaboration;
- cyber security;
- value engineering;
- AI architect;
- building assembly technician;
- construction drone operator;
- operator and other occupations in **industrial construction production**.

For example, the new required skills, knowledge and competences include:

- cognitive and systems thinking;
- programming;
- active approach to further education;
- data-driven decision making;
- complex problem solving with excellent communication skills;
- data analysis, artificial intelligence (AI) and BIM;
- modeling and simulations;
- robotics and drone resource management;
- Internet of Things (IoT);
- computer visualization;
- 3D printing;
- augmented reality (XR), including augmented reality (AR), virtual reality (VR), and mixed reality (MR);

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• production management in industrial construction;	• integration skills, etc.

Measure b.9: Supporting scholarships for students within the fields that are in short supply and necessary to cope with the current changes resulting from European agreements.

Description of the measure:

In order to increase the percentage of graduates who will remain in the construction sector after completing their vocational training at secondary schools, it is necessary to motivate pupils already during the preparation for the profession in the form of scholarships.

Measure b.10: State support in creating new educational programs for pupils and adults.

Description of the measure:

The transformation of the construction industry will require a large-scale change in existing study programs and the creation of new ones. These programs concern not only students in preparation for a profession, but also the retraining of adults in continuous education programs. This scope of work and focus on the latest knowledge in the industry will require collaboration between experts and stakeholders. It is necessary for the state to financially and organizationally support this work. It can also use EU funds, which are part of operational programs.

Measure b. 11: State support for companies involved in the educational process.

Description of the measure:

The construction sector is characterized by a high proportion of micro, small and medium enterprises, which do not have the opportunity to participate in the educational process without financial support from the state. Since their contribution to education in the form of providing know-how and accepting apprentices for practical training is irreplaceable, it is necessary to enable their involvement by revealing the costs and possible other benefits.

Measure b.12: Ensuring additional training of teachers for new requirements.

Description of the measure:

Adaptation of existing and creation of new study programs and continuing education programs must go hand in hand with intensive training of trainers - pedagogues at vocational schools. This training should be recognized as part of the professional education/professional growth of teachers. This will increase the motivation of teachers to acquire new skills and knowledge in the field, which are necessary for the effective preparation of students for a profession in the reformed construction sector.

Measure b.13: Making the profession of teacher more attractive and creating conditions for a significant increase in the interest of young people and professionals in the job of a teacher.

Description of the measure:

Vocational schools are struggling with a shortage of teachers and the growing average age of current employees. Therefore, it is necessary to attract new young teachers to vocational training, so that the age structure of

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teaching staff is sustainable from the point of view of the need to constantly respond to new requirements of practice.

However, the average starting salaries of secondary school teachers lag behind not only all EU member states, but also candidate countries and associated countries. According to Eurostat, with its average starting salaries for secondary schools, Slovakia ranked second worst. Such starting salaries are unmotivating and have stopped the influx of young teachers to schools.

Measure b.14: Change in the method and amount of school financing and material-technical support, so that a network of schools with a smaller number of schools will be created, which will be supra-regional and specialized in the construction industry, so that they are provided with the required material-technical support

Description of the measure:

The biggest obstacle to the introduction of innovative concepts of education is insufficient funding of vocational education schools by the state. It is not sufficient to provide the required modern technical equipment. This insufficient funding is an insurmountable obstacle in the development of education from the point of view of needs in the horizon 2035. The creation of a network of schools with a smaller number of schools with larger number of pupils, which will be supra-regional and specialized in the construction sector, will help more efficient use of financial resources to ensure current and future requirements for skills, knowledge and competences in the construction sector.

Measure b.15: Ensuring effective and sufficient collection of data on the educational system for its management, including the applicability of graduates

Description of the measure:

Effective planning and programming of education, not only in the construction sector, requires high-quality and reliable data. Therefore, it is important to ensure their collection, processing and provision to the public. According to the Statistics Act, such collection and processing of data is the exclusive competence of the state.

Measure b.16: Creation of nationwide campaigns on the applicability of education in the construction sector and systematic promotion of the sector by the state in the media

Description of the measure:

The transformation of the construction sector, changes in the nature and conditions of work in the sector must go hand in hand with the promotion of employment and career opportunities aimed at the general public, at primary school pupils and their parents. Considering the urgency of fulfilling the obligations of the Slovak Republic resulting from EU legislation and other international obligations, it is necessary for the state to process and finance national campaigns with this focus.

Measure b.17: State support for continuous education

Description of the measure:

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The construction sector is becoming a sector in which there will be rapid changes in the requirements for skills, knowledge and competences. For this reason, continuing education will play an important role.

Lifelong education in this sector must be systematic, its stability, quality and availability must be increased. For this reason, the intervention of the state and its financial support for all forms of lifelong education is essential.

c) Joint measures to achieve strategic goal no. 3

EU public finance and other public funds alone will be not sufficient to cover the investments needed to achieve the energy and climate targets in 2030 and 2050. The energy renovation of buildings faces one of the biggest investment gaps. In addition, investments in the energy efficiency of buildings face several obstacles. Key ones include a fragmented market, complex decision-making processes and split incentives. Lack of knowledge and data on the benefits of improving energy efficiency and related uncertainties are also important barriers.

Therefore, it is necessary to establish favorable framework conditions to ensure the supply of private financing for investments in the energy efficiency of buildings. Investments in the energy efficiency of buildings may be perceived by financial markets as too risky. There are several factors that contribute to this perception, but it is difficult to address due to a lack of data. For example, most loans for investments in the energy efficiency of buildings are not labeled as such but are rather personal loans or general lines of credit for companies. To change risk perception, it is important to collect data, promote appropriate labeling and provide guidelines for risk assessment.

The Energy Efficiency Financial Institutions Group (EEFIG) was created in 2013 by the European Commission and the Financial Initiative of the United Nations Environment Program (UNEP FI). It acted as an open dialogue and work platform for public and private financial institutions, industry representatives and sector experts. EEFIG aimed to identify barriers to long-term financing of energy efficiency (not just building renovations, but more broadly) and propose policy and market solutions to increase investment in energy efficiency.

Within EEFIG, 2 specific tools have been developed to inform financial institutions, investors and project proponents about the real benefits and risks of energy efficiency investments:

- The De-risking Energy Efficiency Platform (DEEP) is the largest pan-European open-source database containing detailed information on the technical and financial performance of more than 15,000 energy efficiency projects related to industry and building renovation. It includes track records and helps project developers, financiers and investors better assess the risks and benefits of energy efficiency investments across Europe.
- The EEFIG Underwriting Toolkit, which is also a guide to assessing the value and risk in financing energy efficiency, was launched in June 2017. It aims to help financial institutions increase the deployment of capital in energy efficiency, including building retrofits. It also helps proponents to create funded projects and can be used by public authorities to better assess energy efficiency projects receiving public funding.

Measure c.1: Participation of Slovak investors in the renovation of buildings and other sustainable energy investments on the DEEP (De-risking Energy Efficiency Platform) platform

Description of the measure:

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Support the De-risking Energy Efficiency Platform (DEEP), an initiative of the European Commission and EEFIG, by sharing available data and records of achieved results in the field of energy efficiency. DEEP is the largest pan-European database based on the principle of open-source, i.e. free access to information sources, which contains detailed information on the technical and financial performance of more than 15,000 energy efficiency improvement projects related to industry and building renovation. It includes track records and helps project developers, financiers and investors better assess the risks and benefits of energy efficiency investments across Europe.

Measure c.2: Implement the EEFIG Underwriting Toolkit (EEFIG Underwriting Toolkit)

Description of the measure:

Implement the Underwriting Toolkit processed by EEFIG (EEFIG Underwriting Toolkit), processed in cooperation with the European Commission with the aim of correctly labeling investments in building renovation and other investments in sustainable energy and reduce, in synergy with other tools (e.g. DEEP), the degree of risk of these investments.

While the focus is on value and risk assessment, it also includes additional material on potential market size, financing methods and project life cycle to provide a more complete picture and build capacity within financial institutions. In addition, parts of this EEFIG toolkit have been designed with a number of specific target groups in mind:

- top management;
- managers who make decisions;
- project teams;
- project developers;
- risk management teams.

Measure c.3: Improving the flow of information on the energy efficiency of buildings aimed at more effective pricing of products for financing building renovation

Description of the measure:

EEFIG proposed to the European Commission to amend the EU regulatory framework to ensure that lenders identify, record and maintain current energy performance of their building collateral, including rating energy efficiency as a risk factor in their IRB PD and LGD models. The availability and, in the Slovak reality, even the existence of data on the energy efficiency of collateral is one of the main factors determining the scope of analyzes those financial institutions and stakeholders, including EEFIG, can perform. Analyzes based on improved collection data from financial institutions will facilitate a better understanding of risks in financial institutions.

To achieve all of the above, the Round Table recommends supporting and funding the creation and increased availability of standardized information on the energy performance of both residential and commercial buildings so that banks can better understand all these relationships. Easy access to national data on energy certificates/digital passports of buildings is essential and an interoperable interface with national registers of energy certificates/digital passports of buildings would be beneficial for accessing information from these sources.

Develop and price specialized products based on the identified relationship between credit risk and energy efficiency (the relationship has been demonstrated by EEFIG analyses). Lenders and especially mortgage lenders should consider collecting data on energy certificates/digital building passports and other relevant energy performance metrics. This will encourage the development of specialized products as well as the adoption of energy efficiency in IRB models, which will influence the calibration of reasonable prices for such products.

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Even as the efforts developed towards the objectives of the European Union's initiative to reduce the energy intensity of the European economy EU 20-20-20 by 2020, the potential of financing energy efficiency was not widely recognized and the obstacles to market growth were not systematically understood. Currently, several financial institutions have made significant efforts to develop viable financing mechanisms, and many specialized credit lines and funds focused on energy efficiency have been launched. Energy efficiency projects have been bundled into green bonds, although the total amount in terms of global fixed income issuance remains low. Later, however, joining and aggregating projects, which were previously rather theoretical, has become an accepted concept and is in early implementation.

However, the energy efficiency market remains small, fragmented and difficult to scale given its potential size. Thanks to the work of the pioneering financial institutions, EEFIG and a dozen Horizon 2020 projects, basic structures such as standardized risk assessment protocols, project development standards and a degree of contractual standardization have been established. Innovative financing mechanisms were developed and launched during this time frame.

Importantly, there is growing recognition that energy efficiency is an asset class that represents a market growth opportunity and a way to deploy capital to support the climate goals of the Paris Agreement. This is not insignificant progress in a sector dominated by banks and financial funds with multi-year decision-making processes, but much more can and needs to be done.

Within commercial and public buildings, low owner demand for energy efficiency investments (even showing good returns) remains the most critical missing element preventing greater allocation of resources from financial institutions to this sector. Effectively addressing the scale of investment needed to achieve Europe's energy efficiency and carbon reduction targets by 2030 will require stimulating demand from building owners to match the appetite of financial institutions to invest in these areas.

Measure c.4: Replication of successful practices for the development of the market for sustainable energy investments in the renovation of buildings in order to achieve a critical volume for meeting the Fit-for-55 and 2050 targets

Description of the measure:

Replicate the most successful programs developed over the last 5 years in Europe, which built on existing mortgage schemes and combined them either with strong tax incentives (as in Italy) or with grants (as in Germany) to increase energy efficiency (so-called green mortgages), which would otherwise not be realized. These programs have guided and encouraged building owners' spending to include energy efficiency improvements.

It is recommended to investigate the possibility of applying the Mortgage Portfolio Standard for retail mortgage loan providers.

The nascent nature of the residential energy efficiency investment space means that there is still a lack of capacity in the financial sector to create, develop, value and finance the renovation of residential buildings (other than through standard mortgages, which do not consider the value of energy efficiency gains). To accelerate this, there is an opportunity for targeted public de-risking support and technical assistance to help banks develop specialist green/green mortgages, credit lines and funds.

The UK has recently proposed a regulation to increase the energy efficiency of the mortgage guarantee portfolio and align retail lenders with the government's energy efficiency ambitions for buildings. First, it proposes mandatory disclosure of energy performance for all registered mortgage lenders on their websites and to the government on an annual basis.

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Second, it is also possible to require them to voluntarily agree to set a mortgage portfolio standard in terms of building efficiency goals by 2030 (for example, according to the result of the revision of the EU Directive on the energy efficiency of buildings).

Measure c.5: Standardization of processes for approving building renovation projects, or common methodology for approving project financing

Description of the measure:

Implementing the standardization of project financing approval processes by financial institutions and financial intermediaries can reduce the transaction costs of building energy efficiency financing and is also needed to increase the securitization of green mortgages and other energy efficiency assets. Standardization can include labeling schemes, project evaluation methodologies and risk assessment tools, standardized legal and financial asset structures (loans, guarantees, energy performance contracts, etc.).

As investment funds gain more experience in energy efficiency markets, they are reducing the minimum project size and encouraging the aggregation of smaller projects with increased success as project developers understand what it takes to meet the risk appetite and constraints of these financiers. If public funds were made available to support securitization instruments, this could also improve benchmarks and allow the aggregation of longer returns.

The process of learning from existing projects needs to be accelerated through data more based on the achieved building efficiency and shared in the De-risking Energy Efficiency Platform (DEEP) database.

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5 Specific Measures for Renovation of Residential Buildings

In December 2023, the European Commission, the European Parliament and the Council of the EU reached a compromise regarding the final text of the amended Directive EU/2010/31. This amendment to the directive aims to increase the renovation rate, especially for the worst performing buildings in each country. It also supports better air quality, the digitization of building energy systems and the introduction of infrastructure for sustainable mobility.

Together with the amended directive on energy efficiency (EU/2023/1791), the amended directive on renewable energy sources (EU/2023/2413), as well as the regulation on infrastructure for alternative fuels, it brings fundamental changes for the renovation of buildings, including apartment buildings.

For the first time, the EU has enshrined the legal obligation of the principle of prioritizing the increase of energy efficiency through implemented measures in buildings (*energy efficiency first principle*) and the requirement to renovate all existing buildings to zero emission buildings (ZEB) by 2050. In the transitional period until 2030, the goal of renovations will be required of new buildings to nZEB, while the goal of renovation to ZEB also applies to these buildings until 2050.

The scope of the renovation and its pace will be determined from 2024 in the number of buildings renovated to ZEB with a short-term indicator of the number of buildings renovated to the level of nZEB until 2030. Achieving the pace of building renovation in these new conditions at the level of 2% and in the case of public buildings at the level of 3% will be a big challenge for all stakeholders.

New buildings must reach the level of ZEB from 2028 in the case of public buildings and from 2030 for privately owned buildings.

For these reasons, the stakeholders agreed on a number of measures related to apartment buildings in order to support the fulfillment of these challenges. Stakeholders will continue this discussion and specify possible joint activities for their implementation.

Measure bd.1: National plan for financing sustainability in the housing sector

Description of the measure:

Develop a National Plan for financing sustainability in the housing sector. Sustainability is defined by the requirements of the EU taxonomy. This national plan should include:

- A strategy for solving the housing shortage either **by building new** or **renovating existing** or unused/uninhabited buildings, such as dormitories;
- **Prohibition of building gas connections and the use of carbon fuels** in new buildings and the exchange of gas and other carbon fuels in the renovation of existing apartment buildings;
- Basic **rules for the maintenance and use of apartments** in order to ensure adequate maintenance of the housing stock and financial resources for this maintenance. The goal is to ensure the achievement of the planned service life of apartment buildings, or its extension and the safety of residents (residents, tenants) and the surrounding area;
- **The procedure for the inventory and processing of digital passports for apartment buildings** in order to ensure the necessary data for the management of the apartment building fund, its renewal, facility management and verifiable data for access to the financing of the entire life cycle of apartment buildings;
- Measures to increase the quality of the work of contractors and designers for new apartment buildings as well as for the renovation of existing apartment buildings and related requirements, the fulfillment of which can be verified for the needs of the procurement of (private, public) construction works and services;

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- The mechanism **of adaptation of the structure of available apartments to the demographic development** in the regions of Slovakia;
- Procedures for evaluating the sustainability of the building, or building renovations from the point of view of the EU taxonomy for funding needs and data sharing principles for this evaluation;
- Support initiatives for developing **tools and standards** for evaluating the sustainability of the building, or building renovations from the point of view of EU taxonomy;
- Requirements for **the mapping of structural defects** in the rehabilitation of existing buildings and its financing, in order to avoid the "lock-in effect" of such defects for reasons of limited building rehabilitation.

Measure bd.2: Development of rental housing

Description of the measure:

Develop a rental housing development plan that would include:

- **The balance of housing availability**, including rental housing in the regions of Slovakia;
- **Different categories of rental housing** : social housing, higher standard housing, etc.;
- Inventory of land for residential buildings construction;
- **Adaptation of territorial plans of municipalities** for the development of rental housing, which would determine suitable locations for construction;
- **Incorporating MEPS in spatial plans** with the aim of motivating the high energy performance of rental buildings - buildings with a positive energy balance using systems that use non-carbon renewable energy sources;
- Rules for **collective forms of investment** in apartments, including **real estate funds** (dividend), which are able to generate income during the life of apartment buildings and are aimed at rental housing.

Measure bd.3: Plurality of housing financing

Description of the measure:

Ensure legislative plurality of housing financing, which would include:

- Rules for financial blending of different funding sources with funding from public sources;
- Various financial instruments, for example:
  - financial forfaiting – transfer of liabilities, e.g. resulting from contracts for guaranteed energy service to a financial intermediary (e.g. a bank);
  - structured PPP program for guaranteed energy services;
  - joint public-private fund based on debt subscription (Public-Private Debt Fund);
  - one-stop-financing;
  - preferential loans (so-called soft loans);
  - participatory financing: crowdfunding loan, crowdfunding equity, community energy projects;
  - mezzanine financing;
  - financing through energy bills (on-bill financing) using green bonds;
  - green mortgages;
- Tax instruments, for example:
  - Transferable tax credits (Super Ecobonus);
  - Financing from local taxes (On-tax financing).

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Measure bd.4: Legal certainty for green procurement for the renovation of apartment buildings

Description of the measure:

Prepare and ensure the legislative process for the approval of legislative and commercial legal standards to **ensure legal certainty for procurers using green public procurement**, including rules for the use of public resources, which should be motivating for private investments and not an across-the-board financial instrument, for example from the point of view of gradual reduction of financing from Eurofunds. From this point of view, public finances should be focused on the riskiest phases of the project and activate private investments in projects with state support. At the same time, measures taken to these standards should include:

- Rules for **reverse public procurement** ;
- **Simplification of subsidy mechanisms**, as the excessive complexity of conditions, lack of information cause subsidies to become incomprehensible to ordinary people, or high initial investments on the part of the applicant prevent the effective use of this aid by people and cause discrimination of these people in accessing aid from public sources;
- Rules for the use of the **design and build system** in public procurement;
- Rules for the use **of MEPS** in public procurement.

Measure bd.5: Reduction of VAT on RES in accordance with the EED amendment for final consumers

Description of the measure:

The amendment to the EED brings the possibility for member states to reduce the VAT rate on RES. This reduced rate is intended to motivate the demand for RES on the market from end consumers in the residential sector.

In view of the insufficient rate of use of RES in buildings in Slovakia (one of the lowest in the EU), it is very important to support the development of the market for final consumers in the residential sector, and lower VAT is an effective (but not the only) tool to support this market.

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6 Specific Measures for Renovation of Non-residential Buildings

The amended EU/2010/31 Energy Performance of Buildings Directive (EPBD) together with the amended Energy Efficiency Directive (EU/2023/1791), the amended Renewable Energy Directive (EU/2023/2413) as well as the Infrastructure Regulation for Alternative fuels brings fundamental changes for the renovation of buildings, for example from the point of view of requirements for the use of renewable resources, creating flexibility for energy systems and also better air quality, digitization of building energy systems and introduction of infrastructure for sustainable mobility.

The renovation of these buildings becomes more demanding and requires effective rules and coordination of several stakeholders. Among other things, the extent of renovation and its pace will be determined from 2024 in the number of buildings restored to the level of zero-emission buildings with a short-term indicator of the number of buildings renovated to the level of nZEB by 2030. Achieving the pace of building renovation in these new conditions at the level of 2% and in the case of public buildings at the level of 3% will be a big challenge for all stakeholders.

New buildings must reach the level of zero-emission buildings from 2028 for public buildings and from 2030 for privately owned buildings.

The round table of stakeholders therefore adopted several proposals related to non-residential buildings in order to support the fulfillment of these challenges.

Measure nd.1: Public procurement for non-residential buildings

Description of the measure:

Public procurement processes in Slovakia are very inefficient compared to countries, e.g. Scandinavia, Germany or the Netherlands, where the number of public procurements is incomparably higher as well as the volumes of the procurement. The complexity and non-transparency of public procurements prevents the effective use of EU funds, for example for the renovation of non-residential buildings, and facilitates large-scale corruption and bribery.

The entire process of public procurement needs to be re-evaluated and incorporate the principles of transparency and anti-corruption measures, including:

- Better conditions, **legal certainty when procuring innovative solutions and sustainable solutions** (green procurement);
- **Reverse procurement** , which is used to maximize the benefits of procured objects;
- **Elimination of gold plating** and non-transparent procurement;
- **Transfer of best practice** from countries successful in public procurement, effective in anti-corruption measures and transparency, such as the countries **of Scandinavia, the Netherlands and Germany** ;
- Development of **high-quality methodologies, catalogs and guidelines** that would help public procurement authorities to effectively process requirements for procured buildings and relevant works, goods and services. This would make the whole process more transparent, speed up public procurement and enable comparison of procurements to improve the whole process;
- Standardization and criteria for different types of procurement processed by the Public Procurement Office (UVO);
- **Prevent possible delays in the procurement process** in the procurement process by transferring knowledge from abroad and thereby shorten this process, e.g. incorporating the legal statute of conspiracy to harm the public interest as is the case in many countries;

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- Requirements for **transparent and measurable indicators of meeting the quality parameters of** procured works, goods and services. This transparency will help in the fight against corruption, which often replaces the desired quality;
- **Requirements for suppliers of procured works, goods and services** in accordance with the financial volume and technical complexity of the procured works, goods and services, including requirements for verification of suppliers participating in tenders and the possibility of certification, requirements for securing works, goods and services with own capacities and limiting subcontracts;
- **The use of MEPS** in the public procurement of non-residential buildings, requiring the processing of digital passports and ensuring the sharing of building data to assess the fulfillment of the technical requirements of the EU taxonomy and applicable legislation;
- Take measures against the waste of public funds from grants, e.g. **the use of repayable forms of financing under favorable conditions** tied to the quality of the procurement result.

Measure nd.2: Creation of a one-stop-shop center (OSSC) to support the renovation of non-residential buildings

Description of the measure:

In cooperation with the European Research and Innovation Program Horizon Europe, Climate and Environment Program LIFE, EIB (e.g. ELENA) and other available programs prepare the OSSC, including the networking of all existing professional capacities to support the renovation of non-residential buildings in public and private ownership, which would include the entire cycle of project preparation from the project idea to the signing of financing contracts.

The main objectives would be:

- **Increase the number of** non-residential building renovation projects;
- **Increase the volumes of used financing from all available sources**, including EU funds, the Modernization Fund, the EIB, private sources and institutional investors, especially in areas in which Slovakia strongly lags behind other member countries (currently in most cases);
- **Use available sources of technical assistance** funded by the EU, EIB and other institutions that will help financial innovation, transfer of know-how in the approach to building renovation and related public procurement. This technical assistance and exchange of experience is very important in the technique of demanding and complex plans to restore non-residential buildings;
- Cluster building renovation projects with the aim of creating larger packages of financeable projects to take advantage of economies of scale and more favorable financing conditions (for example, by subscribing green funds directly on the capital market in countries with a powerful market).

Measure nd.3: Support for innovations in the RES sector aimed at increasing the sustainability of RES technologies for use in commercial and office buildings

Description of the measure:

Renewable energy and fuel technologies (REFT) are an integral part of the clean energy transition. These technologies have multiple effects, i.e. they affect the environment, society and the economy. These effects need to be carefully assessed and evaluated in order to obtain a complete picture of the transformation of the energy field and its context and to enable the further development of these technologies. The fact that we use renewable energy sources (RES) is not enough: they must be sustainable to remain a strategic alternative to other technologies and other energy sources.

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Therefore, in addition to the development of the market and the rate of use of RES, it is necessary to support innovations aimed at the sustainability of the technologies we use to use these energy sources. For this, it is necessary to set up OP Slovakia schemes as well as other financial resources.

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7 Specific Measures for Renovation of Industrial Buildings

Decarbonisation of buildings is of fundamental importance for the European Green Deal and for the implementation of the Fit-for-55 package. However, reducing their carbon footprint does not depend on one player, but on the entire value chain. If downstream enterprises do not make every effort to reduce/eliminate the carbon content of their materials, products and services, the entities at the end of the value chain can hardly achieve climate neutrality of the final product. This requires effective cooperation in achieving climate neutrality throughout the value chain.

Entities in the value chain come from different industries. However, their efforts to reduce the carbon footprint of their operations and thus the carbon footprint of their supplies to be used in the next stage of the value chain share many common features. They focus on increasing the energy efficiency of their operations, for example by reducing heat losses, electrifying their thermal processes, using carbon-free renewable energy sources, electrifying their industrial park, increasing the energy efficiency of their buildings, using high-efficiency motors, introducing intelligent building management systems and other measures. In addition, the building value chain includes manufacturers of power electronics, heat pumps, renewable energy technologies and other relevant engineering products. The experts involved in these industries have significant expertise that can be mobilized in the value chain in engineering, digitization, LCA, energy audits, servitisation of the energy sector, which are paving the way for industrial smart energy systems with flexibility management and EnPC contracts able to mobilize or run investments in sustainable energy.

These measures have, for example, a significant contribution to the financial result of companies:

- Increased productivity: for example, increasing energy efficiency means maintaining the productivity of companies while simultaneously reducing energy consumption to carry out the same industrial processes. In fact, if done correctly, the firm will eliminate unnecessary expenses due to improved performance and increased productivity;
- Social commitment and corporate image: In addition to the energy transformation and the corresponding commitment to the goals of the Fit-for-55 package and the REPowerEU plan, the corporate image of the operator will be significantly enhanced, as the customer is increasingly green and positively evaluates sustainable companies. Not to mention the growing financing possibilities due to the increased appetite for portfolios in line with the EU taxonomy on the part of financial institutions, building their positions as climate banks;
- Maintaining competition in the market: saving on energy costs means that the company can invest this money in its own production, increasing the number of employees, better technology, etc. And therefore, the company increases its competitiveness in the market;
- Saving time and money: Energy efficiency also includes energy management, which allows the company to monitor all processes and solutions used so that they always use their full potential and that the company does not waste money and time on delayed repairs or reduced efficiency; and other concrete and quantifiable benefits for companies.

For this reason, there is a clear business case for decarbonising industrial operations and making them more energy efficient.

Furthermore, knowledge within the value chain is the main argument for a joint approach to improving energy efficiency and the use of renewable energy sources. At the same time, it is a cross-cutting cooperation that will break the typical isolation of the construction sector, which still works in

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silos, which prevents the increase of labor productivity, competitiveness in the fight for investments and attracting young and talented people to this sector, or at least overcoming the chronic lack of labor force.

However, the road to energy efficiency can be complex and demanding. Collaboration between different stakeholders is proving to be a powerful tool to overcome these obstacles and to make progress towards a more sustainable energy future.

Measure pb.1: Initiate the cooperation of companies in the field of increasing energy efficiency and the use of renewable resources in companies

Description of the measure:

Process and implement a proposal for cooperation in the field of increasing energy efficiency and the use of renewable resources in companies, which would include:

- Use of renewable energy sources and increasing energy efficiency, use of heat pumps;
- Energy cooperation and collaborative approaches in the regions, along the value chain of energy efficiency and the use of renewable energy sources in industry;
- Shared energy capacities and collective use of renewable resources, waste heat, recovered heat, etc.;
- Analysis of benefits from increased energy efficiency and cooperation in the field of energy (reduction of costs, reduction of business risks, better access to financing of business activity);
- Development and testing of new business models;
- Education and other agreed joint activities;
- Cooperation in the creation of projects using EnPC and innovative financing using shorter payback period of industrial projects.

This program can involve companies along the value chain of energy efficiency and the use of renewable energy sources in industry, the construction sector could be an initiator and draw other sectors into cooperation. From the point of view of the method for processing and starting cooperation, it is possible to use round tables as a best practice.

Measure pb.2: Refinement of conditions for industrial energy communities

Description of the measure:

Industrial buildings of companies have a far wider portfolio of possible energy-saving measures than in buildings, because there is often production that has a high energy demand, the possibility of heat dissipation, companies have larger plots of land or roofs suitable for placing technologies for obtaining energy from renewable sources (mainly the sun and wind). The economy is higher and companies realize **that the energy intensity of production is a significant evaluator of market relevance**, i.e. whether they will stay on the market or not.

In Western Europe, in addition to civil energy communities, there are also numerous industrial, private-public communities including areas adjacent to the companies involved. In addition to improving their own energy balance, companies often offer cheap/free energy as a benefit to their employees.

In order to implement such energy communities in Slovakia, it is necessary to finalize the conditions within the legislation for the implementation of the new design of the electricity market.

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Measure pb.3: Support for innovations in the RES sector aimed at increasing the sustainability of RES technologies for use in industry
Description of the measure: Renewable energy and fuel technologies (REFT) are an integral part of the clean energy transition. These technologies have multiple effects, i.e. they affect the environment, society and the economy. These effects need to be carefully assessed and evaluated in order to obtain a complete picture of the transformation of the energy field and its context and to enable the further development of these technologies. The fact that we use renewable energy sources (RES) is not enough: they must be sustainable to remain a strategic alternative to other technologies and other energy sources. Therefore, in addition to the development of the market and the rate of use of RES, it is necessary to support innovations aimed at the sustainability of the technologies we use to use these energy sources. For this, it is necessary to set up OP Slovakia schemes as well as other financial resources.

8 Specific Measures for Sustainable City Infrastructure and E-mobility

The European Union faces a number of interconnected demographics, public health and environmental challenges: the climate is changing, road mortality is stagnating, urbanization is increasing, air quality standards are still being breached in more than 100 major cities, obesity is on the rise and the population is ageing.

However, there is growing recognition at local, national and EU level that increasing levels of active mobility, particularly walking and cycling, can play an important role in overcoming many of these challenges. Such a policy will also have economic benefits. Based on conservative estimates, even the current level of cycling in the EU brings benefits worth around 150 billion euros per year.

During the COVID-19 pandemic, major cities in Europe have announced infrastructure changes to support cycling and walking. For example, they have temporarily widened or created new cycle lanes to allow safe overtaking with respect to physical distance restrictions while introducing more restrictions on 30km/h or 20km/h zones. The aim of the EU's Horizon Europe programme is to support local authorities in accelerating mobility changes and to address the significant problem that people returning to work after the end of restrictions caused by the pandemic situation (working from home, curfews, etc.) look for alternative forms of transport. This means that allocating public space in favor of bicycles, pedestrians and public transport and reducing the space available for cars will encourage people to cycle, walk or use public transport rather than drive.

Sustainable mobility will contribute to:

- Accelerating the transition to climate neutrality in cities through the promotion of shared, active and human-oriented mobility with zero emissions;
- The scale and speed of the introduction and expansion of innovative solutions, best practices and replicable, affordable and sustainable urban mobility solutions. At the same time, it will contribute to the fulfillment of the priority goals of the Zero Pollution Action Plan, the Sustainable and Smart Mobility Strategy and the EU policy framework in the field of road safety for the years 2021-2030 with the aim of reducing deaths and serious injuries by 50% by 2030;

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- Solutions for hazardous areas in urban/suburban neighborhoods using innovative planning, design and implementation approaches, including but not limited to co-creation and/or citizen engagement, modeling and smart law enforcement tools using artificial intelligence, digital and dynamic spatial redistribution to reduce road safety risks, reduce exposure to air and noise pollution and the perceived sense of danger for pedestrians and cyclists;
- Reassessing the quality of roads and public space in accordance with the needs of different groups (for example, women, children, persons with disabilities and the elderly);
- Proactively address the potential risk arising from the expected increase in cycling and electric scooters;
- Rebalancing the allocation of public space to different modes of transport to better reflect the actual or desired local distribution of traffic, as well as supporting the achievement of Vision Zero (a vision of climate neutrality) and zero emissions, thereby increasing road safety and quality of life in cities;
- For the reconstruction of public space, which will take into account the principles of the circular economy, adaptation to climate change (especially heat), inter-sectoral synergies and which will not lead to the removal or damage of parks, trees or green recreational areas.

Measure mi.1: Plans for sustainable mobility

Description of the measure:

The Sustainable Urban Mobility Plan is a strategic plan designed to meet the mobility needs of people and businesses in and around cities for a better quality of life. It builds on existing planning procedures and takes due account of the principles of integration, participation and evaluation.

The aim of the measure is to find sources of technical assistance for interested regional and district cities to process such plans, which will have:

- Focusing on people (applying the human-centric principle);
- Main objectives: Accessibility and quality of life, including social justice, health and environmental quality, and economic viability;
- Integrated development of all modes of transport and a shift towards sustainable mobility;
- Connecting infrastructure, market, regulation, information and promotion;
- Compliance with related policy areas;
- Functional urban area coverage based on commuting;
- Planning with the involvement of stakeholders and citizens using a transparent and participatory approach;
- Systematic evaluation of impacts to facilitate learning from practice and continuous improvement of mobility in the city.

Measure mi.2: New requirements for urban infrastructure and non-urban road infrastructure

Description of the measure:

Electro-mobility is progressing rapidly in many countries, especially in Western and Northern Europe. There are many new innovations in this area that offer better technical solutions and increase the sustainability and accessibility of electromobility. For example, not long ago, inductive charging of electric cars with a static mode and while driving was considered the music of the future. Just recently, Sweden announced that it is going to build inductive charging into the first highway and aims to build this charging into 6,000 km of public roads in the next few years. This investment has practical implications. This charging will be suitable for both cargo and passenger vehicles and will reduce the need for battery size in passenger and cargo electric vehicles by 70%. At

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the same time, the cost of incorporating inductive charging into the entire road network in Sweden is as financially demanding as the necessary financial support to purchasing batteries for cargo and passenger electric cars, which the Swedish government has allocated in its budget outlook. So, no additional resources are needed by moving these funds to complete the inductive charging infrastructure. The impact on the construction sector is very positive.

The aim of the measure is **to revise the requirements for buildings, outdoor parking spaces, urban infrastructure and road infrastructure outside cities** to be **ready for inductive charging** and to innovate these requirements in line with innovations that increase the sustainability of mobility in and outside cities. Inductive charging will not only reduce the size of the required battery in an electric car, but also reduce the demands on the charging infrastructure for electric mobility. At the same time, incorporate into these requirements other urban infrastructure needs, such as:

- **Building capacities for smart charging** , especially where a longer charging time is expected (e.g. parking while staying at home and at work);
- Support for building infrastructure not only for end devices, but also for **building network infrastructure such as cabling for electromobility and urban lighting**, on which it is possible to mount chargers for electric cars following the example of France, Great Britain and other countries of Western and Northern Europe;
- Involvement of electro-mobility in obtaining **flexibility for energy systems** as a temporary energy storage by using already solved two-way charging (including the V2G concept);
- Measures in new buildings and during the renovation of existing buildings for the connection with the smart city concept, the installation of smart grid infrastructure and electric mobility.

Measure 3: Development of Positive energy districts (PEDs)

Description of the measure:

PEDs are energy-efficient urban areas or clusters of buildings that produce zero greenhouse gas emissions and actively generate an annual surplus of electricity from renewable sources at a local or regional level - the amount of electricity produced within the PED must be greater than the amount supplied from the outside environment. They require the integration of multiple systems and types of infrastructure, interaction between buildings, users and regional energy, transport and information and communication systems. They ensure the stability of electricity supplies and the quality of life for all residents in accordance with social, economic and environmental sustainability. PEDs serve as innovation labs. They are strongly integrated into the context of the entire city. They are currently being built as part of building renovation projects, to a lesser extent than new neighborhoods.

The core of PED is the energy system – the physical infrastructure required for the production, transformation, supply, storage and consumption of energy. Management systems work on the basis of ICT.

The main four components of PED are: **Energy efficiency, RES, energy flexibility and e-mobility.**

The aim of the measure is to develop a strategy for the development of PEDs in Slovakia, which would include:

- **Government and local government support** and their strong involvement;
- **Broad partnership** between public and private institutions and companies;
- Building **a strong awareness and involving residents** in the preparation and implementation of projects;
- Focusing on the overall benefits for residents and businesses in PEDs rather than seeing costs as the main factor;
- **Innovations** and demonstrating their positive impact on obtaining financing/investments;
- Networking of reliable suppliers and contractors;
- Innovative **urban and energy planning** ;

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- **Increasing Slovakia's participation in the PED association** - Slovakia is little involved in PED building projects, it is not part of Urban Europe and the associations that develop such projects, and therefore cannot apply for grants.

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9 The Action Plan for the implementation of the Green Deal for Buildings

a) Implementation of the Agreed Measures

The Green Deal for Buildings has been the culmination of the cooperation of all involved stakeholders within the GreenDeal4Buildings (GD4B) project in the creation of proposals for road map measures together with the proposal of a strategy for its implementation. At the Ceremonial Round Table, which was held in Bratislava on April 23, 2024, we presented the resulting document under the title Green Agreement for Buildings, the basis of which is the proposal of almost fifty measures. It reflects all the needs that are necessary for the transition to an efficient carbon-neutral construction industry, the financing of which will be sustainable and stable. The 48 proposed concrete measures are intended to help create more favorable conditions for investments in clean energy in buildings and urban infrastructure, including the renovation of buildings to emission-free buildings. Their fulfillment will lead to the fulfillment of the goals of the European Green Agreement and the better use of public financial resources with the participation of private capital and the attraction of sustainable energy investments in renewal and the reduction of their risks. The ceremonial round table was an important milestone of the project and the culmination of several years of cooperation and joint efforts to create a road map. At the same time, it served to declare the importance of an agreement on future cooperation within the new European coalition for financing energy efficiency and started the round tables as a permanent multilateral discussion forum. The event highlighted the importance of the joint efforts of various stakeholders in solving challenges in the construction and energy sectors.

More than 45 participating stakeholders endorsed the Green Deal for Buildings and expressed direct support. These organisations were representing the key stakeholders from the construction sector, education, energy efficiency value chain, housing and building renovation financing, state and public administration, secondary vocational schools and universities and professional associations, guilds, clusters and other. All the representatives met together at the Ceremonial Round Table to express their support for the resulting Green Deal for Buildings, and to move the dialogue towards specific projects and activities aimed at increasing the volume of investments to implementing the objectives of the European Green Deal, including the renovation wave.

The discussions at the ceremonial meeting covered all the key topics and challenges of today's fast-changing society. The construction and energy sectors are in the spotlight and facing major challenges like never before. The impact of innovations and new technologies, the transformation of the construction industry and Slovakia's strategy in supporting the introduction of innovations were among the issues discussed. The necessary cooperation across sectors and the impact of digitization on the education system and the impact of innovation and digitization on businesses and firms were emphasized. Participants focused on the integration of renewable energy sources, the high energy demand of buildings, the reduction of greenhouse gas emissions, the low productivity of work in the construction sector, the lack of qualified labor, the high prices of materials and the requirements on the necessary financing for the renovation and construction of buildings from private and public sources.

The event successfully brought together all key stakeholders and confirmed their commitment to the project's goals and paved the way for further cooperation and implementation of the identified and adopted measures. Support for the activities of the GD4B project and the proposed measures in the

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Green Deal for buildings was expressed at the ceremonial meeting by the representative of the state administration, the Ministry of Economy of the Slovak Republic (MH SR), state secretary Kamil Šaško.

The importance of education in the entire process of transformation of the construction industry, the introduction of innovations, digitization and the lack of qualified personnel needed to meet the goals of the European Green Deal and the need to train high-quality experts, emphasized Peter Mesároš, rector of the Technical University of Košice (TUKE), representative of the education sector. He emphasized that the critical factor is precisely human capital and declared support for the entire spectrum of measures aimed at optimizing the vocational education system.

Support for the Green Deal for Buildings was also declared by Jiří Plíšek, representative of the financial sector, chairman of the board of directors of Prva stavebná sporiteľna, as (PSS). He emphasized that the renovation of buildings in Slovakia cannot reach the required pace without the participation of private capital and without the involvement of various sources and financing instruments. This requires the cooperation of all interested parties and the implementation of effective financial instruments. Sufficient resources and diverse financing instruments can help in increasing the rate of building renovation to the necessary level so that they continue to serve their residents without posing a disproportionate burden on the environment.

Martin Svoboda, director of the innovation and international relations section of the Slovak Innovation and Energy Agency (SIEA), also emphasized the support and need for the introduction of innovations in Slovakia and the importance of digitization for businesses. The demanding European requirements for achieving a high level of energy efficiency are not possible without creating suitable conditions for the development of the digitalization of the Slovak construction and energy industry.

Pavol Kováčik, president of the Association of Construction Entrepreneurs of Slovakia (ZSPS), emphasized the need for the cooperation of all interested parties. As the coordinator of the GreenDeal4Buildings (GD4B) project, he believes that the project has created a platform and will help to transfer existing best practice of other EU Member States, define measures and plans, propose improvements within national policies and action plans, and will also monitor the implementation of these measures to improve the functioning of the market.

The proposed measures in the Green Deal for Buildings are aimed at increasing the competitiveness of Slovakia, its regions and especially the construction sector. It is crucial for attracting private investment in sustainable energy investment and building renovation and for reducing the risks of private investment in building renovation and sustainable energy projects. The Green Deal for Buildings further elaborated other specific measures aimed at the renovation of residential and non-residential buildings, the renovation of industrial buildings and specific measures for sustainable urban infrastructure and e-mobility.

The strategic material Green Deal for Buildings is part of the initiative of the European Commission and corresponds to the new initiative of the European Alliance for Energy Efficiency Financing (EEEFin), which was launched on April 22, 2024. This new initiative brings together EU countries, financial institutions and the Commission at the highest level with in order to create a long-term and viable framework for financing investments in energy efficiency, it is developing a platform for dialogue and exchange of experience and the development of new cooperation initiatives over the coming years.

At the ceremonial round table in the Primatial Palace in Bratislava, the supporters of the measures of the Green Deal for Buildings and also the partners of the project declared their interest

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in continuing the organization of round tables and the implementation of the proposed measures. As part of their endorsements, some organizations expressed interest in sponsoring specific measures and/or continuing actively in further dialogue aimed at developing details and implementing these measures. Therefore, at the 12th round table that was organized on 30-31 May 2024 in Novy Smokovec. At this meeting, the further involvement of stakeholders in agreed measures and initiatives was disc used. The resulting agreements were translated into an action plan that that is presented in this section.

Topics such as energy decentralization, building energy communities and the creation of the European Energy Efficiency Financing Coalition (EEFIC) were also presented by Zuzana Šulková, the EEFIC dossier manager at the Ministry of the Interior of the Slovak Republic. It is a follow-up platform to the EEFIG (Energy efficiency financing institutions group) and the Sustainable Energy Investment Forums together with the projects supporting creation of stakeholders'' roundatables such as GreenDeal4Buildings project. The goal is to strengthen cooperation between national policy makers and financial institutions and other stakeholders. An important and new element is establishing national hubs in all EU member states. The national hubs should start their activities by end of 2025. The partners and stakeholders of the GreenDeal4Buildings project expressed their willingness to actively participate and help in the organization of meetings, as well as to use their communication channels. MH SR accepted the offer.

As explained above, the outputs of the roundtable meetings were refined in the Action Plan presented in this section of the deal. Further active work after the end of the GreenDeal4Buildings project is expected from the stakeholders who expressed their willingness to lead the work on implementing the concrete measures. These stakeholders are listed in the Action Plan. The diverse representation of stakeholders in the given area can significantly move the dialogue towards specific projects and activities aimed at increasing the volume of investments in implementing the objectives of the European Green Deal, including the renovation wave. The cooperation of all interested parties and the implementation of effective financial instruments will be necessary . Emphasis will be placed on coordinated progress in construction and energy, decentralization of energy, education and support of local communities.

Table 1 List of stakeholders listed in the action plan

Name of the organization	Abbreviated name used in the action plan
Competent authorities - national, regional, local	
Ministry of Education, Research, Development and Youth of the Slovak Republic	MSVVM
Ministry of Transport of the SR	MD
Ministry of the Environment of the Slovak Republic	MZP
Ministry of Economy of the SR	MH
Bratislava self-governing region	BOD

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Name of the organization	Abbreviated name used in the action plan
Banskobystrica self-governing region	BBSK
Slovak Environmental Agency	SAZP
State Housing Development Fund	ŠFRB
Union of Cities of Slovakia	UMS
Secondary and higher education institutions	
Secondary industrial school of construction and surveying, Bratislava	SPSSBA
Secondary industrial school O. Winkler, Lučenec	SPSLC
Secondary industrial school of construction and surveying, Košice	SPSSKE
Emil Belluš Secondary Industrial School of Construction, Trenčín	SPSSTN
Secondary vocational school of crafts and services, Poprad	SOSPP
Secondary vocational school of technologies and crafts, Bratislava	SOSBA
Secondary Vocational School of Construction, Nitra	SOSSNR
Technical secondary school, Prešov	SOSTPO
Secondary Vocational School of Electrical Engineering, 85101 Bratislava	SPSBA1
Secondary Vocational School of Electrical Engineering, 84102 Bratislava	SPSBA2
Secondary industrial school of construction, Prešov	SPSSPO
Secondary Industrial School of Construction, Žilina	SPSSZA
Secondary Vocational School of Construction, Žilina	SOSSZA
United school, Banská Bystrica	SSBB
Technical University of Košice	FAT
University of Žilina in Žilina	ZU
Employers	

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Name of the organization	Abbreviated name used in the action plan
Strabag Pozemné stavitelstvo sro	STRABAGPS
Danucem Slovensko a.s	I will give it
Chemkostav as	CHEMKOSTAV
Proma sro	PROMO
BALA a.s	BALA
HORNEX a.s	HORNEX
Koga Bau sro	WHO
STRABAG sro	STRABAG
Metrostav as - organizational unit Bratislava	SUBWAY
VÁHOSTAV-SK as	VAHOSTAV
Employee representatives	
Integrated trade union	IOZ
Associations of employers	
Association of Industrial Unions and Transport	APZD
Republican Union of Employers	RED
Slovak Trade Union	SZZ
Professional associations, guilds, clusters and other stakeholders	
Slovak Banking Association	SBA
Slovak Association of Sustainable Energy	SAPI
Association of energy service providers	APES
Cluster of Energy Communities of Slovakia	COOKIE
Consumer Protection Society	SOS

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Name of the organization	Abbreviated name used in the action plan
Slovak Council for Green Buildings	SKGBC
Buildings for the Future	BPB
Institute for Passive Houses	IEPD
Guild of painters of Slovakia	CMS
Guild of Roofers of Slovakia	CS
Kempelen Institute of Intelligent Technologies	KINIT
The first construction savings bank	PSS
CEPA - Friends of the Earth	PZCEPA
Chamber of Geodesy and Cartography	KGK
Slovak climate initiative	SKI
Slovak Smart City Cluster	SSCC
National energy cluster	NEK
Project coordinator and partners	
Association of Construction Entrepreneurs of Slovakia	ZSPS
Slovak Innovation and Energy Agency	SIEA
ViaEuropa Competence Centre sro	VIA
First Construction Savings and Loans (Prvá stavebná sporitelňa, a.s)	PSS
Institute of Education and Services, Ltd	UVS

An overview of the measures, the implementation schedule and stakeholders whose further efforts will lead to the implementation of the proposed measures are summarized in the **Action Plan (Table 9)**. Although the table specifies specific stakeholders, all supporters of the Green Deal for Buildings and members of the Round Table will be invited and informed about all activities related to the proposed measures and will be allowed to participate in the discussions and implementation of the measures as considered.

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Table 2 Action plan

Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
a.1	**National Sustainability Financing Strategy** (For the success of Slovakia, it is necessary to develop a comprehensive strategy at the national level and, following the example of some EU member states, implement measures that will ensure the transfer of public and private funding to areas that are critical for the transformation aimed at ensuring sustainability from the perspective of the European Green Deal and Fit for 55 .)	2025-2026	BSK, SOSTPO, SOSBA, SPSSKE, SOS, CS, KEKS, MH, RUZ, NEK, ZSPS, DANUCEM, APZD, METROSTAV, MD, HORNEX, SSCC, SKI, SAZP, PZCEPA, BPB, APES, SIEA	✓	✓	✓	✓	✓	✓
a.2	**A platform for financing sustainable energy investments and building renovations** (The round table of stakeholders agreed on the creation of a Financial Platform for the financing of sustainable energy investments, which will include key stakeholders such as financial institutions, the Ministry of Finance of the Slovak Republic, cities and others.)	2026-2027	SIEA, BSK, SOSTPO, SOSBAV, SOS, SAPI, CS, KEKS, ZSPS, MH, RUZ, NEK, ZSPS, DANUCEM, APZD, METROSTAV, TUKE, MD, SZZ, SSCC, SKI, SAZP, PZCEPA, BPB, APES, PSS, SBA, ŠFRB	✓		✓	✓		

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
a.3	**Financial blending (small PPP projects) for financing sustainable energy investments and building renovations** (Develop standardized principles for PPP (public-private partnership) and EnPC (Energy Performance Contracting) in the field of energy renovation of public buildings, so-called small PPP projects.)	2025-2026	SOSTPO, SOSBAV, SPSSKE, SAPI, KEKS, ZSPS, MH, RUZ, NEK, DANUCEM, APZD, TUKE, MD, PZCEPA, SKI, BPB, APES, SIEA	✓	✓	✓	✓	✓	
a.4	**Platform for smart energy services (prosumer platform)** (Establish a prosumer platform that will facilitate the cooperation of market participants on both the supply and demand sides. This platform is expected to bring together people, assets and data, creating entirely new ways of designing, providing and consuming smart energy services and relevant products.)	2024	BSK, ZU, SOSTPO, SOSBA, SPSSKE, SAPI, KEKS, ZSPS, MH, RUZ, NEK, APZD, TUKE, STRABAGPS, MZP, MD, SAZP, SKI, APES	✓	✓			✓	✓
a.5	**Support for participatory financing of community projects** (Process and enforce the legislative conditions of participatory financing (e.g. crowdfunding), including the conditions for an independent oversight.)	2025-2026	ZU, SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, HORNEX, SAZP, SKI, SSCC, PZCEPA, APES, SIEA	✓	✓		✓		

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
a.6	**Strategy and scheme for supporting households in the event of fluctuations in energy prices threatening households with energy poverty or in case of market manipulation by oligopolies on the domestic or world market**	2025-2027	BSK, ZU, SOS, KEKS SOSTPO, SPSSBA, SOSBA, SPSSKE, CMS, ZSPS, MH, RUZ, NEK, APZD, MD, SAZP, SKI, SSCC, PZCEPA, BPB, SIEA	✓			✓	✓	
a.7	**Scheme of support for the establishment of energy communities** (To prepare and implement a support scheme for motivating the creation of energy communities with the aim of reducing Slovakia's lagging behind in the use of renewable energy sources and achieving the capacity of renewable energy sources owned by citizens at the level of EU members such as Germany or the Netherlands, which face similar challenges in decarbonizing energy sources and reducing dependence on gas from Russia.)	2025-2027	BSK, BSK, SOSTPO, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, STRABAGPS, HORNEX, TUKE, ZA, SAZP, SKI, SSCC, PZCEPA, APES	✓	✓	✓	✓	✓	✓
a.8	**Raising public awareness, development and dissemination of skills, knowledge, competences related to the implementation of new smart energy service solutions** (To support programs for the dissemination of skills, knowledge and competences related to the implementation of new smart energy service solutions aimed at consumers (prosumers, for example from energy communities) as well as the necessary experts for their implementation.)	2025-2027	BSK, ZU, SOSTPO, SPSSBA, SOSBA, SPSSKE, SOS, CS, KEKS, UVS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, TUKE, ZU, MSVVM, SPSLC, SPSBA1, BALA,	✓	✓		✓	✓	✓

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
			METROSTAV, PROMA, SZZ , SAZP, SKI, SSCC, SIEA						
a.9	**One-stop-shop support for building renovation** (Establish and operate regional/national contact points/centers, with the aim of accelerating the renovation wave in the private (and public sector), offering a comprehensive service from technical, financial to legal advice, procurement and quality assurance of works.	2026-2028	BSK, SOSTPO, SPSSKE, SOS, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, TUKE, ZU, SZZ, BPB, SAZP, SKI, SSCC, PZCEPA, APES, SIEA	✓	✓	✓	✓	✓	✓
a.10	**The development of financial innovations to ensure the necessary investments in the renovation of buildings** (Investments in the clean energy stock of buildings can support the transition to a low-carbon economy in Slovakia and move the decarbonization of the economy to the desired levels by 2050. Therefore, the development and implementation of financial innovations for financing the renovation of buildings that complement existing consumer loans and construction loans is necessary.)	2025-2027	BSK, ZU, SOSTPO, SPSSBA, SOSBA, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD, MD, PROMA, SAZP, SKI, PZCEPA, BPB, APES, PSS, ŠFRB	✓	✓		✓		
a.11	**Implementation of individual building renovation roadmaps** (Implement individual renovation roadmaps for buildings that will use public funds for stepwise renovation and energy efficiency improvements, to ensure the efficient use of	2027-2028	BSK, ZU, SOSTPO, SPSSBA, SOSBA, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD,	✓	✓	✓	✓	✓	

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
	public funds and the optimal progress in the renovation of the building towards zero-emission building.)		MZP, MD, TUKE, SOSZA, PROMA, KOGA, STRABAG PS , SAZP, SKI, PZCEPA, BPB, APES, SIEA						
a.12	**Implementation of the digital building passport** (The current revision of EU legislation (EPBD) introduces the obligation to implement digital building passports. The European approach ensures implementation and a harmonized approach. Providing accessible and high-quality information, digital building passports will enable optimized maintenance, renovation and general maintenance planning. It will reduce energy and material flows, will extend the life of the building and support the principles of the circular economy.)	2027-2030	BSK, ZU, SOSTPO, SPSSBA, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, SAZP, SKI, TUKE, KGK, PROMA, KOGA, STRABAG PS, HORNEX, SZZ, BPB, APES, SIEA	✓	✓		✓	✓	
a.13	**Implementation of Minimum Energy Performance Standards (MEPS) for building renovation** (Creating demand in the form of government-mandated minimum energy performance requirements for buildings by local authorities or requirements for buildings that are rented commercially. In the private sector, it is recommended to combine minimum energy performance requirements with appropriate and clearly defined tax incentives.)	2027-2030	BSK, ZU, SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, TUKE, PROMA, STRABAG PS, SZZ, HORNEX,	✓			✓	✓	

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
			CHEMKOSTAV, SAZP, SKI, PZCEPA, BPB, SIEA						
a.14	**Support and monetization of several benefits of building renovation** (Implement multiple renovation benefits into building renovation contracts, including non-energy benefits (e.g. health benefits, mobility, etc.), which are one of the key aspects of demand creation.)	2027-2028	SOSTPO, SOSBA, SPSSKE, SOS, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, TUKE, HORNEX, CHEMKOSTAV, SAZP, SKI, BPB, APES, SIEA	✓	✓		✓	✓	
a.15	**Abolition of the exemption from the EU taxonomy for the governments of the EU member states** (The aim of this measure is to formulate a recommendation to the European Commission for the cancellation of the exception in question and stricter assessment of financial support and subsidies in areas that do not meet the requirements of the EU taxonomy.)	2026-2030	ZU, SOSTPO, SOSBA, SPSSKE, KEKS, MH, RUZ, APES, NEK, APZD, MZP, MD, SAZP, SKI, PZCEPA, APES	✓			✓	✓	
b.1	**Changing societal priorities towards climate-neutral innovations** (Achieving climate neutrality is a turning point that requires a fundamental reassessment of social priorities and their reflection in the state budget and the allocation of EU funds in operational programs.)	2025-2027	BSK, SOSTPO, SOSBA, SPSSKE, CMS, SAPI, KEKS, ZSPS, MH, RUZ, NEK, APZD, MZP, MD, TUKE, PROMA,	✓	✓	✓	✓	✓	✓

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
			STRABAG PS, HORNEX, CHEMKOSTAV, SSCC, PZCEPA, SKI, APES, SIEA						
b.2	**Support for innovations to increase labour productivity in construction sector and industrialization of construction production** (Prepare and implement an innovation program to increase labor productivity in the construction industry by rebuilding the industry around innovation in materials, building products, equipment and processes, as well as by leveraging the digitization of the industry)	2026-2031	ZU, SOSTPO, SOSBA, SPSSKE, SAPI, CS, KEKS, ZSPS, NEK, TUKE, ZA, APZD, RUZ, STRABAGPS, DANUCEM, PROMA, METROSTAV, VAHOSTAV, MD, MH, MSVVM, SZZ, APES	✓	✓	✓	✓	✓	✓
b.3	**Support for the creation of an ecosystem for the use of modular technology in the construction of new buildings and the renovation of existing buildings** (Modular construction requires a strong material and technical ecosystem, which requires high initial costs. Also, the risk in developing the local market is high. For this reason, support for developing the necessary ecosystem using EU funds for the transformation to climate neutrality from operational programs as well as support for	2026-2031	ZU, SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS, NEK, TUKE, ZA, APZD, RUZ, STRABAGPS, DANUCEM, PROMA, METROSTAV,	✓	✓	✓	✓	✓	✓

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
	the involvement of Slovak institutions in European projects aimed at the development of modular construction.)		VAHOSTAV, MD, MH, MSVVM						
b.4	**Support for dual green and digital growth (Twin Green and Digital Growth) in the construction sector** (The digitization of the process of green transformation in the construction space is based on 5 basic pillars. The development of solutions within the defined pillars must be supported by a structured innovation support program in order to accelerate the green transformation and use the synergies of green and digital growth.)	2025-2030	ZU, SOSTPO, SPSSBA, SOSBA, SPSSKE, SAPI, KEKS, ZSPS, NEK, TUKE, ZA, APZD, RUZ, STRABAGPS, DANUCEM, PROMA, METROSTAV, DANUCEM, VAHOSTAV, MD, MH, MSVVM, SZZ	✓	✓	✓	✓	✓	✓
b.5	**Support of building owners and communities in cities and towns in the renovation of buildings to zero emission building standard and buildings with positive energy balance** (active nods on the grid) **from community projects** (a form of crowdfunding) **aimed at decarbonizing energy in buildings**	2027-2030	BSK, SOSTPO, SOSBA, SPSSKE, SOS, CS, KEKS, ZSPS, NEK, RUZ, APZD, MH, MD, MZP, SKI, SAZP, PZCEPA	✓	✓	✓	✓	✓	✓
b.6	**Smart Cities research and development program** (Create a support scheme for the area of Smart Cities at the level of operational programs, including support for the participation of Slovak cities in European projects.)	2025-2030	ZU, SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS,	✓	✓		✓	✓	✓

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			TUKE, ZA, ZSPS, MH, MD, SSCC						
b.7	**Strategy of further and continuing education in the energy and construction sectors for implementing innovations, including financing** (Develop a strategy and new educational programs of continuing professional education and further education at the secondary school level for training and re-training craftsmen from the energy and construction sectors)	2025-2027	ZU, SOSTPO, SPSSBA, SOSBA, SPSSKE, CMS, KEKS, UVS, ZSPS, MSVVM, MH, MD, NEK, RUZ, APZD, TUKE, ZA, SPSZA, SPSBA1, SPSTN, SOSPP, SZZ, PROMA, VAHOSTAV, HORNEX	✓	✓		✓	✓	✓
b.8	**Updating existing and creating new vocational education and training programs at secondary level in order to adapt programs to technical progress and the needs of the transformation of the construction sector** (The transformation of the construction sector towards industrial construction production, which will largely be carried out outside the construction site and the structures will be assembled on the construction site, places new demands on skills, knowledge and competences.)	2024-2026	ZSPS, SIEA, UVS, RUZ, MSVVM, MD, SOSPP, SOSBA, SPSLC, SPSSBA SPSSKE, SPSSPO, SPSSZA, SOSTPO, BSK, BBSK, CMS, SAPI, CS, KEKS, MH, NEK, APZD, TUKE, ZA, SPSBA1 , SPSTN, PROMA,	✓	✓	✓	✓	✓	✓

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
			VAHOSTAV, HORNEX, SZZ,						
b.8.1	Development of educational programs and training focused on buildings with zero emissions, carbon neutrality and circular nature of buildings	2024-2026	ZSPS, UVS, NEK, SPSSKE, TUKE, PZCEPA, MD, MSVVM, MH, MD, RUZ, APZD, ZA, SPSZA, SOSBA, SOSPP, SOSNR, SPSBA1, SPSTN, SOSPP, PROMA, VAHOSTAV, HORNEX, SZZ,	✓	✓		✓	✓	✓
b.8.2	Development of educational programs and training focused on the integration of decentralized energy sources and flexibility management	2024-2028	ZSPS, UVS VIAEUROPA, NEK, SPSSKE, MD, MSVVM, MH, MD, RUZ, APZD, TUKE, ZA, SPSZA, SOSBA, SOSPP, SPSBA1, SPSTN, SPSLCSOSPP, SPSPO, SPSBA2, SSBB, SOSNR,	✓	✓		✓	✓	✓

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
			PROMA, VAHOSTAV, HORNEX , STRABAGPS, SZZ,						
b.8.3	Development of educational programs and training focused on the integration of XR off-site, on-site and in education	2027-2029	MD, ZSPS, UVS, NEK, SOSBA, TUKE, MSVVM, MH, RUZ, APZD, ZA, SPSZA, SOSPP, SPSBA1, SPSTN, SPSLC SOSPP, SPSPO, SPSBA2, SSBB, SOSNR, PROMA, VAHOSTAV, HORNEX, STRABAGPS, SZZ ,	✓	✓		✓	✓	✓
b.8.4	Development of educational programs and training focused on industrialized construction and Industry 5.0	2029-2031	MD, ZSPS, UVS, VIAEUROPA, MSVVM, MH, RUZ, APZD, TUKE, ZA, SPSZA, SOSPP, SPSBA1, SPSTN, SOSPP, SPSPO,	✓	✓		✓	✓	✓

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			SPSBA2, SSBB, SPSLC, SOSNR, PROMA, VAHOSTAV, HORNEX, STRABAGPS, SZZ,						
b.8.5	Adaptation of secondary school curricula to cross-trade educational programs	2024-2025	MD, ZSPS, RUZ, UVS, SOSBA, SPSSZA, SPSLC, MSVVM, MH, APZD, TUKE, ZA, SOSPP, SPSBA1, SPSTN, SOSPP, SPSPO, SPSBA2, SSBB, SOSNR, PROMA, VAHOSTAV, HORNEX, STRABAGPS, KOGA, SZZ,	✓	✓		✓	✓	✓
b.8.6	Updating the curriculum for vocational education in secondary schools with regard to technical progress in the field of digital technologies in the construction industry and the regeneration cycle of buildings	2026-2029	ZSPS, UVS, RUZ, KGK, MD, SOSPP, SOSBA, SPSLC, SPSSKE, SPSSPO, SPSSZA, TUKE, MSVVM, MH,	✓	✓		✓	✓	✓

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			APZD, ZA, SPSZA, SOSPP, SPSBA1, SPSTN, SOSPP, SPSPO, SPSBA2, SSBB, SPSLC, SOSNR, PROMA, VAHOSTAV, HORNEX, STRABAGPS, SZZ,						
b.8.7	Updating the curriculum for vocational education in secondary schools with regard to Industry 5.0 and industrial construction	2029-2031	MD, ZSPS, UVS, RUZ, KGK, SOSPP, SOSBA, , SPSLC, SPSSKE, SPSSPO, SPSSZA, MSVVM, MH, APZD, TUKE, ZA, SOSPP, SPSBA1, SPSTN, SPSPO, SPSBA2, SSBB, SOSNR, PROMA, VAHOSTAV , HORNEX, STRABAGPS, KOGA, SZZ,	✓	✓		✓	✓	✓

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
b.9	**Supporting scholarships for students in the study fields that are in short supply in the country and necessary to cope with the current changes resulting from European agreements** (In order to increase the share of graduates who remain working in the construction industry after completing secondary education, it is necessary to motivate students already during their education in the form of scholarships.)	2024	MD, ZSPS, APZD, SOSBA, SPSLC, SPSSBA SPSSKE, SPSSPO, SOSTPO, BBSK, CMS, CS, KEKS, MSVVM, MH, TUKE, ZA, SOSPP, SPSBA1, SPSTN, SOSPP, SPSBA2, SSBB, SOSNR, PROMA, VAHOSTAV , HORNEX, KOGA, BALA, SZZ,	✓		✓	✓	✓	
b.10	**State support in the creation of new educational programs for pupils and adults** (The transformation of the construction sector will require a fundamental change in existing educational programs and the creation of new ones. These programs concern not only pupils in preparation for a profession, but also the retraining of adults in further education programs.)	2024-2026	ZSPS, MD, MSVVM, BSK, NEK, SOSBA, SPSSKE, SPSSPO, SPSSZA, SOSTPO, SOSSNR, SOS, CMS, SAPI, CS, KEKS, RUZ, APZD, TUKE, HORNEX, KOGA, PROMA, DANUCEM, SZZ,	✓	✓				✓

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b.11	**Support from the state for companies involved in the educational process** (The construction sector is characterized by a high proportion of micro, small and medium-sized enterprises, which do not have the opportunity to participate in the educational process without financial support from the state.)	2024	MD, MH, ZSPS, RUZ, APZD, NEK, SPSSPP, SPSPO, SPSSZA, SOSTPO, SPSSBA, SOSSNR, SOSBA, CMS, SAPI, KEKS, DANUCEM, SZZ, CHEMKOSTAV, STRABAG, HORNEX, METROSTAV, VAHOSTAV, KOGA, PROMA, BALA, STRABAGPS, CHEMKOSTAV,	✓			✓	✓	✓
b.12	**Ensuring additional education of teachers for new requirements** (Modification of existing and creation of new vocational education and training programs must go hand in hand with intensive education of trainers - teachers in secondary schools. This education should be recognized as part of professional education/professional development of teachers.)	2024	ZSPS, UVS, VIAEUROPA, MSVVM, RUZ, APZD, MD, SOSPP, SOSSNR, SOSBA, SPSLC, SPSSKE, SPSSBA, SPSSPO, SPSZA,	✓		✓	✓	✓	✓

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			SOSTPO , BBSK, CMS, SAPI, KEKS, HORNEX, STRABAG, VAHOSTAV, METROSTAV, SZZ,						
b.13	**Making the teaching profession more attractive and creating conditions for a significant increase in the interest of young people and professionals in the teaching profession** (Secondary schools are struggling with a shortage of teachers and the increasing average age of current employees. It is therefore necessary to attract new young teachers to secondary education so that the age structure of teaching staff is sustainable from the point of view of the need to constantly respond to new practical requirements.)	2025	MSVVM, MD, ZSPS, SIEA, RUZ, APZD, TUKE, SOSBA, SPSLC, SPSSKE, SPSSPO, SPSZA, SOSTPO, BBSK, SPSSBA, SOSSNR, CMS, SAPI, CS, KEKS, HORNEX, STRABAG, VAHOSTAV, METROSTAV, SZZ,	✓			✓	✓	✓
b.14	**Change in the method and amount of school financing and material-technical support, so that a network of schools with a smaller number of schools (optimalization of the network of secondary vocational schools) with optimum number of pupils (around 1000 pupils per school) is created, which would be supra-regional and specialized in construction, and having the required material-technical support**	2024-2025	MSVVM, MD, RUZ, APZD, ZSPS, MSVVM, KGK, SOSPP, SOSBA, SOSSNR, SPSLC, SPSSBA, , SAPI SPSSKE, SPSSPO, CMS,	✓	✓		✓	✓	✓

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	(The analysis of the current situation showed that the biggest obstacle to the introduction of innovative educational concepts is insufficient funding of secondary schools by the state.)		SPSZA, SOSTPO , BBSK, KEKS, SZZ,						
b.15	**Ensuring effective and sufficient collection of data on the education system for the purposes of its management, including the employability of graduates** (Quality and reliable data are necessary for effective planning and programming of education, not only in the construction sector.)	2024-2026	MD, MSVVM, ZSPS, KGK, RUZ, APZD, TUKE, ZA, SPSSKE, SOSNR, SOSPP, SSBB, SOSBA, SPSSKE				✓	✓	✓
b.16	**Creation of nationwide campaigns on the applicability of the education in the construction sector and systematic promotion of the industry by the state in the media** (The transformation of the construction industry, changes in the nature and conditions of work in the construction must go hand in hand with the promotion of employment and career opportunities aimed at the public, primary school pupils and their parents.)	2024-2028	MSVVM, MD, MH ZSPS, RUZ, APZD, ZU, SIEA, NEK, KGK, SOSPP, SPSLC, SPSSKE, SPSBA, SPSSZA, TUKE	✓			✓	✓	✓
b.17	**State support for continuing education**	From 2025	MSVVM, MD, MH, APZD, KGK, RUZ,	✓	✓		✓		✓

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	(Construction is becoming a sector where the requirements for skills, knowledge and competence will change rapidly. For this reason, continuing education will play an important role that is unprecedented in the past. Lifelong learning in this sector must be systematic and its stability, quality and accessibility must be improved. For this reason, government intervention and financial support of all forms of lifelong learning is essential.)		SOSPP, SOSBA, SPSSKE, NEK						
c.1	**Participation of Slovak investors in building renovation and other sustainable energy investments on the DEEP (De-risking Energy Efficiency Platform) platform** (To support the De-risking Energy Efficiency Platform (DEEP), which was developed at the initiative of the European Commission and EEFIG, by sharing available data and records of achieved results in the field of energy efficiency.)	2026-2027	SOSTPO, SOSBA, SPSSKE, SAPI, KEKS, ZSPS, RUZ, APZD, HORNEX, STRABAGPS, PROMA, BPB, APES, ŠFRB	✓		✓	✓	✓	
c.2	**Implement the EEFIG Underwriting Toolkit (EEFIG Underwriting Toolkit)** (Implement the EEFIG Underwriting Toolkit (EEFIG Underwriting Toolkit), developed in cooperation with the European Commission in order to correctly label investments in building renovation and other investments in sustainable energy and reduce in synergy with other instruments (e.g. DEEP) the degree of risk of these investments.)	2026-2027	SOSTPO, SOSBA, SPSSKE, SAPI, KEKS, MD, MH, ZSPS, RUZ, APZD, TUKE, BPB, APES, ŠFRB			✓	✓		

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
c.3	**Improving the flow of information on the energy performance of buildings aimed at more effective pricing of building renovation financing products**	2025-2027	BSK, SOSTPO, SPSSBA, SOSBA, SPSSKE, SAPI, KEKS, MH, MD, TUKE, ZSPS, RUZ, APZD, BPB, APES, ŠFRB, SIEA			✓	✓	✓	
c.4	**Replication of successful practices to develop the market for sustainable energy investment in building renovation to reach critical mass to meet Fit-for-55 and 2050 targets**	2025-2028	BSK, SOSTPO, SOSBA, SPSSKE, SAPI, KEKS, , SZZ, ZSPS, TUKE, ZU, RUZ, APZD, NEK, PROMA, SSCC, BPB, APES, ŠFRB, SIEA	✓	✓	✓	✓	✓	
c.5	**Standardization of processes for approving building renovation projects, or common methodology for approving project financing**	2026-2028	MD, MH, BSK, ZU, SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS,			✓	✓	✓	

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	(Implementing standardization of project financing approval processes by financial institutions and financial intermediaries can reduce transaction costs for energy efficiency financing of buildings and is also needed to increase securitization of green mortgages and other energy efficiency assets.)		RUZ, APZD, TUKE, BPB, APES, ŠFRB, SIEA						
bd.1	**National Plan for Financing Sustainability in the Housing Sector** (Process the National Plan for financing sustainability in the housing sector. Sustainability is defined by the requirements of the EU taxonomy.)	2026-2028	SOSTPO, SPSSBA, SOSBA, SPSSKE, SOS, KEKS, ZSPS, TUKE, ZA, RUZ, APZD, PROMA, HORNEX, BALA, METROSTAV, SZZ, SAZP, SSCC, PZCEPA, SKI, BPB, APES, PSS, ŠFRB, SIEA	✓		✓	✓	✓	
bd. 2	**Development of rental housing** (Develop the rental housing development plan.)	2026-2030	SOSTPO, SOSSNR, SPSSBA, SOSBA, SPSSKE, CMS, CS, KEKS, ZSPS, MD, MH, RUZ, HORNEX, METROSTAV, CHEMKOSTAV, SZZ,	✓	✓	✓	✓	✓	

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			SAZP, PZCEPA, SKI, APES						
bd. 3	**Plurality of housing financing** (Ensure legislative plurality of housing financing, which would include rules for financial blending of different sources of financing, different financial instruments and tax instruments.)	2025-2028	SOSTPO, SOSBA, SPSSKE, KEKS, ZSPS, MH, MD, RUZ, APZD, TUKE, APES, PSS, ŠFRB	✓	✓	✓	✓	✓	
bd. 4	**Legal certainty for green procurement for the renovation of apartment buildings** (Prepare and ensure the legislative process for adopting legislation and commercial-law standards to ensure legal certainty for procurers using green public procurement, including rules for the use of public resources.)	2025-2028	SOSTPO, SPSSBA, SOSBA, SAPI, KEKS, ZSPS, MD, MH, RUZ, HORNEX, METROSTAV, SKI, SSCC, APES	✓	✓	✓	✓	✓	
bd. 5	**Reduction of VAT on RES in accordance with the amendment of the EED for final consumers** (The amendment to the EED brings the possibility for member states to reduce the VAT rate on RES. This reduced rate is intended to motivate demand for RES on the market by final consumers in the residential sector.)	2025-2026	ZU, SOSTPO, SOSBA, SOS, SAPI, KEKS, MH, TUKE, ZSPS, RUZ, SZZ, SSCC, APES, SIEA	✓	✓		✓		

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nb. 1	**Public procurement for non-residential buildings** (The entire public procurement process needs to be re-evaluated and the principles of transparency and anti-corruption measures incorporated.)	2026-2028	BSK, SOSTPO, SPSSBA, SOSBA, KEKS, ZSPS, MD, MH, RUZ, HORNEX, METROSTAV, KOGA, PROMA, APES	✓	✓		✓	✓	
nb. 2	**Creation of a one-stop-shop center (OSSC) to support the renovation of non-residential buildings** (Preparing in cooperation with the European research and innovation programs Horizon Europe, Climate and Environmental Program LIFE, EIB (e.g. ELENA) and other available programs establishment of an OSSC, including the networking of all existing professional capacities to support the renovation of non-residential buildings in public and private ownership.)	2026-2028	BSK, SOSTPO, SOSBA, KEKS, ZSPS, MH, MD, NEK, SPSSKE, RUZ, APZD, TUKE, SZZ, SAZP, APES, SIEA	✓	✓	✓	✓	✓	✓
nb. 3	**Support for innovations in the RES sector aimed at increasing the sustainability of RES technologies for use in commercial and office buildings**	2028-2030	SOSTPO, SOSBA, SAPI, KEKS, ZSPS, MH, MD, NEK, SPSSKE, SPSBA, RUZ, APZD, TUKE, SZZ, SSCC, APES, SIEA	✓	✓		✓		

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
pb.1	**To initiate the cooperation of companies in the field of increasing energy efficiency and the use of renewable resources in companies** (Process and implement a proposal for cooperation in the field of increasing energy efficiency and the use of renewable resources in companies.)	2025-2027	SOSTPO, SOSBA, SAPI, KEKS, MD, MD, ZSPS, RUZ, APZD, SZZ, TUKE, ZU, BPB, APES, SIEA	✓	✓	✓	✓	✓	
pb.2	**Finalization of conditions for industrial energy communities** (In order to be able to implement such energy communities in Slovakia, it is necessary to finalize the conditions within the legislation for the implementation of the new design of the electricity market.)	2026-2028	BSK, SOSTPO, SOSBA, SAPI, KEKS, ZSPS, RUZ, APZD, NEK, TUKE, ZU, DANUCEM, CHEMKOSTAV, STRABAG, HORNEX, METROSTAV, VAHOSTAV, KOGA, PROMA, BALA, STRABAGPS, CHEMKOSTAV, SSCC, SKI, APES, SIEA	✓	✓		✓	✓	
pb.3	**Support for innovations in the RES sector aimed at increasing the sustainability of RES technologies for use in industry** (In addition to the development of the market and the rate of use of RES, it is necessary to support innovations aimed at the sustainability of the technologies that	2026-2028	SOSTPO, SOSBA, SAPI, KEKS, MH, MD, SPSSKE, ZSPS, RUZ, APZD, NEK, TUKE, ZU,	✓	✓		✓	✓	

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				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
	we use to use these energy sources. For this, it is necessary to set up OP Slovakia schemes as well as other financial resources.)		SSCC, DANUCEM, CHEMKOSTAV, STRABAG, HORNEX, METROSTAV, VAHOSTAV, KOGA, PROMA, BALA, STRABAGPS, CHEMKOSTAV, APES, SIEA						
mi.1	**Plans for sustainable mobility** (The Sustainable Urban Mobility Plan is a strategic plan designed to meet the mobility needs of people and businesses in and around cities for a better quality of life. It builds on existing planning practices and takes due account of the principles of integration, participation and evaluation.)	2026-2028	ZU, SOSTPO, SPSSBA, SOSBA, KEKS, MH, MD, RUZ, ZSPS, TUKE, SPSSKE, SSBB, SPSSTN, SZZ, STRABAG, VAHOSTAV, METROSTAV, HORNEX, PROMA, KOGA, CHEMKOSTAV , SSCC, SKI, PZCEPA	✓	✓		✓	✓	✓

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Measure number	Name (focus) of the measure/action	Implementation schedule	Stakeholders who lead efforts aimed at the implementation of the measure/action	Stakeholders to be involved					
				Employers	*Other corporate stakeholders*	*Financial institutions*	*The government*	*Regions*	*Educational institutions*
mi.2	**New requirements for urban infrastructure and non-urban road infrastructure** (The aim of the measure is to redesign requirements for buildings, outdoor parking spaces, urban infrastructure and non-urban road infrastructure to be ready for inductive charging and to innovate these requirements in line with innovations that increase the sustainability of mobility in and outside cities.)	2027-2030	ZU, SOSTPO, SOSSNR, SPSSBA, SOSBA, KEKS, ZSPS, TUKE, RUZ, APZD, HORNEX, PROMA, MH, SSCC, SKI, PZCEPA	✓	✓		✓	✓	
me.3	**Development of Positive energy districts (PEDs)** (PEDs are energy-efficient urban areas or clusters of buildings that produce zero greenhouse gas emissions and actively generate an annual surplus of electricity from renewable sources at the local or regional level. At the core of a PED is the energy system – the physical infrastructure required for production, transformation, delivery, storage and energy consumption. Control systems work on the basis of ICT.)	2026-2030	BSK, SOSTPO, SOSBA, SAPI, KEKS, ZSPS, MH, TUKE, ZU, SPSSKE, SPSSBA, SSBB, SPSPO, RUZ, APZD, NEK, HORNEX, PROMA, BALA, METROSTAV, STRABAGPS, SSCC, SKI, PZCEPA, SAZP, APES, SIEA	✓	✓		✓	✓	

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b) Sustainability of the Stakeholders' Consultation and Framework for Monitoring the Implementation of the Green Deal for Building

The implementation plan of the agreed measures is also the work program of the roundtable of stakeholders of the Green Deal for buildings, which has been set as a permanent forum for discussion and dialogue about the agreed measures, and about new round table activities that will respond to specific problems and needs in the field of renovation of existing and construction of new buildings and smart city infrastructure. The round table can take up new topics related to other areas covered by the European Green Deal and related European and Slovak legislation and policies. Such areas can be, for example, energy efficiency and decarbonization of industry, decarbonization of value chains (for example, to achieve climate neutrality of buildings), resilience of value chains to mitigate impacts in availability of materials and their price fluctuations, and the like.

The round table has been monitoring the efforts towards implementing the agreed measures and evaluating the impact of the measures to be carried out at least once every 3 years. The nearest such evaluation will be prepared by December 31, 2027. In further work, the roundtable will continue to be assisted by technical working groups created by the Green Deal for Buildings project.

According to the agreement of the stakeholders, including the Ministry of Economy of the Slovak Republic, the round table of the Green Deal for Buildings will integrated within the framework created by the European Coalition for Energy Efficiency Financing. This coalition creates a platform for the cooperation of EU countries, financial institutions and the Commission in the field of financing energy efficiency. Through dialogue and exchange of experience, the coalition will develop concrete measures and initiatives in the field of financing energy efficiency in the coming years.

The goal of the coalition is to create a favorable market environment for energy efficiency investments and to increase the private financing needed in energy efficiency to help achieve the EU's 2030 and 2050 energy and climate goals.

Its activities include:

- facilitating the implementation of financial instruments and energy efficiency schemes within EU funding programs;
- supporting these programs to encourage or facilitate further private investment in energy efficiency projects.

The coalition is divided into three layers:

- **General Assembly** – The General Assembly includes high-ranking representatives of all coalition members and is chaired by the Commission.
- **Expert groups** - these groups include highly qualified experts from the coalition membership who are appointed to address specific demands emanating from the coalition.
- **National hubs** - the hubs represent the coalition in individual national markets. **The Slovak Round Table of the Green Deal for Buildings will be included in the role of the Stakeholder Group** , which will be part of every national hub.

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10 Abbreviations and Acronyms

EU acquis	The level of regulation achieved in the EU
AI	Artificial intelligence from English Artificial intelligence
AR	Augmented reality from English
AR	Augmented reality from the English Augment Reality, including altered reality
Carbon life cycle	Carbon life cycle
CDE	Shared data environment
COVP	Centre for vocational education and training
CZ	Czech Republic
CZT	Central heat supply
CZV	Lifelong learning
EE	Energy efficiency
EHB	Energy efficiency of buildings
EEA	European Heat Pump Association
EKR	European qualification framework
EP	European Parliament
EPC	Guaranteed energy service from the English Energy Performance Contracting
EQUATE	European reference framework for ensuring the quality of vocational education and training
EQF	European qualification framework from the English European Qualifications Framework
ESCO	A company providing guaranteed energy services from the English Energy Services Company
ESG	Abbreviation from the English combination of the words Environmental, Social, Governance, which represents an aspect of the environment, social impacts and business management
ESHIF	European structural and investment funds

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ETS	Emissions trading system from the English Emissions Trading System
EU	European Union
IoT	Connecting devices/objects/people to the Internet from the English Internet of Things
ISCO	International standard classification of occupations from the English International Standard Classification of Occupations
IVU	Individual education accounts
COOKIE	Cluster of energy communities of Slovakia
MD SR	Ministry of Transport of the Slovak Republic
MDaV SR	Ministry of Transport and Construction of the Slovak Republic
MDV SR	Ministry of Transport and Construction of the SR
MF SR	Ministry of Finance of the SR
MH SR	Ministry of Economy of the SR
MPSVR SR	Ministry of Labour, Social Affairs and Family of the SR
MR	Mixed reality
SMEs	Small and medium enterprises
MŠVVaŠ SR	Ministry of Education, Science, Research and Sports of the Slovak Republic
MTZ	Material and technical security
MV SR	Ministry of the Interior of the Slovak Republic
NACE	European classification of economic activities from the French Nomenclature statistique des activités économiques
nD BIM	n-dimensional BIM
NCP	National qualification platform
NSK	National system of qualifications
NSP	National system of occupations
nZEB	From the English Nearly zero-emission building

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OVP	Vocational education and training
RES	Renewable energy sources
PED/PEDs	neighbourhoods with a positive energy balance from English Positive Energy Districts
P.O.O	Recovery and Resilience Plan
PV	industrial construction production
SIEA	Slovak Innovation and Energy Agency
SK	Slovak Republic
SKKR	Slovak qualification framework
Secondary school	Secondary vocational school
SQA	Analysis of the national status quo from status quo analysis
SR	Slovak Republic
SRI Upgrade	Smart readiness indicator update
SSTP	Slovak Society for Environmental Technology
SZČO	self-employed person
SIOV	State Institute of Vocational Education
ŠR	State budget
SÚ SR	Statistical Office of the Slovak Republic
ULOs	Qualification standard-competencies from English Unit Learning Outcomes, units of learning outcomes defined as a summary of knowledge, skills and competences
ÚOŠS	Central body of state administration
VA	Educational activity
VET	Vocational education and training in English vocational education and training
VR	Virtual reality
VR	Virtual reality from English Virtual reality

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University	College
VÚC	Higher territorial unit
XR	Augmented reality from English...
Z. z.	Collection of laws of the Slovak Republic
ZEB	Buildings with zero emissions from the English Zero-Energy Building

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