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Title: Draft Status Quo Analysis - Slovakia

Analýza národného status quo -Slovensko

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Build up Skills (BUS) initiative in CZ and SK –

Rebooting the National qualification platforms and Roadmaps towards implementation of nearly Zero Energy Buildings and support for Renovation Wave

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Further information

More details on BUILD UP Skills can be found at www.build-up.ec.europa.eu

More details on the LIFE CET programme can be found at https://cinea.ec.europa.eu/programmes/life_en

Obsah

EXECUTIVE SUMMARY

Will be part of the final version

1 Úvod

Will be part of the final version

2 Ciele a metodológia

The goal of the Analysis of the National Status Quo is to analyze the current state of the construction industry and the situation in lifelong learning in the construction industry with regard to energy climate goals, energy efficiency of buildings, including trends in digitization, the introduction of smart technologies and renewable energy sources.

The analysis focuses on an overview of national policies (legislative and non-legislative) aimed at the construction sector in the fields of energy, construction and education. The goal was to provide an overview of the most important measures leading to the achievement of energy and climate goals and measures to increase energy efficiency according to the Low Carbon Development Strategy of the Slovak Republic until 2030 and with a view to 2050.

The analysis focuses on information from the construction sector and the energy sector with regard to the development of human resources and employment in the construction industry and the development of the building stock and the state of renovation of buildings in Slovakia.

One of the main goals is the analysis of the current state of vocational education and training within the system of lifelong learning and the identification of current and future needs and new requirements for education and qualification of relevant professions. The increasing rate of digitization and automation of individual processes, the use of smart technologies, new materials, as well as the transition to a green economy clearly leads to an increased need for qualified and requalified experts in the construction industry. Furthermore, we focused on identifying obstacles and barriers that could prevent the country from achieving its energy goals by 2030 in the construction sector.

The methodology is based on individual tasks and goals set within the DoubleDecker project. It mainly consists of an analytical part and data collection and research of all relevant information published in printed form and published on the Internet. Analytical data processing of strategic materials, documents and data processed mainly by the Ministry of Transport and Construction of the Slovak Republic (MDaV SR), the Ministry of Education, Science, Research and Sports of the Slovak Republic (MŠVaV SR) and data processed by the Statistical Office of the Slovak Republic and the Center for Scientific and Technical Information of the Slovak Republic. Personal cooperation and interviews with identified stakeholders of

the national qualification platform (NKP), involved mainly in professional associations, chambers, guilds and with representatives of central state administration bodies and representatives of vocational schools, universities and other educational institutions, at joint meetings (First NKP meeting on December 8, 2022 in Bratislava), workshops (Workshop-meeting of school principals with leading employers in the construction industry on March 2, 2023 in Bratislava) and other bilateral meetings.

The analysis started with an evaluation of the effectiveness of the implementation of the first national BUS road map of 2013. This evaluation and the results related to the evaluation of the fulfillment of the individual measures and goals established in the national road map and subsequently realized and implemented within the Build up Skills Pillar II projects, were processed into the project deliverable and subsequently incorporated into the Status Quo Analysis - Slovakia.

The collection of necessary data and information was supplemented by a survey, which was carried out in the form of online questionnaires. Tree types of questionnaires designed for two target groups were created.

Questionnaire for high schools and universities, with the aim of identifying to what extent the current system includes the necessary skills and knowledge with regard to new trends and needs in the construction industry. To what extent and whether the current system of formal education includes knowledge and skills related to the energy efficiency of buildings and the use of renewable energy sources in buildings, green economy, digitalization, automation, robotization and the use of new methods and technologies, smart technologies, 3D technologies and materials and using artificial intelligence and virtual reality in construction. Furthermore, we focused on the identification of barriers to the introduction of the necessary innovations and new vocational programmes at secondary schools, study programs at universities, and the need for continuous education of teachers.

The questionnaire for companies operating in the construction sector focused on the identification of needs and barriers in terms of economic and technological development and the needs of qualified workers in the construction sector. We focused mainly on the identification of shortage professions, finding out the current situation and examples of solutions with a shortage of qualified labor. For employers in the construction industry, it will be key to set up the system and support for further education of adults, but also to improve the quality of teaching of graduates, which could help to meet the needs of the labor market. This survey has been complemented by a third survey to receive additional information needed for SQA.

The result of the work so far is this Draft Analysis of the National Status Quo - Slovakia.It will be further developed in Sections 7 to 10 based on the results of the surveys, follow-up interviews and targeted discussions at the meeting and workshop of NKP. After presentating SQA to stakeholders, consultation with experts within the framework of NKP, and stakeholder

workshops, the final document of the Analysis of the National Status Quo - Slovakia will be prepared, as a starting point for preparing draft Roadmap.

3 Characteristics of the construction sector

The construction sector affects all vital parts of social life, culture and economy and is considered one of the most important sectors of the Slovak economy. It is an indicator of the development of the economy to which it is directly linked and immediately reacts to all its changes.

However, the main importance of the construction sector lies in its end products, which ensure the operation or development of other sectors and disciplines. Without the end results of the construction sector, it would not be possible to provide a social life in which housing, health care, culture, roads or education could be integrated.

3.1 Development of the construction sector

After the fall of the totalitarian regime in 1989, the construction industry in Slovakia underwent extensive restructuring, which involved mainly changes in the number and size of construction companies and also changes in the ownership structures. After this period, the volume of construction output declined until the establishment of the independent Slovak Republic in 1993, where periods of stagnation, decline and growth alternated.

The growth in the volume of construction output started in 2000 and the most significant growth in the construction industry in Slovakia was recorded in the years 2005 - 2006. The year 2008 can be called the peak of the Slovak construction industry in comparison to the volume of construction output. At the same time, this year was also a turning point and due to the global financial and economic crisis, construction output started to decline in 2009 and continued its downward trend until 2014. During 2015, the value of construction work carried out by construction companies in the country increased by 15.2%, with the largest increase recorded in new construction, including modernisation and reconstruction. From 2015 to 2019, only slight year-on-year increases and decreases in construction output followed. A more significant decline only came in 2020 with the arrival of the COVID-19 pandemic, which after a brief growth hit again in 2022 with the war in Ukraine. The Slovak construction industry has not yet returned to 2008 levels of construction output.

Chart 1 – Development of construction output between 2000 and 2021 (Source: Construction Yearbook 2022)

The comparison of the development indexes of the Slovak construction industry with the average of the EU 27 and the Central European countries is significantly negative for the Slovak Republic. While the development of production in 2016, 2017 and part of 2018 roughly followed the development in the neighbouring countries, after this period the Slovak construction industry started to decline significantly, even before the effects of the coronavirus pandemic became apparent.

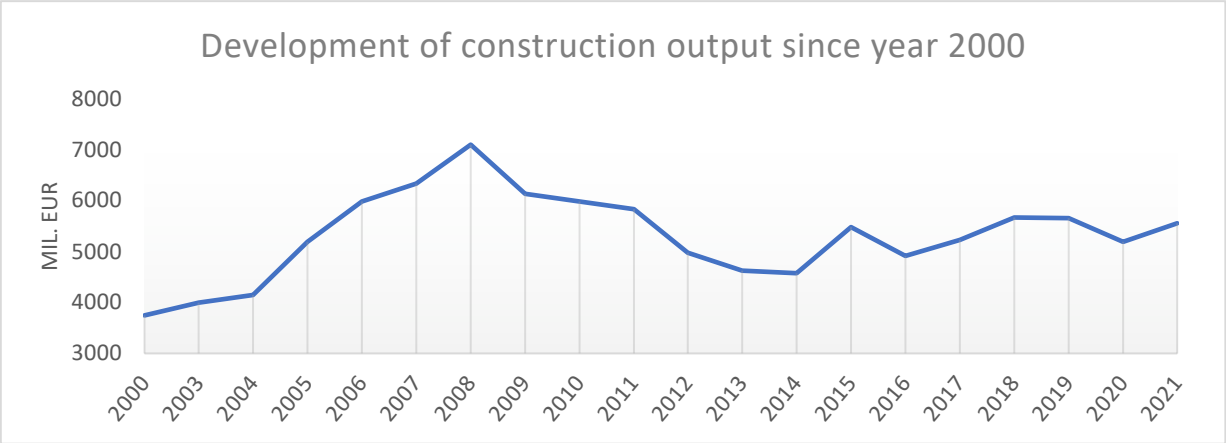


Chart 1 – Development of construction output between 2000 and 2021 (Source: Construction Yearbook 2022)

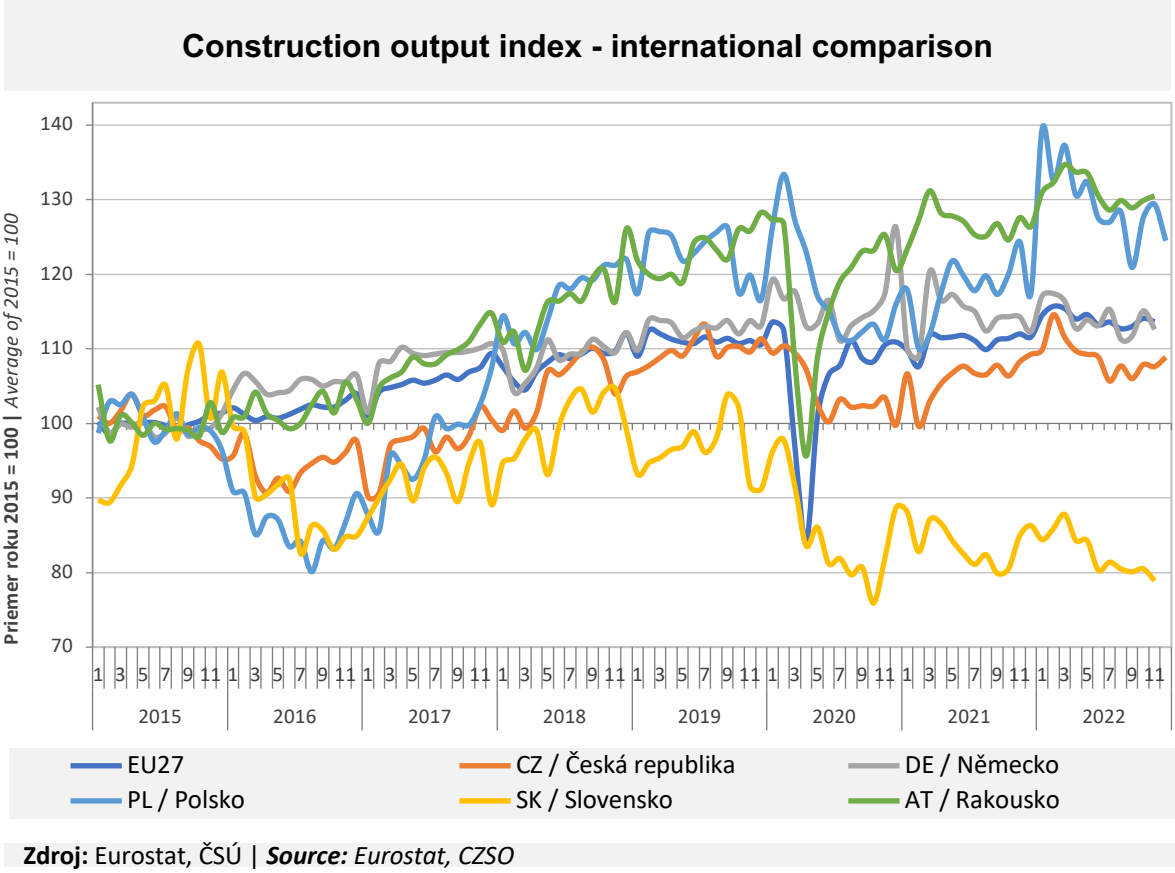


Chart 2 - International comparison of the construction output index

While other neighbouring countries as well as the EU 27 average managed to stop the decline and start growing again in mid-2020, the production in Slovakia continued to decline and oscillated in the range of 80 to 90% of the construction output of 2015. All the monitored countries were already above 100% of 2015 production in 2020. It is currently at around 80%. Investment in the construction sector in Slovakia is currently underperforming Western Europe

and, once price levels are factored in, the Slovak construction sector lags behind even when compared to some Eastern European countries.

3.2 Contribution of the construction sector from the perspective of the national economy

The share of the construction sector in the gross domestic product can be the most concise assessment of the position of the construction sector in the national economy. Since 2005, the share of the construction sector in GDP has been increasing and reached its peak in 2009, when its value reached 8.6%. Subsequently, due to the financial and economic crisis, there was a decrease in private and public investment, which had a significant impact on the share of the construction sector in GDP. In 2021, the construction sector accounted for only 5.4% of GDP of all sectors. Despite the long-term decline, the construction sector is still considered one of the crucial sectors of the Slovak economy.

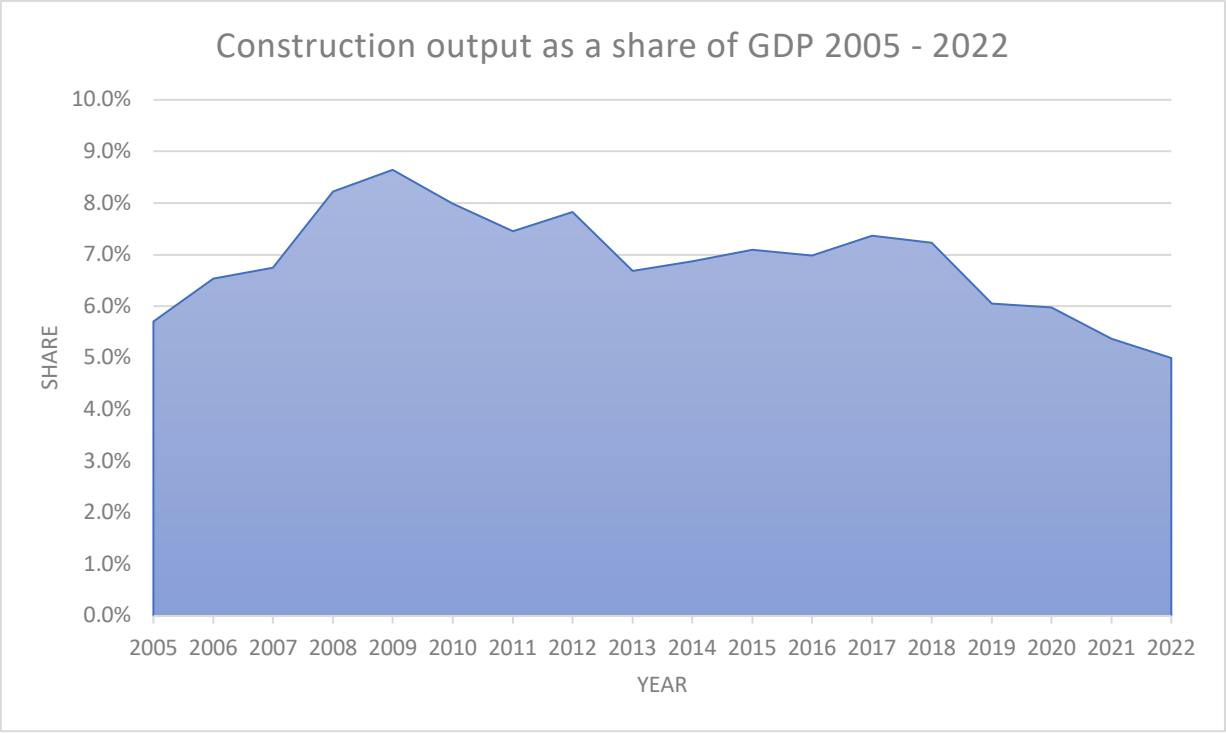


Chart 3 - Construction output as a share of GDP 2005 - 2022

Another important indicator is the share of the construction sector in total employment in the national economy. While the highest employment in the construction sector of 8.5% was in 2009, and subsequently had a declining character, the share of workers has been increasing again year-on-year in the last two years. In 2022, the share of workers in construction was 9.9% with a growth of 0.5% from the previous year. The potential is of course much higher. Construction is also important for the national economy in terms of its multiplier effect, high share of human labour, wide supply chain as well as low import intensity. In construction

activities, the multiplier effect coefficient in downstream industries abroad ranges from 1.8 to 3.5. For example, a public investment of 500 million € in the construction and renovation of buildings can generate an additional 650 million € in GDP and create 17 500 jobs. At the same time, every 10 million € invested in construction will raise the national budget by 6 to 8 million € through taxes and other revenues. It is precisely through public investment in construction contracts that states stimulate the economy more effectively, all the more so in times of crisis.

3.3 Subjects active on the construction market

Subjects active on the construction market have a very important social position.

Since the construction industry's tasks also include the production of building materials and the organisation and preparation of construction activities, we divide the subjects into several groups:

- Manufacturers of building materials
- Building contractors - construction companies
- Planners carrying out project management activities
- Architects providing all architectural activities from conception to design and construction of a building, i.e., building implementation plans
- Educational organisations
- Transport companies

The largest part of the construction sector's workforce is made up of freelance workers, who accounted for 51.3% of the workforce in 2021. Over the last 5 years there has been a trend indicating an increase in employment, particularly in small businesses in the category of up to 19 employees, by 46% at the expense of freelancers, where there has been a decline of 14.5% in each category over the last 5 years. This is mainly due to the way of doing business and thus the transition from freelance workers as natural persons to legal entities. In this set-up, the owner of the company and the managing director are the same person. The advantage is the limited liability and the possibility of adjusting the tax and levy burden.

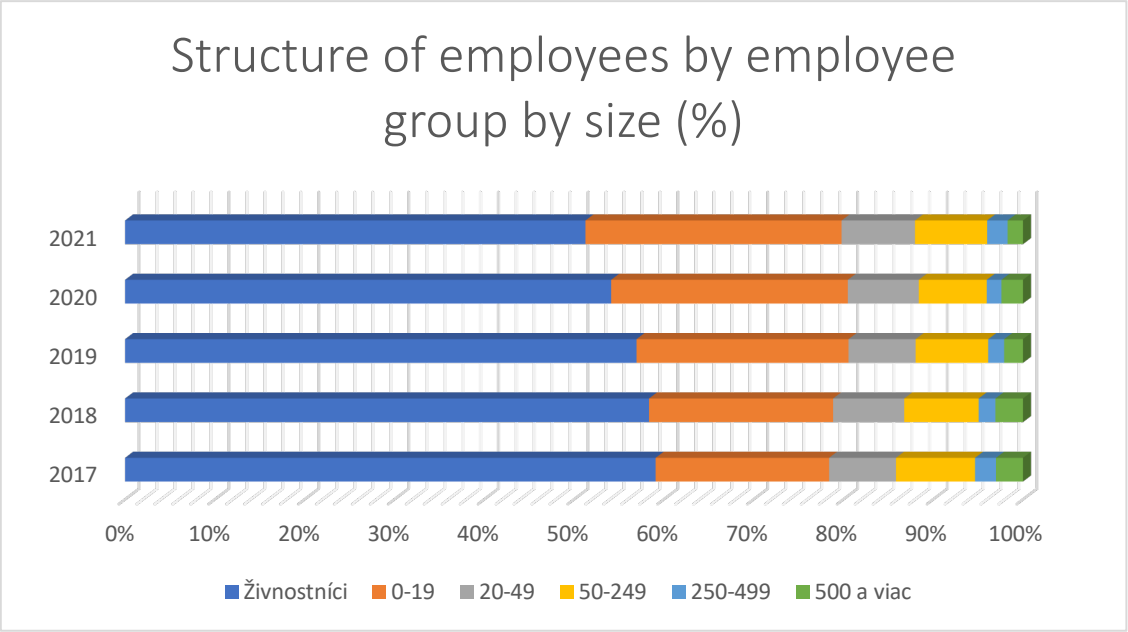


Chart 4 - Structure of employees by size groups of subjects operating on the Slovak market (Source: Construction Industry Yearbook 2022)

3.4 New technologies

The construction industry's significant impact on the economy is also influenced by innovative changes and stakeholders in the construction market. Labour shortages are causing companies to work with fewer and fewer workers and to find solutions to maintain the required performance and increase labour productivity, which are particularly assisted by new methods. In terms of innovation, these are mainly in the areas of automation, drones, 3D technologies, BIG DATA, building information modelling - BIM, digitisation, the Internet of Things, robotics, smart technologies, artificial intelligence, virtual and augmented reality or even waste-free and carbon-free construction. New ways, methods and working practices are expected, which will require an educated workforce with new professional knowledge that will need to be complemented by new professional skills.

3.5 Development of the construction industry and forecasts of further development

It is very difficult to predict the development of the construction sector today. The war in Ukraine, the unforeseen enormous increase in the prices of construction materials and labour and especially the current unstable political situation are creating deteriorating conditions for the construction industry in Slovakia. One of the possible ways to support the construction industry and boost the national economy is the proper implementation of the Recovery and Resilience Plan in the coming period. This plan sets out a comprehensive package of reforms and investments to be implemented by 2026 in the form of calls in the context of the European Commission's recommendation to Slovakia on green and digital transformation. It is a

temporary and emergency instrument designed by the European Commission to help repair the economic and social damage caused by the coronavirus and thus support economic recovery.

Another instrument is the drawdown of Structural and Investment Funds from the 2014-2020 operational programming period, which are intended to support economic growth and employment and to properly set the drawdown for the new programming period 2021-2027. These funds should be primarily allocated to pre-consumption investments.

The new Building Act with its subsequent laws and implementing decrees, which aims to streamline the planning and approval process for construction, is currently going through the legislative process. The new version of the legislation should reflect the requirements of today's modern construction industry with effect from 2024. The most important change from this year will be the transfer of competences exercised in construction procedures, which includes the establishment of the Office for Planning and Construction, the acceleration of the granting of building permits from 300 days to 40 days, and the introduction of the Urbion information system, which will automatically assess the construction plan.

3.6 Worker migration/shadow economy

The construction industry in all its sectors also faces another persistent problem, namely labour shortages. Even before the coronavirus pandemic, construction companies were already expressing in surveys the impossibility of further developing their companies and taking on new contracts because of the lack of labour. This problem is also linked to education in the construction sector itself, which is not perceived as promising for young people, despite the low competition on the labour market. It is expected that in 2025, there will be a shortage of 20,500 workers in the areas of civil engineering, construction, bricklaying, carpentry, painting, roofing, etc. According to projections, there are expected to be approximately 11,000 more workers in the construction industry in 2025 than in 2019.

The labour shortage situation in the construction sector has led to the migration of workers, mainly from Eastern European countries. This migration affects the whole of Europe. While Slovak workers go to Western Europe to work for higher earnings, workers from Ukraine, Romania or Moldova come to Poland, Slovakia or the Czech Republic for better earnings.

In 2022, after the start of war in Ukraine, the migration of workers to all sectors of the economy was triggered. The construction sector expected that managed migration would help solve the ongoing labour shortage problem. However, the current situation is that current legislation and policy decisions do not allow for the recruitment of sufficient numbers of construction workers from outside the EU. At the same time, migration has also opened the door for the grey economy. It does not matter to migrant workers whether they work legally or illegally, what is important to them is a stable employment base, which they were forced to leave because of

the war. What remains unknown for the Slovak construction industry is the situation on the labour market when work on the reconstruction of Ukraine begins, not only in terms of labour, but also in terms of construction materials and the volume of construction production abroad. At the moment, investment in the construction industry for the reconstruction of war-torn Ukraine is expected to reach 780 million €, which may also cause an outflow of domestic labour for a longer period of time.

4 National policies and strategies leading to the implementation of the EU's energy and climate targets for 2030 with a projection to 2050 in the building sector

Slovak Republic places great emphasis on air quality, reduction of greenhouse gas emissions, climate change mitigation, security of supply of all types of energy and their affordability. In this context, the Slovak Republic has signed up to a 2019 commitment to achieve carbon neutrality by 2050. In the context of this commitment, the Integrated National Energy and Climate Plan, which is an update of the Energy Policy of the Slovak Republic from 2014, has been expanded from the original four pillars of (i) energy security; (ii) energy efficiency; (iii) competitiveness; and (iv) sustainable energy to include a fifth dimension - decarbonisation.

In Europe, the building sector is the largest energy consumer. Almost 50% of final energy consumption in the EU is used for heating and cooling, while the estimated share of the building sector in final energy consumption in the Slovak Republic is around 40%. In terms of meeting the national energy and climate targets by 2030 (Table 1), the building sector is considered to be one of the key ones.

Given the long renovation cycle of existing buildings, buildings undergoing major renovation should meet minimum energy performance requirements dependent on local climatic conditions and the guarantee of indoor thermal comfort requirements. In order to be able to implement the necessary measures on the required scale in a long-term and consistent manner - whether in the construction of new buildings or in the major renovation of existing buildings - it is essential to have the right national policies and strategies in place leading to the achievement of energy and climate targets in the building sector as well as in the promotion of energy efficiency and the development of the use of energy from renewable sources.

4.1 National policies on energy efficiency (linked to climate protection) in the building sector

4.1.1 Legislative policies

Act No. 321/2014 Coll. on Energy Efficiency and on Amendments and Additions to Certain Acts, which transposed Directive 2012/27/EU on Energy Efficiency and included, among other things, an amendment to Act No. 71/2013 Coll. on the Provision of Subsidies under the Competence of the Ministry of the Economy of the Slovak Republic, or provisions that allow for the preparation of Voluntary Agreements with the participating entities.

Amendment to the Energy Efficiency Act No. 4/2019 Coll. in relation to the Eurostat methodology on guaranteed energy services, which was approved in December 2018. The amendment enabled the implementation of guaranteed energy services in the public sector without any impact on the public debt of the state. Following this amendment, the Ministry of Finance of the Slovak Republic, in cooperation with the Ministry of Economy of the Slovak Republic, developed a concept for the development of guaranteed energy services in the public sector of the Slovak Republic.

4.1.2 Non-legislative policies

The Slovak Recovery and Resilience Plan *(March 2021)* is part of the EU's joint response to the severe economic recession caused by the new coronavirus pandemic. The Slovak economy shrank by 5.2% in 2020. The Recovery Plan is a comprehensive document focusing on five key public policy areas: Green Economy, Education, Science, Research, Innovation, Health and Efficient Public Administration and Digitalisation.

The Integrated National Energy and Climate Plan for 2030 *(December 2019)*, prepared in accordance with Article 9 of Regulation (EU) No 2018/1999 on the Governance of the Energy Union and Climate Action, is an update of the energy policy approved by Government Resolution No 548/2014 of 05.11.2014.

Report on energy efficiency and RES targets by 2020 *(2022)*, which aims to evaluate the implementation of energy efficiency targets set by the Slovak Republic for the period 2014 - 2020. The report contains basic information on energy efficiency and consumption of individual sectors of the national economy of the Slovak Republic and information on the amount and method of meeting the energy efficiency targets.

The Low Carbon Development Strategy of the Slovak Republic for 2030 with a projection to 2050 (March 2020) is a cross-cutting document across all sectors of the economy, which individual policies must address so that they can complement each other towards the common goal of fully decarbonising the whole of Slovakia by the middle of this century. The strategy analyses three emission reduction scenarios, of which two less ambitious ones - namely the scenario with existing measures (WEM) and the scenario with additional measures (WAM), will not lead Slovakia to fully meet the goal of achieving climate neutrality by 2050. The most ambitious third scenario - the so-called NEUTRAL scenario - also includes a list of so-called

"additional" measures for energy efficiency, but without further specification of their implementation.

The Long-Term Building Stock Renovation Strategy *(December 2020)* is the implementation of Article 2a of Directive (EU) 2018/844 of the European Parliament and of the Council from 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency. The Strategy is based on the adopted document Update of the Strategy for the stock of residential and non-residential buildings in the Slovak Republic and has been updated with information for the period from 2017 to 2019 and refined according to the new requirements of the Directive, with an emphasis on the implementation of in-depth renovation of buildings and the intensification of the renovation rate. It identifies those areas of renovation where increased efforts and human and financial resources need to be devoted in the next period. Targeted implementation of cost-effective in-depth renovation of a building on a one-off or phased basis will significantly reduce heating and cooling demand and ensure significant energy savings for the future. **This strategy also implements the energy and climate priorities of the Integrated National Energy and Climate Plan for Buildings for 2030 at the national level.** The document contains a summary of current and planned measures to promote the energy efficiency of residential and non-residential buildings.

4.1.3 Current state of implementation of the European Union strategic and legislative framework in the field of energy efficiency into the national strategic and legislative framework

Slovak Republic has transposed the entire strategic and legislative framework of the European Union in the field of energy efficiency into the national strategic and legislative framework. The main implementation tools for energy efficiency up to 2020 were the Energy Efficiency Action Plans, which evaluate energy efficiency measures as well as set new measures to meet energy savings targets. This task is shifting to biennial progress reports on the energy sector after 2020.

The national energy and climate goals of the Slovak Republic for 2030, based on the EU-wide energy and climate goals, are set out in the **Integrated National Energy and Climate Plan for 2030**, which is an update of the Energy Policy of the Slovak Republic approved by Government Resolution No. 548/2014 of 05.11.2014, as follows:

Table 1 - National energy and climate goals of the Slovak Republic for 2030

EU and SR goals	***EU 2030***	***SR 2030***
Greenhouse gas emissions (as of 1990)	**- 40 %**	No targets set for individual Member States
Emissions in the ETS sector (as of 2005)	**- 43 %**	
Greenhouse gas emissions in non-ETS (as of 2005)	**- 30 %**	**- 20 %**
Total share of renewable energy sources (RES)	**- 32 %**	**19,2 %**

Share of RES in transport	**14 %**	**14 %**
Energy efficiency	**32,5 %**	**30,3 %**
Interconnection of electrical systems	**15 %**	**52 %**

According to the Integrated National Energy and Climate Plan for 2030, one of the main priorities with the greatest potential in relation to meeting the national energy efficiency target by 2030 is the renovation and improvement of the thermal-technical efficiency of buildings.

Directive (EU) 2018/844 of the European Parliament and of the Council on the energy efficiency of buildings, amending Directive 2010/31/EU on the energy efficiency of buildings and Directive 2012/27/EU on energy efficiency, introduces an obligation for each Member State to set indicative milestones for 2030, 2040 and 2050 with a specific long-term target of 80% to 95% reduction of greenhouse gas emissions in the Union by 2050 compared to 1990 levels.

In terms of the Recovery Plan, the main objective in the building sector is to reduce CO2 emissions. To establish a baseline of emissions in the building sector in 1990, the same methodology was used as for the 2016 level. The total CO2 emissions in the building sector were set at approximately 14.2 MtCO2 for 1990, which represents a 40% reduction compared to the 2016 baseline of 8.54 MtCO2[1].

The share of individual fuels in the energy consumption of buildings as well as the amount of CO2 emissions are shown in the following tables:

Table 2 - 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 sources	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 %

[1] Long-term strategy for the renewal of the building stock

Table 3 - Building sector - estimated CO2 emissions (MtCO2) - indicative milestones

CO2 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 sources	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 %

Energy consumption in buildings is expected to be reduced by 40% by 2050 compared to 2020, while at the same time emissions are expected to fall by 79% compared to 2020 and 87% compared to 1990.

The model for determining the trajectory is based on several assumptions, the most important of which are the following:

- Electricity and heat supply will be decarbonised by 50% by 2050;
- Direct consumption of solid fossil fuels, waste, LPG and gas oil and diesel will be phased out by 2030;
- The level of carbon emissions from gas will be reduced by 25% by 2050;
- The use of RES in buildings will grow +10% every 5 years;
- The net impact of new buildings on emission levels by 2050 will be zero.

Table 4 - Types of renovation based on the amount of primary energy savings achieved.

	Renovation type		
	light, shallow	**medium**	**deep**
Primary energy savings (%)	3 - 30	30- 60	over 60

In line with the set milestones, the renovation scenario requires a significant shift from partial renovation of buildings to in-depth renovation (also in incremental steps), so that the share of in-depth renovation in completed building renovations reaches 40% in 2050.

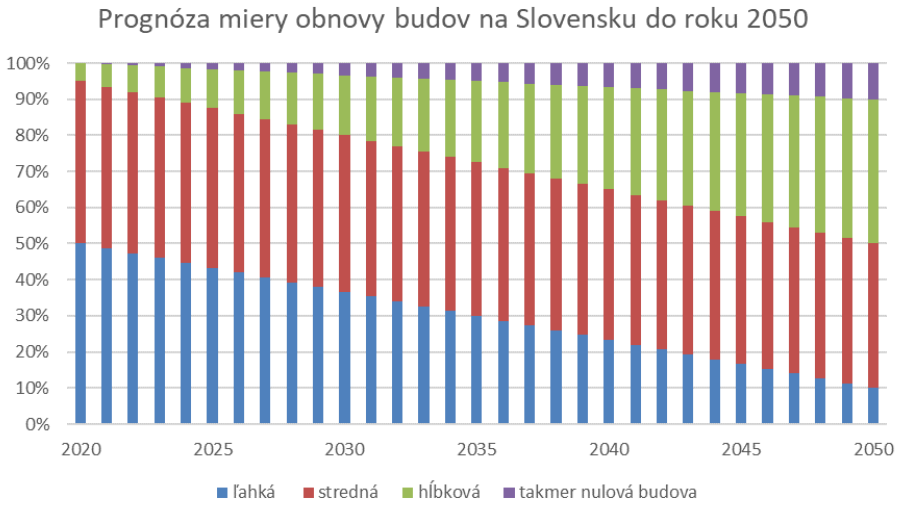


Chart 5 - Forecast of the renovation rate of buildings in Slovakia by 2050[2]

4.1.4 Estimation of the investment demand for the renovation of buildings after 2020

The current total annual rate of investment in the renovation of buildings in Slovakia is 900 million €. The model of the investment need for the renovation of the building stock in Slovakia in accordance with the established milestones points to an annual absorption capacity of 1.1 - 1.2 billion €, with a peak of 1.3 billion € per year in the period 2026 - 2031. In line with the assumption that the rate of renovation and the period of achievement of the renovation of the building stock will be maintained, the cumulative investment needs in the years concerned are shown in the table below:

Estimated cumulative investments in the building sector by 2050[3]

Building sector (billion €)	2030	2040	2050
Residential buildings (billion €)	8,2	16,7	17,3
Non-residential buildings (billion €)	4,9	5,5	5,5
Cumulative investments	13,2	22,2	22,8

Table 5 - Estimated cumulative investments in the building sector by 2050

Existing forms of support for recovery form a solid basis for the development of other financing platforms. Loans at a preferential interest rate for a long term (approx. 20 years) will continue to be the mainstay of financing for building renovation projects. These loans, combined with state subsidies and private capital, constitute a proven and effective instrument for renovation in the residential building segment.

[2]Long-term strategy for the renovation of the building stock
[3] BPIE model

Scope of renovation of residential buildings in 2020[4]

Description	Flats in apartment buildings	Detached houses
SODB 2011	931 605	856 147
Scope of renovation as on 31.12.2020	661 801	450 665
Renovation rate as on 31.12.2020 in %	71,04	52,64
Balance for the years 2021 to 2030	269 804	405 482
Number of years of renovation after 2020	9,1	20,3

Table 6 – Scope of renovation of residential buildings in 2020

In the segment of non-residential public buildings, the main source of financing will continue to be the ESIF funds (both repayable and non-repayable) in combination with the state budget and private capital from guaranteed energy services. The renovation of private non-residential buildings will mainly be carried out with the help of financial institutions and own capital. The most appropriate way to use them is a combination of the ESIF acting as a guarantee and private providers' resources to enable in-depth renovation of the building. In mobilising efforts to achieve the ambitions, additional 750 million € from the Multiannual Financial Framework 2021-2027 is expected to be used for residential buildings, and 367.5 million € for public buildings. Further additional financial resources should be used from the Mechanism for Supporting Recovery and Resilience (NextGenerationEU instrument) under the policies set out in the Modern and Successful Slovakia vision in the Green Economy section related to energy efficiency, where resources of 300 million € are proposed for improving the energy efficiency of family houses, 130 million € for the renovation of historic and listed public buildings and 200 million € for improving the EHB of public buildings.

4.2 Key actions leading to energy and climate targets in the building sector

4.2.1 Measure from the Recovery Plan in the context of Component 2: Renovation of buildings

The goal of the measure is to contribute to the reduction of CO2 emissions by implementing measures to improve energy efficiency of:

- Single-family houses
- Public historical and listed buildings.

Renovation of single-family houses

The grant for the renovation of a single-family house can be obtained for one or more measures, provided that a 30% (or more) saving in primary energy is achieved compared to the

[4] Assumption according to the Long-term Building Stock Renovation Strategy

pre-renovation situation. The following groups of measures are supported by the renovation plan: i. improvement of thermal performance, ii. installation of an energy source, iii. green roof, iv. rainwater storage tank, v. shading technology, vi. asbestos removal. Eligible costs include project documentation.

Estimated cost: 500 million €

Exemplary restoration of public historical and listed buildings

In terms of social resilience, the exemplary renovation of public buildings, frequently visited by the public, carried out to a high standard, is an important element promoting a participatory approach to the renovation of buildings by other subjects in society.

Estimated cost: 200 million €

4.2.2 Financing of building renovation from the state budget in the form of subsidies and loans

Chapters 4.2.2 to 4.2.4 summarise the most relevant measures in the building sector according to the Long Term Strategy of the Building Renovation Fund, which contains a summary of current and planned measures to promote the energy efficiency of residential and non-residential buildings.

According to the above strategy, the state budget has provided support for the insulation of residential buildings in the form of subsidies and loans since 1996. The number of renovated residential buildings (flats) supported through the housing development programme (subsidy provided by the Ministry of the Interior of the Slovak Republic) and the State Fund for Housing (loan) as well as the amount of support provided are shown in the table below by intended use for the given time period. Since 2000, 451 100 flats have been supported through the programme and the total amount of support has reached 1,43 billion €.

Number of renovated residential buildings (flats) supported through the Housing Development Programme (subsidy from the Ministry of the Interior of the Slovak Republic) and ŠFRB (loan)

Intended purpose	Form	Time period	Support provided (€)	Average yearly support (€)	Number of renovated:	
					Apartment buildings	Single-family houses
Correction of a system failure in a residential building	subsidy	2000 - 2009	112 342 700,08	5 617 135,00	151 949,00	0
	loan	2014 - 2019	24 076 470,00	4 012 745,00	15 484,00	0
Renovation of residential building	loan	2014 - 2019	1 155 280 201,00	82 520 014,36	253 350,00	28
including: - insulation of residential building		2014 - 2019	349 356 107,29	58 226 017,88		
Government programme for the insulation of residential buildings	loan	2009 - 2014	133 779 242,54	22 296 540,42	30 317,00	51

Subsidy for the insulation of single-family house	subsidy	2016 - 2019[5]	1 144 185,58	286 046,40	0	173
Total			**1 429 150 799,20**		**451 100,00**	**568**

Table 7 – Number of residential buildings (flats) renovated with Housing Development Programme

Currently the projects IROP I, IROP II and REACT EU are providing support for the renovation of residential buildings from the Integrated Regional Operational Programme (IROP), whose managing authority is the Ministry of Investment, Regional Development and Informatization of the Slovak Republic and the administrator is ŠFRB. Eligible applicants for soft loans from these credit lines are (i) owners of flats and non-residential areas represented by the administrator and (ii) associations of owners of flats and non-residential areas in a residential building. Basic information on the projects is given in the table below:

ŠFRB projects for the renovation of residential buildings

	Currency	Project name		
		IROP I	**IROP II**	**REACT EU**
Operational programme		**Integrated regional operational programme**		
Managing authority		**Ministry of Investment, Regional Development and Informatisation of the Slovak Republic**		
Date of the contract for financing		12.10.2017	28.11.2018	12.11.2021
Amount of EU funding received	EUR	109 738 446,50	27 797 307,70	47 800 000,00
Total amount of funding from the SR and EU budget	EUR	135 949 179,12	34 750 000,00	
Total amount of funds allocated to the financial instrument	EUR	159 940 210,71	43 437 500,00	56 235 294,12
Information on the purposes of the support, the objectives of the project and the measurable indicators		www.sfrb.sk/iropi/	www.sfrb.sk/iropii/	https://www.sfrb.sk/eu-fondy/react-eu/

Table 8 - ŠFRB projects for the renovation of residential buildings

[5] State as of 31. 12. 2019

4.2.3 Support for use of RES in buildings

Currently, the use of RES in buildings is promoted through the National Green Households Project, which supports the installation of five types of equipment, including small-scale electricity generation equipment with an output of up to 10 kW (photovoltaic panels, wind turbines) and heat generation equipment that covers the household's energy needs (solar collectors, biomass boilers, heat pumps)[6].

A single household can only receive support for one device of each type. Single-family houses are eligible applicants for all five types of devices, so they can apply for support for more than one type. Apartment buildings can only receive support for solar collectors and biomass boilers.

Support for the use of RES in buildings from the National Green Households Project

	Project name		
	Green Households	**Green Households 2**	**Green Households 3**
Source of financing	**Operational Programme Quality of the Environment + SR**		
Managing authority	**Ministry of the Environment of the Slovak Republic**		
Period of implementation	2015 - 2018	2019 - 2023	2022 - 2023
Number of supported households	18 501	21 077	6 112
Total amount of funding from the SR and EU budget (EUR)	41 007 323	43 034 672	12 254 460

Table 9 - Support for the use of RES in buildings from the National Green Households Project

4.2.4 Policies and actions focused on public buildings

For the purposes of this analysis, public buildings are all buildings that are used by local or regional authorities, as well as buildings that are owned by central government or local authorities but not necessarily used by them. The renovation of public buildings in the Slovak Republic lags significantly behind the rate of renovation of residential buildings, especially apartment buildings. Slovak Republic does not have comprehensive programmes in place to support the renovation of these buildings as it does for residential projects. Public buildings have so far been renovated from the ESIF, the state budget, private funds (EcoFund), and International Fund for the support of the removal of the Bohunice VI power plant.

[6] Long term strategy for building stock renovation

From 2015 to the end of 2019, 3423 buildings have been covered by the EnviroFund in terms of increasing the energy efficiency of existing public buildings, including insulation, with a subsidy of 433,83 million €.

Undertaking energy audits in public buildings helps to identify renovation measures with the greatest savings potential and partly fulfils the function of a building passport.

Since February 2019, public administration subjects in Slovak Republic can sign energy efficiency contracts for the public sector according to Act No. 321/2014 Coll. on Energy Efficiency, the subject of which is to improve the energy efficiency of a building or facility without these contracts having consequences on the amount of debt of the public administration in the unified methodology applicable to the European Union.[7] This allows the public authority to develop and finance projects by mobilising private capital. Energy services allow the mobilisation of private finance, not only for investment but especially for the subsequent debt buyout, which can increase the pace of renewal (maximum leverage, minimum market distortion). Technical assistance in project preparation is provided by the Slovak Innovation and Energy Agency (hereinafter referred to as 'SIEA'). This measure is expected to significantly boost the renovation of public buildings but carries the risk of performing mostly partial renovations with a short payback period and thus mostly focusing only on the renovation of the technical equipment of the building, which is however not in line with the objectives of the Energy Performance of Buildings Directive with its emphasis on implementing in-depth renovation of buildings and avoiding the lock-in effect of energy savings. In order to avoid the lock-in effect and to carry out in-depth renovation of buildings using guaranteed energy services, the use of financial instruments or a combination of grant financing and repayable financing will be essential.

4.3 Measures to increase energy efficiency in accordance with the Low Carbon Development Strategy of the Slovak Republic for 2030, with projection to 2050

- Consistently apply green procurement principles to all energy efficiency measures, with an emphasis on energy consumption and emissions throughout the life cycle of the measure.
- Increase the achieved energy savings for building renovations from 30% to 60%, as building renovation is the most cost-effective and efficient measure, also according to the Low Carbon Study for Slovakia prepared in cooperation with the World Bank. In the short term until 2030, the Strategy considers building renovation policy to be the most important source of potential energy savings.
- Increase the pace of renovation of public buildings and single-family houses.

[7] www.mfsr.sk/sk/financie/ppp-projekty/garantovane-energeticke-sluzby/metodika-vzorova-zmluva.html

- When renovating public buildings, promote mainly in-depth renovation of the building, in line with the principles of green public procurement.
- Setting up financial support mechanisms from the EU and SR so that they can finance in-depth renovation of public buildings and create the necessary opportunities for financing the renovation of buildings in the Bratislava region in accordance with the principles of green public procurement.
- Establish multi-source financing for regional development, so-called regional development funds, which would enable the financing of decarbonisation measures in the relevant regions (forms of financing ranging from grant to revolving financing, not only from EU resources and the relevant co-financing, but from all sources, both public and non-public).
- Promote the establishment of regional sustainable energy centres and regional energy centres, which would provide support and advisory services at the regional and county level with the aim of increasing energy efficiency and the use of RES.
- Support the improvement of the expertise of planners and construction companies with a focus on in-depth renovation of buildings.
- Promote the improvement of the energy efficiency of buildings through measures implemented in the heating and cooling sector aimed at decarbonising the supply of heat to buildings from district heating and cooling systems. Promote only efficient district heating systems with heat supply from RES, waste heat from industrial and energy processes on economically cost-effective use of RES, e.g., also locally available biomass/biomethane and waste.
- Upgrade existing district heating systems in the field of thermal energy.
- Introduce new district heating systems in a cost-effective way in valleys and basins with increasing deployment of RES in the systems.
- Expansion of the energy efficiency monitoring system operated by the Slovak Innovative Energy Agency with the aim of creating a single database centre covering both the private and public sectors of building renovation, including an overall overview of public buildings in the Slovak Republic.
- Use of innovative financing mechanisms (green bonds and green vouchers, energy saving audits, guaranteed energy services, auction system for energy purchases, soft loans through revolving funds, bonus-malus financial mechanism, mortgages with preferential rates for energy efficient buildings).
- Installation and deployment of smart meters in energy systems and facilities, including gas distribution and supply (where the benefit to the consumer demonstrably outweighs the cost of deploying the systems).
- Consistently apply the "polluter pays" principle.
- End environmentally damaging subsidies, such as support for coal or for biomass from unsustainable sources.
- Set the rules for the use of financial support mechanisms from the EU and SR in the field of energy efficiency so that the energy sector is also eligible to receive subsidies for investments that demonstrably reduce greenhouse gas emissions.

- Support of ESCO (energy service company) companies as providers of energy services with guaranteed savings for the public sector, so-called EPC (Energy Performance Contracting) and support in the form of Guaranteed Energy Services according to Act No. 321/2014 Coll. on Energy Efficiency.
- Through the creation of financing instruments, support the deployment of heat pumps for the production of heat and cold in order to increase the accessibility of heat pumps also for low-income groups of the population.
- In order to increase the energy efficiency of buildings, ensure the active application of passive elements and passive technologies in buildings, i.e. focus on reducing heat transfer through the envelope and roof cladding (by applying elements of climatic, energy-active applications) as well as nature-based solutions, such as well-planned greenery in the streets, car parks (to serve as climatic and energy-active areas), green roofs and walls providing thermal protection and shade to the buildings.
- As part of the update of the Low Carbon Development Strategy 2030 with a projection to 2050, consider introducing a target for the whole building sector (whether for 2030, 2040 or 2050) that would be consistent with achieving climate neutrality in 2050.
- The need for education, raising awareness and understanding of the general public on the need for additional measures in this sector.

4.4 Construction sector

4.4.1 Relevant national laws and regulations in the field of construction

Act No. 555/2005 Coll. on the Energy Performance of Buildings and on Amendments and Additions to Certain Acts

Act No. 200/2022 Coll. on Spatial Planning

Act No. 201/2022 Coll. on Construction

Act No. 314/2012 Coll. on Periodic Inspection of Heating Systems and Air Conditioning Systems and on Amendments to Act No. 455/1991 Coll. on Trade Business (Trade Licensing Act), as amended

Decree No. 364/2012 from 12.11.2012, implementing Act No. 555/2005 Coll. on the energy performance of buildings and on amendment and supplementation of certain acts, as amended (energy class for the global indicator - primary energy - A0 is the minimum requirement for energy performance of buildings with almost zero energy demand for all new buildings after 2020).

Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources and on Amendments and Additions to Certain Acts.

Concept of municipal development in the thermal energy sector (Act No. 657/2004 Coll. on thermal energy).

Act No. 314/2012 Coll. on periodic inspection of heating systems and air-conditioning systems and on amendments to Act No. 455/1991 Coll. on trade business (Trade Licensing Act), as amended.

Decree No. 364/2012 from 12.11.2012, implementing Act No. 555/2005 Coll. on the energy performance of buildings and on amendment and supplementation of certain acts, as amended (energy class for the global indicator - primary energy - A0 is the minimum requirement for energy performance of buildings with almost zero energy demand for all new buildings after 2020)[8].

Current laws and regulations can be found on websites:

www.slov-lex.sk

www.economy.gov.sk

www.mindop.sk

4.4.2 Summary of requirements related to the implementation of the revised EPBD and RES directive

Directive (EU) 2018/844 of the European Parliament and of the Council on the energy performance of buildings, amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, introduces an obligation for each Member State to set indicative milestones for 2030, 2040 and 2050 with a perspective on the long-term 2050 target of an 80-95% reduction in EU greenhouse gas emissions compared to 1990 levels. The indicative milestones for estimated energy consumption, CO2 emissions and primary energy savings for 2030, 2040 and 2050 for the Slovak Republic set out in the Long-term Strategy for the Renewal of the Building Stock are presented in Tables 2 to 4[9].

In order to meet the basic requirements for buildings and in particular to meet the minimum requirements for the energy performance of buildings, it is already necessary to ensure the implementation of in-depth renovation of buildings, i.e. the renovation of building envelope structures and the implementation of the necessary interventions in the technical systems of heating, hot water preparation, including the replacement of wiring in the installation cores of apartment buildings. In-depth renovation measures can be carried out as partial, step-by-step measures, or separately, as a major renovation of the building (building structures) and a major

[8] Long-term strategy for the renovation of the building stock
[9] Page 29 Long-term strategy for the renovation of the building stock

renovation of the technical systems. In-depth renovation can also be carried out simultaneously with the application of all measures at the same time.

The draft measures are classified according to:

a) the targets set to ensure the EHB set by the Act and Decree No. 364/2012 Coll;

b) building categories (residential and non-residential buildings);

c) periods of construction (up to 1983, up to 2002, after 2002);

d) the original condition of the building structures (openings including shading, envelope, roof cladding and internal dividing structures between heated and unheated rooms);

e) the original condition of the technical systems in the building (heating, hot water, ventilation (including heat recovery), cooling, lighting);[10]

f) the age and technical condition of heating and hot water systems, cooling and distribution systems inside and outside the building;

g) the extent to which automation and automated controls can be installed;

h) the extent of the deployment of renewable sources of heat, hot water and electricity.

Procedures for cost-effectiveness assessment are specified in STN EN 15459-1 Energy performance of buildings. Procedures for the economic evaluation of energy systems in buildings. Part 1: Calculation procedures, module M1-14. These procedures have also been used to establish cost-optimal levels of minimum EHB requirements under EU Commission Regulation 244/2012, supplemented by national parameters. Intermediate targets for the achievement of individual energy levels of construction were set in Decree No 364/2012 Coll, implementing the Act in three time phases as follows: (a) a low-energy building level for both new and renovated buildings starting in 2013, given by the upper limit of energy class B for each building category; (b) an ultra-low-energy building level for all new buildings starting in 2016, given by the upper limit of energy class A1, for renovated buildings, provided that cost-effectiveness conditions are met; (c) a near-zero energy building level for new buildings owned and managed by public bodies starting in 2019 and all new buildings starting in 2021, given by the upper limit of energy class A0 for the global indicator (primary energy).

The values set for the scale of individual energy classes for different categories of buildings take into account the results of the calculations from the second phase of the deduction of cost-optimal levels of minimum energy performance requirements for buildings with near-zero energy demand published in 2018.

[10] Page 34 Long-term strategy for the renewal of the building stock

New buildings must meet the standardised requirements for the thermal-technical properties of building structures and elements given by the Slovak technical standard STN 73 0540-2+Z1+Z2. Significantly renovated buildings must also meet the standardised requirements. If it is not functionally, technically and economically feasible, all building structures and elements undergoing major renovation shall meet at least the thermal properties according to the technical standard (e.g. STN 73 0540-2+Z1+Z2). Achieving near-zero energy demand for all new and substantially renovated buildings requires the efficient use of renewable energy sources.

Under the implementation of the revised version of the EPBD through Act No.555/2005 Coll. on the Energy Performance of Buildings and on Amendments and Additions to Certain Acts, according to Section 4, the technical, environmental and economic feasibility of high-efficiency alternative energy systems at the construction site must be assessed in preparation for the construction of a new building. The technical, environmental and energy feasibility of high-efficiency alternative systems, as well as the conditions of a healthy climate in the indoor environment of the building, the level of fire safety and the risks arising from intense seismic activity, shall be taken into account in the preparation of a major renovation of an existing building, if technically, functionally and economically feasible.

4.5 National policies on continuing and further vocational education and training (VET/vocational training)

4.5.1 Estimated development of human resources for the labour market in the construction sector

The labour market in all EU countries is currently undergoing dynamic development. The ongoing transformation of several sectors of the economy in line with the Industry 4.0 concept is bringing about a number of related trends, such as the increasing digitisation and automation of individual processes, the use of smart technologies, new materials, as well as the application of the green economy and low- or zero-emission technologies.

These trends also apply to the construction sector, among other sectors. According to the document 'Strategy for the development of human resources in the construction, surveying and cartography sector by 2030', it is expected that in the near future the construction sector will focus primarily on the construction of buildings with almost zero energy consumption, in-depth renovation of the existing housing and non-housing stock, increased automation of construction, especially in the use of earthmoving machinery, and safety in the construction and operation of complex civil engineering works, where automated measuring systems will be used to a much greater extent.

The construction, geodesy and cartography sector in Slovakia currently accounts for 9.2% of GDP and this share is growing slightly in the long term. The sector is thus among the 4 sectors with the most significant contribution to GDP and is considered one of the most decisive sectors

of the Slovak economy. Enterprises without employees (i.e. natural persons - entrepreneurs, self-employed persons) have a significant representation in the sector, contributing 45% to the sector's GDP and accounting for 39% of total employment in the sector. Although the sector is characterised by a high share of GDP, its labour productivity is below the national average.

The following figure shows the estimated evolution of human resources in the sector in the near term up to 2025.

Picture 1 - Estimated development of human resources in the construction, surveying and cartography sector up to 2025[11]

In the period of 2021-2025, a total of 21 thousand secondary school and university graduates are expected to enter the labour market, having completed their studies in one of the corresponding disciplines suitable for employment in the sector and not continuing their studies. Of this number, approximately 58% will be secondary school graduates and approximately 42% will be university graduates. The number of secondary school graduates is expected to increase by 2030 at the expense of the number of university graduates. **Of the total number of graduates entering the labour market for the construction, surveying and cartography sector, 9% are employed in this sector** and the remaining 91% find employment in other sectors. **Thus, the shortage of graduates in the sector is expected to reach around 19 thousand by 2025.** It is anticipated that this shortfall will need to be made up by human resources from other sectors, once the qualifications have been supplemented accordingly.

[11] Stratégia rozvoja ľudských zdrojov v sektore stavebníctvo, geodézia a kartografia do roku 2030

The construction, surveying and cartography sector is one of the sectors with lower automation potential**. In the timeframe up to 2040, it is expected that around 53% of the work processes currently performed by employees can be replaced by technology.** This amounts to approximately 46 500 employees, mainly in the jobs of Bricklayer, Support worker in building construction and Construction machine operator. These changes will lead to the employees concerned seeking other jobs, which will also require additional qualifications.

4.5.2 New education and qualification requirements for all relevant professions and green professions

In Slovakia, there is a legislative obligation for building owners and designers to use new or refurbished technical systems in the construction of new buildings or significant renovation of existing buildings, to introduce smart metering systems and to install automated systems aimed at energy saving, where feasible. **This also entails the requirement for adequate training and qualifications of all relevant professions involved in the construction and renovation of buildings.** Green professions include professional staff such as: bricklayers, plasterers, roofers, carpenters and building structure installers providing construction work related to the insulation of building envelopes and roofs, the installation and replacement of opening structures, insulators and waterproofers, electricians installing solar panels, installers installing solar hot water collectors, construction workers who build energy efficient buildings and wind power plants or other workers involved in the sustainable development of a clean and renewable energy future, as well as specialists in verifying the functionality of energy efficient building systems and so-called facility managers of energy efficient buildings. These are professions associated with the sector of reducing energy consumption in buildings and the use of renewable energy sources and energy efficiency.

Following these trends and expectations, the issue of lifelong learning is coming to the fore, as it is an essential part of the process of transition to a knowledge-based economy and society. **Lifelong learning has been defined** by the EU as any purposeful educational activity aimed at the continuous improvement of knowledge, skills and general competences with a goal of increasing the participation of adults in learning.

Within the construction sector and in the sense of lifelong learning and continuing education, we focus on the acquisition of knowledge and skills of **selected professions** necessary to ensure the construction and renovation of buildings in the required quality, with the application of new construction techniques and innovative technologies and elements in order to achieve the minimum requirements applicable to the level of construction of buildings with almost zero energy demand, if technically, economically and functionally feasible.

The competence and quality of the subject to carry out specialised work in the field of the heat-exchange envelope of a building is demonstrated, for example, by **licences issued for special**

construction work such as the licence for thermal insulation work (ETICS), the licence for the construction of thermal insulation and waterproofing systems for flat roofs, the licence for the incorporation of external opening structures into the building, the condition of which is the performance of these activities by qualified labour. It is therefore necessary to continuously develop the system of vocational education and further vocational education and training for the professions concerned.

In Slovakia, we are involved in activities related to the international project **BUILD UP SKILLS**. The main needs in the development of skills and knowledge of craftsmen and construction workers were identified and the BUS National Roadmap was agreed and approved. Its implementation was launched in 2014. It directly led to four projects: StavEdu, ingREeS, NEWCOM and Net-Ubiep. In the framework of the **StavEdu** project, a national system for up-skilling and further training of craftsmen and construction workers in the building sector for energy efficiency and the use of renewable energy sources in buildings was established. It offers 9 cross-cutting programmes for 30 trades and professions. It was followed up by the **CraftEdu** and **Net-Ubiep** projects, which aimed to develop further certificate programmes for the continuing education of craftspeople and construction workers in the field of energy efficiency and the use of renewable energies in buildings, which was also expanded to include online programmes and e-learning on its platform. We responded to the changing environment and new emerging needs and covered additional professions such as Electrician for Smart electrical installations (CraftEdu project); Building Information Management (BIM) - BIM for Public Administration, BIM for Building Owners, BIM for Facility Managers, BIM for Technicians, BIM for Professionals (Net-Ubiep project). The **ingREeS** project targeted middle and senior management level building professionals in five professions, key to achieving the 2020 energy targets according to the roadmap, such as building managers, building supervisors, structural engineers and architects, building sustainability consultant; qualified persons for energy certification of buildings. The **NEWCOM** project has developed further training programmes. It focused on defining new skills and knowledge and a system of certification and mutual recognition of formal and informal learning achievements for the building sector (flat and green roofs and ventilation with heat recovery).

The 2019 OECD analysis "A National Skills Strategy for Slovakia" concluded that Slovakia faces a number of challenges in the area of skills. The skills of the younger generation in reading and science lag behind the OECD average, with a negative long-term trend. There is a significant skills mismatch between demand and supply in the labour market and a shortage of skilled labour, which is particularly evident in sectors with strong demand for skills in science and technology. The adult learning culture is underdeveloped and underfunded, adult participation in learning is low, and participation is lowest among those who would need it most.

The analysis of the green economy and related labour market needs was also addressed by the Republican Union of Employers in the document **"Identification of new trends in education**

and training for the labour market in relation to priorities and trends in the green economy and environmental protection". The document identifies 325 occupations with a significant impact of the green economy and environmental protection (of which 95 with a secondary education qualification and 230 with a university qualification), 123 apprenticeship and degree courses for secondary schools and 120 training programmes for universities with a high impact of green economy mechanisms, as well as 67 occupations that currently have no training equivalent (of which 15 with the required secondary education qualification and 52 with the required university qualification). The document proposes to address the issue of vocational education and training in the green economy by introducing a new group of disciplines called "Green economy, environmental protection and creation".

In the following part of the text, individual national policies and strategies in the field of education and skills with an overlap into the green economy are analysed separately

4.5.3 National policies related to green skills and professions

The European Qualifications Framework (EQF) was created and endorsed by the EU to facilitate comparisons between national education and qualifications systems in EU Member States and other countries that have joined its implementation. The EQF was adopted at EU level in 2008 and revised in 2017. The EQF distinguishes eight levels of competence, with level 1 being the lowest and level 8 being the highest.

For each level, the EQF defines what a person meeting that level must know, understand and be able to do. The EQFs are matched to the individual national qualification frameworks of the implementing countries, allowing easy comparison of national qualifications against a single scale of levels and their transferability between countries.

Slovak Qualifications Framework (SQF) and National Qualifications Framework (NQF)

In December 2017, Slovakia became the 33rd country to implement the EQF. This happened with the adoption of the Slovak Qualifications Framework (SQF) and the National Qualifications Framework (NQF) at the level of the Ministry of Education, Science, Research and Sport of the Slovak Republic. The so-called SQF to EQF mapping report defined the SQF as the national qualification framework in Slovakia and determined the way of mapping the SQF qualification levels to the EQF qualification levels. Like the EQF, the SQF defines eight qualification levels, describing the required knowledge, skills and competences of an employee at each level. As with the EQF levels, level 1 is the lowest and level 8 the highest. The different levels of the SQF then correspond equivalently to the corresponding levels of the EQF.

The eight levels of the SQF are linked to the individual NQF qualifications. The NQF is a publicly accessible register that contains descriptions of qualifications distinguished and verified in Slovakia with the aim of creating a unified and transparent system based on the assumption

that the skills, knowledge and competences needed to obtain a qualification can be acquired through different routes of education and learning:

- **through formal education** - it takes place at school and leads to a diploma or certificate of education;
- **through non-formal education** - which takes place in a variety of educational institutions outside school education;
- **through informal learning** - takes place as a natural part of life anywhere, anytime and does not have to be intentional (e.g. learning in the family, in the workplace, in leisure time, etc.).

The NQF is expanding opportunities to gain qualifications through non-formal and informal learning. Anyone can have their skills tested by an expert committee and obtain a qualification certificate.

The backbone of the NQF are qualification cards in which qualification and assessment standards are defined. The qualification standards represent the totality of knowledge, skills and competences that are required for the acquisition of a given qualification. The assessment standards are a set of criteria, organisational and methodological procedures, material, technical and spatial prerequisites for verifying the achievement of the qualification standards. On the basis of the assessment standards, examinations are conducted to verify the qualifications.

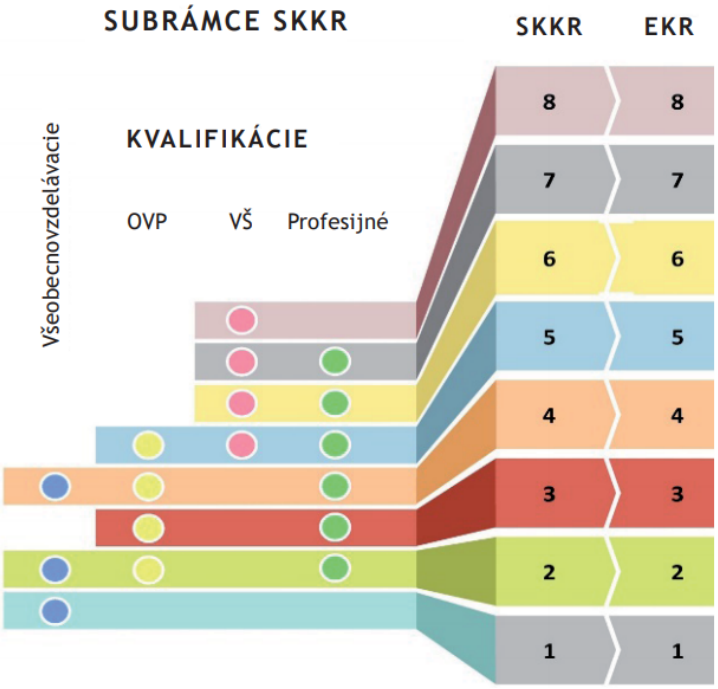
The SQF is thus a tool for creating a typology of qualifications in the national context of Slovakia. Four subframes are defined within the SQF according to the form of education. The first three subframes (general education, vocational and higher education qualifications) are linked to formal education, while the fourth subframe (vocational qualifications) is made up of qualifications that are acquired outside the formal system, i.e. through non-formal education or informal learning. Vocational qualifications are generally tailored to the needs of the labour market and can therefore also be achieved outside formal education, e.g. in adult education, further education or through the attainment of learning outcomes in other ways. The individual sub-frames are governed by the relevant legislation:

- the sub-framework of general education qualifications - is governed by Act No. 245/2008 Coll. on Education and Training (Education Act) and on Amendments and Additions to Certain Acts, as amended;
- the sub-framework of professional qualifications - is governed by Act No. 61/2015 Coll. on Vocational Education and Training and on Amendments and Supplements to Certain Acts, as amended;
- the sub-framework of higher education qualifications - is governed by Act No. 131/2002 Coll. on Higher Education and on Amendments and Additions to Certain Acts, as amended;

- the sub-framework of professional qualifications - is governed by Act No. 568/2009 Coll. on Lifelong Learning and on Amendments and Additions to Certain Acts, as amended.

The relationships between the subframes and the levels of the SQF and EQF respectively are illustrated in the following diagram.

Picture 2 - Relationship between the levels of the EQF, the SQF and its subframes[12]



The current practice related to the creation of qualifications is governed by Act No. 568/2009 Coll. on Lifelong Learning and on Amendments and Additions to Certain Acts, as amended. The concept is based on partial qualifications and full qualifications and is currently proving to be inadequate for the needs of adult education in Slovakia. At the same time, the current legislation lacks the possibility to recognise the results of non-formal and informal learning.

In this context, the Ministry of Education, Science, Research and Sport of the Slovak Republic has published preliminary information on the forthcoming draft of a new law on lifelong learning and on amendments and supplements to certain laws. The aim of this legislative change is to introduce a system of recognition and validation of non-formal and informal learning outcomes in line with the Council Recommendation of 20 December 2012 on

[12] Source: MŠVVaŠ SR

validation of non-formal and informal learning (2012/C 398/01) and to create space for a more intensive involvement of vocational secondary schools, universities and non-profit organisations in the lifelong learning system. At the same time, the new draft law is to introduce a new system of accreditation of educational programmes in the field of adult education, which will reflect the real needs of the labour market. It is also intended to create a sustainable system of management and activities of sectoral councils in Slovakia in order to support the alignment of the lifelong learning system with the needs of the labour market. It will also introduce basic principles for funding in the field of adult education. The pre-preparatory phase of the legislative process is now complete.

The material entitled "**Strategy for Lifelong Learning and Counselling for 2021-2030**" (hereinafter referred to as the "Lifelong Learning Strategy"), which was approved by the Government of the Slovak Republic in November 2021, also fully corresponds to the forthcoming intention of the new Act on Lifelong Learning. This is a cross-sectoral strategy in the field of lifelong learning, which aims to ensure lifelong access to learning opportunities for every citizen, to develop their skills and competences throughout their lives and with regard to individual needs and circumstances. The Lifelong Learning Strategy builds on forms of education that have a tradition in Slovakia (formal education - schooling) and at the same time introduces innovative pilot activities, building on new challenges and good practice from other EU countries (in particular the promotion of non-formal education and an individualised approach).

The LLL strategy builds on and complements existing strategies and conceptual documents adopted in Slovakia in recent years, in particular:

- Vision and strategy for the development of Slovakia up to 2030;
- National Programme for the Development of Education and Training;
- National programme for the development of education and training "Learning Slovakia";
- National Skills Strategy for Slovakia;
- Lifelong Learning Strategy 2007;
- Lifelong Learning Strategy 2011;
- National Programme for Active Ageing for 2014-2020;
- Migration policy of the Slovak Republic with a perspective for 2030;
- Zero Action Plan of the Strategy for Inclusion in Education for 2021;
- Roma Equality, Inclusion and Participation Strategy for 2030;
- New Strategy of the Slovak Republic for Youth (2021-2030) (in preparation);
- National Programme for the Development of the Living Conditions of People with Disabilities for 2021-2030.

The LLL Strategy identifies key tools for future development in the area of skills enhancement beyond the initial education and VET system. The objectives of the LLL strategy are:

- Objective 1: Strengthen the inclusiveness of adult learning and improve learning pathways for all, including adults with low levels of basic skills;
- Objective 2: Increase participation and equity of adults in learning, i.e., opportunities also for adults with low levels of skills and/or educational attainment;
- Objective 3: Support the development of further vocational training;
- Objective 4: To link education and the labour market more effectively, with an emphasis on the expected changes in the structure of jobs, to strengthen the motivation of both employees and employers to engage in the training of their employees, without creating additional administrative burdens and increasing costs;
- Objective 5: Increase the efficiency and flexibility of the qualification system of the Slovak Republic.

Relevant actions for green skills and professions

The LLL strategy will be implemented through a number of proposed actions. Selected areas and actions relevant to the field of green skills and professions are described in more detail below.

Increasing the attractiveness and quality of VET - VET Centres of Excellence

The LLL strategy anticipates the transformation of the existing Centres of Vocational Education and Training (CVET) into Centres of Excellence in VET (CEVET). Vocational Education and Training Centres are vocational secondary schools that differentiate themselves from other vocational secondary schools in terms of material, technical and personnel facilities, the offer of adult education programmes, retraining courses, training for the low-income, the long-term unemployed or the training of teaching staff.

Some training programmes cannot currently be implemented through the existing dual education system (work experience with the employer and theory at school) because some sectors are mainly made up of small and medium-sized enterprises (e.g. construction, among others). A secondary effect of the introduction of CEVET is to increase the share of SMEs and self-employed persons in VET and the dual education system, where the Slovak Republic shows low figures compared to countries with traditional dual education.

Slovak Qualification Framework and National Qualifications Framework

The Lifelong Learning Strategy foresees a redefinition of the role and status of the National Qualification Framework through a new Lifelong Learning Act and the implementation of the linking of education and skills data with EU skills platforms. A more detailed description of the

Slovak Qualification Framework and the National Qualification Framework and their position in relation to the European Qualifications Framework is given in the previous sections of the text.

Recognition system for non-formal education and informal learning

The current system of qualification verification in Slovakia focuses exclusively on obtaining a certificate of qualification - a document on the basis of which a person can apply for a trade licence in a given field. A national validation system that would include all four parts, i.e. identification, documentation, assessment and certification, needs further development of tools and their verification, as the only possible way to obtain a certificate confirming professional competence at present is to pass an examination. In this respect, the LLL strategy aims to introduce new systemic elements for the recognition of qualifications based on knowledge, skills and competences acquired through practice. This is a new way of looking at the qualifications provided and recognised in Slovakia, as until now the emphasis has been on the education system in terms of the degree attained rather than the level of qualification achieved. Looking at the achievement of learning outcomes through qualifications represents a new systemic element - what is most important are the learning outcomes (knowledge, skills and competences) achieved by a given candidate for a qualification and not the form of study, the length of study or the credits achieved. This opens up new possibilities for more flexible forms of qualification acquisition in different life situations of citizens (e.g., change of job, career progression, the need to acquire new qualifications with an employer, etc.).

Measures in this area are also supported by the **national project "Qualifications Verification System in the Slovak Republic"**, implemented by the State Institute for Vocational Education between March 2019 and February 2023, which aims to set up a comprehensive system for the verification of qualifications and the results of non-formal and informal learning in Slovakia, by establishing structures and binding procedures for Lifelong Learning (LLL) processes, with an emphasis on the verification of qualifications valid at the national level, and by pilot testing the system of verification of qualifications and their parts (units of learning outcomes) through the promotion of LLL in Slovakia.

Increasing the flexibility of the qualifications system with smaller qualifications and micro-qualifications (micro-certificates)

The intention is to segment the existing formal qualifications acquired in secondary vocational schools into smaller sub-qualifications so that it is also possible to acquire sub-qualifications with a narrower focus in less time than a standard course of study or apprenticeship would require. Such smaller qualifications also take into account small changes in work ability, the acquisition of a small number or only one specific new market-relevant skill, may be targeted at a smaller number or only one job and may not fulfil the requirements for the attainment of a degree. Foreign experience shows that documenting such micro-qualifications is useful from the perspective of both employees and employers.

Supporting the sustainability of the management system of sector councils with a focus on the transfer of innovative processes and labour market requirements to LLL

In Slovakia, the National System of Occupations (NSO) has been created as a comprehensive information system describing the standard labour market requirements for individual jobs. The NSO specifies the requirements for professional knowledge, professional skills and competences necessary for the performance of work activities in jobs on the labour market. The NSO is continuously updated with definitions and the new vocational knowledge and skills that are related to new needs of different sectors of the economy influenced by innovation, digitalisation, new technologies as well as global challenges in the political and economic European and global context.

Alliance of Sectoral Councils, Sectoral Councils

The creation and updating of the NSO, in accordance with developments on the labour market, is ensured and coordinated by the Ministry of Labour, Social Affairs and Family of the Slovak Republic. For this purpose, the Ministry has established, with the participation of relevant ministries, professional unions and associations and other entities, the competence of which includes, in particular, the establishment of sectoral councils according to the relevant sectors of the economy and the evaluation of their functionality and effectiveness. A sectoral council is a voluntary independent professional and expert association of representatives of employers, representatives of trade unions, educational institutions and other organisations, state and local government bodies. Currently, the Alliance of Sectoral Councils and the Sectoral Councils are coordinated, methodologically guided and evaluated within the framework of the national project "**Sector-led innovations towards an efficient labour market in the Slovak Republic**", coordinated by the Ministry of Labour, Social Affairs and Family of the Slovak Republic. The activity of sectoral experts is also allocated within the national project "**System of Qualification Verification in the Slovak Republic**", coordinated by the ŠIOV, which ensures the transfer of labour market needs for a skilled workforce to the LLL system.

The NSO occupational register contains 79 different occupations in the construction sector, and the register also includes information on the recommended level of education or the relevant SQF/EQF level.

Among the 24 existing sectoral councils, there are three sectoral councils substantively related to the issue of low-emission buildings, namely:

- Sectoral Council for Construction, Geodesy and Cartography;
- Sectoral Council for Electrical Engineering;
- Sectoral Council for Energy, Gas and Electricity.

The LLL strategy focuses on the proposal of measures in the field of creating a sustainable system of management and activities of sectoral councils in the conditions of the Slovak Republic, while priority should be given to deepening coordination in the development and

updating of the NSO and the National Qualifications Framework (NQF) in order to coordinate the functioning of both systems. At the same time, it is essential to align the LLL system with the needs of the labour market through the NSO and the NQF.

A more detailed description of the NQF and its relationship to the Slovak Qualifications Framework and the European Qualifications Framework is described in the previous sections of the text.

Individual Learning Accounts (ILAs) as a tool for individualised support in further education

The LLL strategy notes that the participation rate in adult learning for 25-64 year olds is slightly above the EU average (SK 46.1%, EU 44.6%), with non-formal learning taking place predominantly through employers (to a large extent mainly in the context of compulsory training resulting from legislation - e.g. OSH, various compulsory certifications, etc.), and thus capturing mainly the employed. Schemes for the unemployed are characterised by a high degree of control at entry, which reduces opportunities and incentives for participation. The aim is to eliminate barriers to participation and to increase interest in learning among all groups. In the context of limited resources and efficient use of funds, the national skills policy will be implemented in the form of calls for tenders for different types and forms of training, which will be launched in response to current societal needs and periodically reviewed labour market needs. Support will be provided primarily to jobseekers working in sectors that are already facing, or are likely to face in the near future, an economic downturn or a change in the nature and forms of work, and only training that will lead to new qualifications or an increase in qualifications in a sector (occupational group) that has future development potential will be eligible.

5 Key figures from the construction and energy sectors

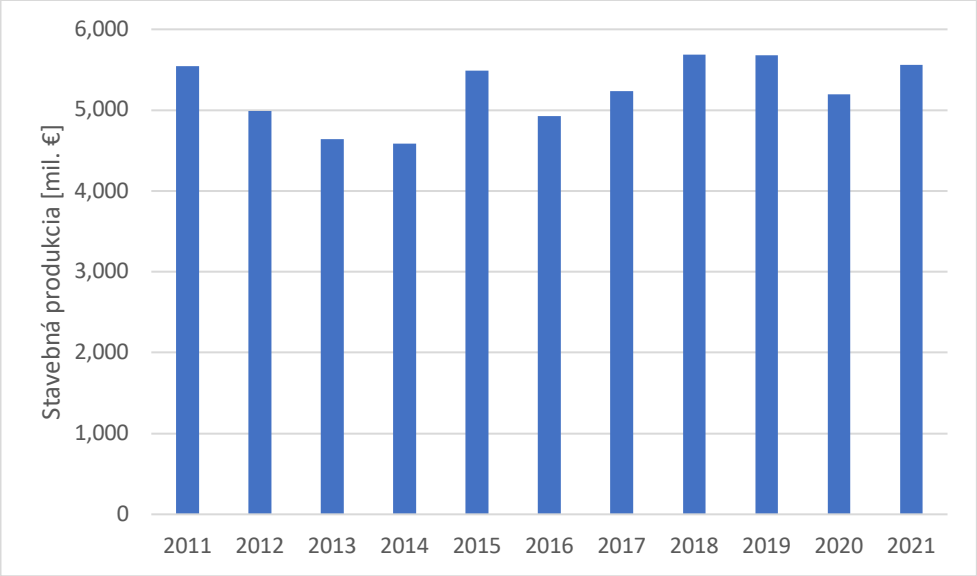
5.1 Development of construction output

Construction output in Slovakia in the period between 2011 and 2021, without major year-on-year fluctuations, averaged at around 5200 million € in current prices (b.c.), or 5000 million € in constant 2015 prices (s.c.), per year. The most significant year-on-year declines of 10% occurred in 2011 and 2012, when output fell below 5000 million € in b.c. and 5200 million € in s.c. respectively, where it remained until it picked up again in 2015. From a slight correction in 2016, between 2017 and 2019, annual output in the construction sector in Slovakia averaged at 5500 million €, below 5100 million € in b.c. and s.c., respectively.

The impact of the COVID-19 pandemic resulted in a year-on-year decline of over 8% in b.c. and nearly 11% in s.c. in 2020 compared to 2019, followed by a slight recovery in 2021 of nearly 7% in b.c. and less than 3% in s.c. The level of output in the construction sector in 2021 reached

4654,98 million € in s.c., which represents a decline of nearly 20% in constant prices compared to 2011.

Construction output at current prices [13]



Graph 6 - Construction output at current prices

In 2021, business entities operating in the construction production sector realised a volume of construction production worth 5562,7 million € (b.c.) and 4654,98 million € (s.c.), which means an increase of 7% in b.c. and 3% in s.c. compared to 2020.

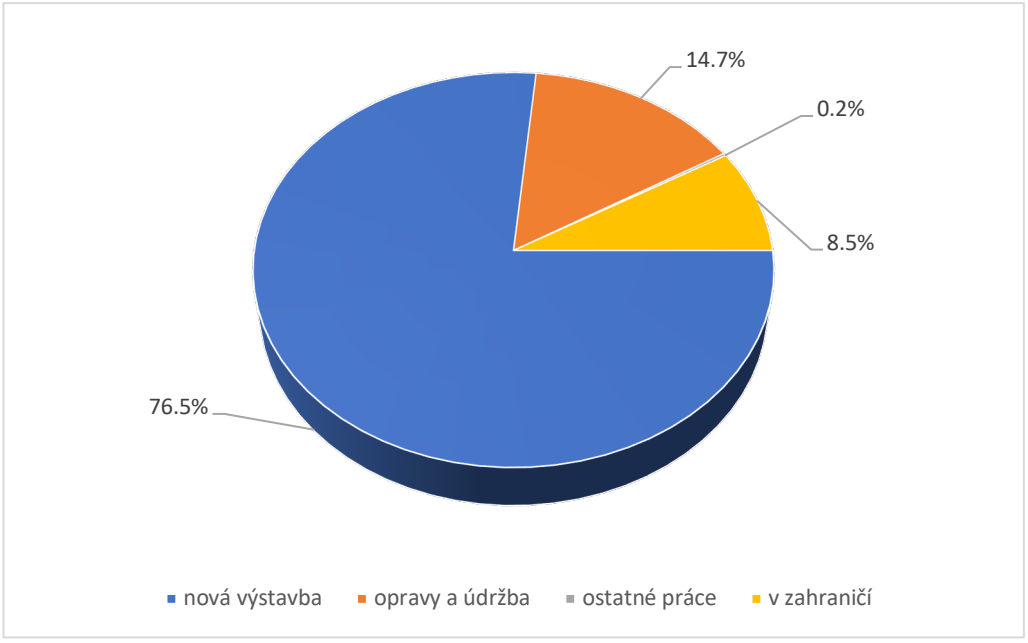
In terms of the structure of construction output by investment focus (in current prices), construction work in 2021 was carried out as follows:

- new construction, renovation and modernisation 76,5 %[14]
- for repairs and maintenance 16,3 %
- on other construction work 0,2 %
- abroad 8,5 %.

Structure of construction output by type of construction in 2021 in % (Source: SO SR)

[13] Construction Yearbook 2022 and 2020, Tab. T I.1-2

[14] Construction Yearbook 2022 and 2020



Graph 7 – Structure of construction output by type of construction in 2021 in %

The bulk of the construction output of 5197 million € (Graph 10) in 2021 was domestically produced (91,5%), increasing by 0,3% compared to 2020. Construction output abroad, amounting to 399,74 million €, accounted for 7,1% of total construction output and increased by 27% compared to 2020. Of the total domestic construction output, new construction, modernisation and reconstruction accounted for 76,5% (3585,02 million € s.c.), repair and maintenance for 14,7% (687,59 million € s.c.), other works for 0,2% (11,06 million € s.c.).

Development of the structure of construction output by type of construction in %

Indicator	M. j.	2017	2018	2019	2020	2021
Domestic construction production, of which	%	94,00	93,12	91,21	93,31	91,50
- Construction of residential buildings	%	7,21	6,72	8,54	7,62	7,54
- Construction of non-residential buildings	%	22,82	20,64	20,87	17,65	18,12
- Construction of residential and non-residential buildings n.e.c.	%	6,37	3,48	4,59	6,16	7,20

- Engineering constructions	%	37,21	41,15	34,76	38,01	35,02
- Specialised construction work	%	20,39	21,14	22,45	23,88	23,62
Construction production abroad	%	6,00	6,88	8,79	6,69	8,50
Total	**%**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**

Table 10 – Development of the structure of construction output by type of construction in %

According to the types of construction, the largest share of the total construction output in 2021 was accounted for by engineering constructions - 35,02% (1712,18 million €), smaller shares were accounted for by specialised construction works – 23,62% (1155 million €), or construction of non-residential buildings – 18,12% (91,5 million €).

5.1.1 Employment in construction sector

The organisational structure of the Slovak construction industry is similar to that of developed European countries. Of the total number of enterprises in the EU, up to 97% have less than 20 employees and 93% have less than 10 employees. In general, the EU pays particular attention to small and medium-sized enterprises and a significant part of EU financial resources is directed towards their development.

Number of employees in the construction industry by employer size group

Size group by number of employees	2017	2018	2019	2020	2021
Small enterprises (0-49 employees)	43 540	47 437	55 001	56 981	59 054
Medium-sized enterprises (50-249 employees)	14 310	13 818	14 301	12 599	12 933
Large enterprises (250 or more employees)	8 685	8 241	6 846	6 708	6 424
Self-employed	96 096	97 368	100 766	90 048	82 499
Total	**162 131**	**166 864**	**176 914**	**166 336**	**160 910**

Table 11 – Number of employees in the construction industry by employer size group

As of 31 December 2021, according to the Construction Yearbook 2022 issued by the Statistical Office of the Slovak Republic, out of the total number of 160 910 employees employed in the construction sector in the Slovak Republic (Table 11), about 88% worked as self-employed or employees of small enterprises. From this perspective, it is clear that small and medium-sized enterprises in the construction sector occupy a significant position and it is assumed that such an organisational structure will be supported in the future.

Development of construction output by business entities from 2017 to 2021
(EUR million - current prices)

Size group by number of employees	2017	2018	2019	2020	2021
Small enterprises (0-49 employees)	1 748,96	2 091,55	2 425,91	2 447,33	2 749,17
Medium-sized enterprises (50-249 employees)	827,96	1 010,84	1 090,08	1 033,11	1 032,03
Large enterprises (250 or more employees)	1 139,01	1 025,41	626,07	616,64	673,76
Self-employed	1 476,25	1 510,39	1 483,41	1 061,20	1 058,46
Total	**5 192,18**	**5 638,19**	**5 625,47**	**5 158,28**	**5 513,41**

Table 12 - Development of construction output by business entities from 2017 to 2021 (EUR million - current prices)

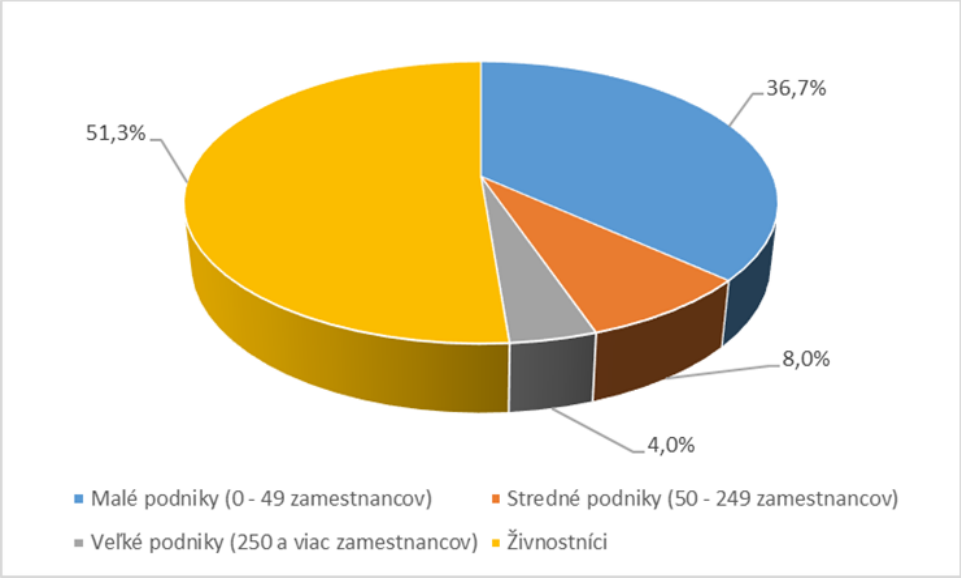
Small businesses accounted for the largest share of construction output (Table 12) at around 50% in 2021 (a 36% increase in output from 2017), with this share rising steadily over the period 2017 to 2021.

In terms of size structure, large enterprises with 250 or more employees accounted for the smallest share (12,3%) of construction output in 2021, with a decreasing trend over the period 2017 to 2021. The output of these enterprises decreased by -40% compared to 2017.

In the case of self-employed contractors, a downward trend in output of -28,4% is visible between years 2017 and 2021, with their share of construction output in 2021 accounting for 19,2%. The construction output of medium-sized enterprises jumped by roughly 1/5 between 2017 and 2018, and in the following years it kept above the level of 1000 million € per year, with their share in the total construction output amounting to 18,7% in 2021.

The structure of employment in the construction sector in Slovakia in 2021 according to the size groups of business entities is shown in graph 12.

Structure of employment in construction sector by size groups of business entities in 2021 in % (Source: SO SR)



Graph 8 - Structure of employment in construction sector by size groups of business entities in 2021 in % (Source: SO SR)

5.2 Residential and non-residential building stock

Buildings (heated and cooled) have an impact on final energy consumption. The estimated share of the buildings sector in the final energy consumption in the Slovak Republic is around 40%, with a large part of the energy in buildings consumed mainly for heating, hot water and, in recent years, cooling and ventilation. Due to the long renovation cycle of existing buildings, existing buildings undergoing major renovation should meet minimum energy performance requirements depending on local climatic conditions and the provision of indoor thermal comfort requirements. The source of the statistical data on the stock of residential and non-residential buildings presented in this analysis is the Long Term Building Renewal Fund Strategy.

5.2.1 Residential buildings

Residential buildings are divided into apartment buildings and single-family houses. Their structural and technical design is different, they differ fundamentally in size, number of floors and number of flats. The characteristics of the building structures and their share of the total area of the building envelope and the total floor area of the building are different, and therefore the heat and energy demand for heating in those buildings is different per unit of total floor area.

Summary data on houses and apartments from the SODB 2011

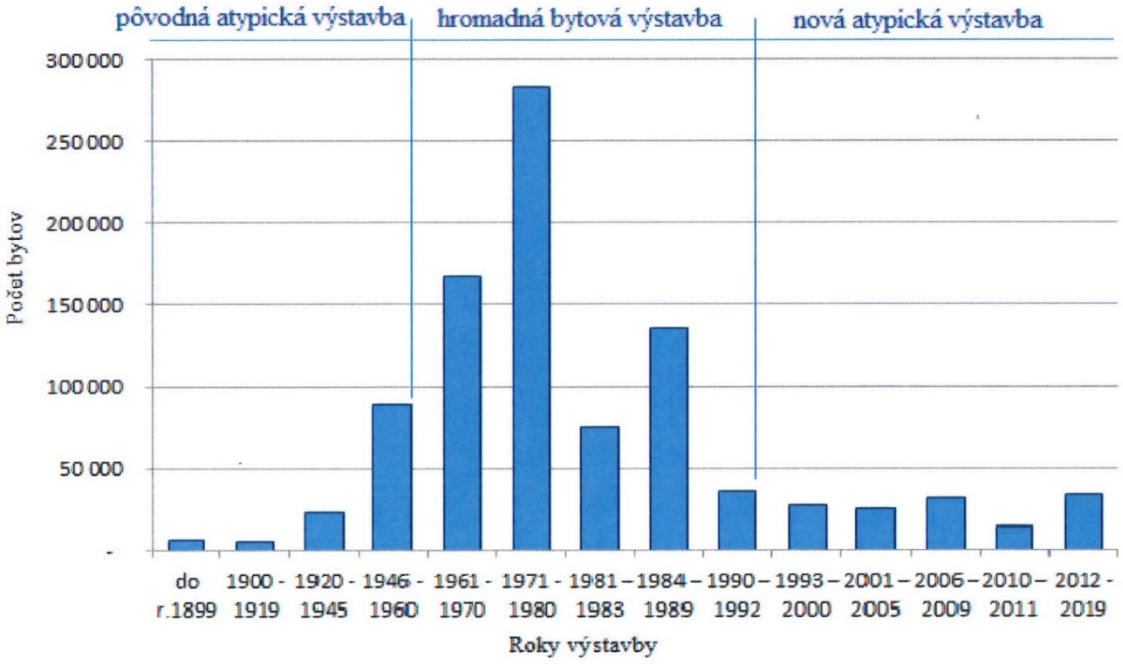
Description	Single-family houses	Apartment buildings	Total
Number of buildings	969 360	64 846	1 034 206
Number of apartments	1 008 795	931 605	1 940 400
Of which Number of occupied apartments	856 147	877 993	1 734 140

Table 13 - Summary data on houses and apartments from the SODB 2011

In addition to apartments in apartment buildings and single-family houses, there are also apartments in other buildings (religious institutions, social service homes, retirement homes, etc.), of which there are 13 020, which is a 3,41% share. The number of apartments in these buildings is 54 497.

Residential buildings can be characterised according to the period of construction. From 1947 to 1992, mass residential construction of apartment buildings was carried out in different types, construction systems and building systems (existing buildings), especially in panel technologies after 1955. After 1992, the individual solutions were atypical buildings (new buildings). More precise data on the construction of apartments in apartment buildings up to 1992 could be used from the SODB 2001 and SODB 2011 and the database of the SO SR.

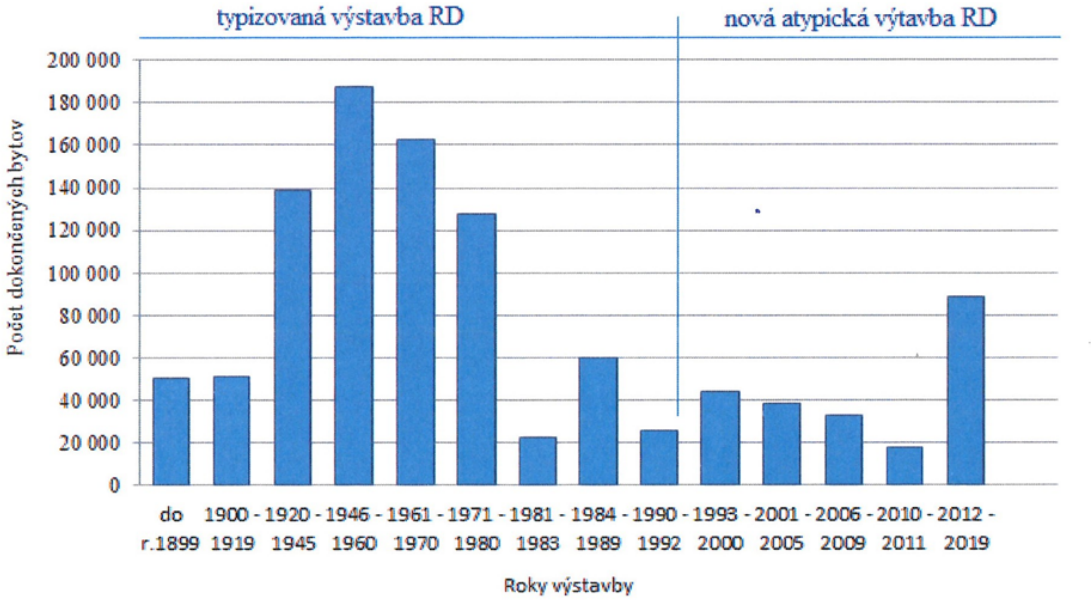
Number of apartments in apartment buildings by period of construction



Graph 9 - Number of apartments in apartment buildings by period of construction

Single-family houses are variable in their shape, the achieved form factor values and the share of individual building structures in the building's thermal envelope. There are no detailed statistics or databases available on detached houses. The number of apartments in detached houses built in each period is available according to SODB 2001 and SODB 2011, and statistical reports published by the Statistical Office of the Slovak Republic.

Number of apartments in single-family houses according to statistical data



Graph 10 - Number of apartments in single-family houses according to statistical data

From the database of the SO SR it is possible to obtain data on the number of completed apartments in apartment buildings and single-family houses for the period 2012 - 2019 presented in Table 14.

Number of completed apartments in residential buildings for the period 2012 - 2019

New apartments	2012	2013	2014	2015	2016	2017	2018	2019	Total 2012-2019
in apartment buildings	4 155	2 603	2 995	3 751	4 176	3 516	6 037	6 369	**33 602**
in single-family houses	9 479	10 208	10 041	9 860	11 195	11 547	12 687	13 338	**88 355**
Total apartments in residential buildings	13 634	12 811	13 036	13 611	15 371	15 063	18 724	19 707	**121 957**

Table 14 - Number of completed apartments in residential buildings for the period 2012 - 2019

5.2.2 Non-residential buildings

5.2.2.1 Buildings of central government authorities

Article 5 of Directive 2012/27/EU requires each Member State to ensure that, from 1 January 2014, buildings owned and used by central government authorities (hereinafter 'CGAs') are renovated at a rate of 3% of the total floor area of heated or cooled buildings per year, so as to achieve at least the minimum requirements for the EHB set by the Member State concerned under Article 4 of Directive 2010/31/EU. Directive 2012/27/EU (Article 5(6)) also allows for an alternative way to meet the obligation under Article 5(1). This means that a Member State may take cost-effective measures, including deep renovation and behavioural change measures, to achieve energy savings in the relevant 11 buildings by 2020 that are at least equivalent to the amount of savings required by Article 5(1) of Directive 2012/27/EU, which Member States will report annually to the European Commission.

CGAs buildings - number, total floor area and built volume

Data	Number of buildings	Total floor area (m^2)	Built volume (m^3)
The sum of all buildings	3 806	4 773 344	21 678 102
The sum of all buildings by owner - area not specified	189	0	9 408
Buildings above 500 m^2 - total	**1 893**	**4 370 709**	**19 571 523**
Buildings above 500 m^2	1 364	3 175 872	14 026 720
Buildings above 500 m^2	62	112 392	536 336
Buildings above 500 m^2	135	365 202	1 860 893
Buildings above 250 m^2 - total	**2 631**	**4 641 021**	**21 070 474**
Buildings above 250 m^2 – from 1947 to 1993 (including)	1 938	3 386 048	15 178 299
Buildings above 250 m^2 – year not specified	1 938	3 386 048	15 178 299
Buildings above 250 m^2 – up to 1947	192	385 754	1 000 936

Table 15 - CGAs buildings - number, total floor area and built volume

The list of relevant (eligible) buildings of the CGAs according to Article 5 of Directive 2012/27/EU is published on the website of the Ministry of the Interior of the Slovak Republic:

https://www.mindop.sk/ministerstvo-1/vystavba-5/stavebnictvo/zoznam-budov-uoss-podla-cl-5-smernice-2012-27-eu-660

The notification report informs the European Commission of the planned alternative measures that will achieve the 2020 energy savings target according to Article 5(6) of Directive 2012/27/EU. The report includes a proposal for an interim target according to Article 5(1) of Directive 2012/27/EU, a target expressed in terms of energy savings for the application of the alternative pathway, as well as a list of alternative measures. In order to determine the list of buildings for the implementation of the mandatory in-depth renovation of the buildings of the CGAs, the total floor area of the building of more than 250 m2 is decisive. The annual target under Article 5 of Directive 2012/27/EU is 3% of the total floor area of the listed buildings. Based on the total floor area of 445 791 m2 of the buildings of the CGAs, it means that 13 374 m2 (3%) should be renovated each year or an annual saving of 52,17 GWh should be achieved.

5.2.2.2 Public buildings

Under the Act, for the purposes of determining policies and actions under the Renovation Strategy, a public building is a building owned by the State, a higher territorial unit, a municipality or a public institution. The SR does not have a single manager for state-owned buildings or for the buildings of the CGAs. There are also no statistical surveys by ownership of non-residential buildings (of any kind). In the future, there is a need to ensure the collection and improvement of the availability of data needed for targeted planning of the renovation of public buildings, in particular data on the structural and technical condition of the building, its energy performance or data related to energy consumption.

Non-residential non-production buildings owned by the state classified according to the purpose of use

Purpose	Number of buildings	Percentage of total (%)	Built volume (m^3)	Percentage of total built volume (m^3)
Schools	6 943	45,0	58 382 303	50,9
Shops and services	156	1,0	680 090	0,6
Medical facilities	1 293	8,4	15 197 903	13,2
Culture facilities	525	3,4	3 071 713	2,7
Administrative buildings	2 556	16,6	14 365 217	12,5
Accommodation	1 317	8,5	11 814 638	10,3
Sport	126	0,8	810 218	0,7
Other	2 519	16,3	10 381 270	9,0
Total	**15 435**	**100,0**	**114 703 652**	**100,00**
of which primary schools	2 513	16,3	26 549 348	23,1

Table 16 - Non-residential non-production buildings owned by the state classified according to the purpose of use

This would provide an information source for better planning of investments in renovation in the public buildings sector. The data will have the highest added value if it is also added to existing building information systems such as the Central Asset Register (CEM). The CEM is established as a publicly accessible register of immovable property owned by the Slovak Republic[15]. At the same time, when planning the use of existing information systems, it will be necessary to assess the costs of system modifications and to secure funding for them, in cooperation with their operators. Of the total number of non-residential buildings, 15 435 buildings owned by the State and local authorities were identified between 1994 and 2003. In terms of building volume, schools accounted for 50,9 % of these non-residential buildings, health facilities for 13,2 %, administrative buildings for 12,5 % and accommodation for 10,3 %.

5.2.2.3 Other non-residential buildings

Non-residential buildings in the Slovak Republic were owned by the state until 1989. In the following period, new construction of non-residential buildings started slowly. Existing non-residential buildings were gradually transferred to private ownership. Since 2016, the Slovak Statistical Office has carried out a statistical survey on the number of completed non-residential buildings from the issued approval decisions annually according to the Statistical Classification of Buildings, broken down into new non-residential buildings and renovated non-residential buildings. This survey for the period 2016-2019 shows that 1 986 new non-residential buildings were constructed, and 662 non-residential buildings were renovated.

Statistical survey for new and renovated non-residential buildings from building approvals in 2016-2019

Purpose	2016	2017	2018	2019	Celkom
Hotels	33	59	62	51	205
Administrative buildings	80	86	89	120	375
Shops and services	258	271	241	279	1 049
Schools, universities and educational buildings	42	24	34	45	145

[15] Act of the National Council of the Slovak Republic No. 278/1993 Coll. on State Property Management as amended by Act No. 324/2014 Coll.

Hospitals and healthcare facilities	35	18	23	20	96
Sport buildings	24	24	45	23	116
New total	**472**	**482**	**494**	**538**	**1 986**
Hotels	16	14	14	18	62
Administrative buildings	26	29	35	57	147
Shops and services	65	101	66	68	300
Schools, universities and educational buildings	22	11	23	27	83
Hospitals and healthcare facilities	15	11	10	6	42
Sport buildings	10	6	8	4	28
Renovated total	**154**	**172**	**156**	**180**	**662**

Table 17 - Statistical survey for new and renovated non-residential buildings from building approvals in 2016-2019

5.2.3 Current state of building renovation in Slovakia

5.2.3.1 Renovation of residential buildings

The systemic approach to the solution of the renovation of buildings in Slovakia was already taken at the beginning of the nineties of the last century, when it was stated that a common feature of buildings older than 30 years built in the Slovak Republic, especially in the years 1960 to 1992 by mass forms of construction, is the inadequate thermal protection of building structures and the high wear and tear of the technical equipment of the buildings, which should be urgently replaced by elements whose quality and characteristics will create the required safety, internal comfort and elimination of hygiene deficiencies for the purpose of further use of these buildings.

The SO SR, as well as other institutions, do not yet statistically evaluate individual construction works (e.g., insulation of external walls). For the first time, the SO SR paid more detailed attention to the renovation (insulation) of buildings in the 2011 SODB, where the tracking of house data was extended to include the items "Thermal insulation of the building" (insulation of external walls and replacement of windows) and "Extent of reconstruction". From the data obtained in this way, after their professional correction and on the basis of the professional estimation of the Association for Building Insulation, it was possible to calculate the extent of renovation (insulation) for the years 2011 until the end of 2019 and to conclude that, from a national point of view, more than 67,87 % of apartments in apartment buildings and 44,97 % of apartments in single-family houses have been renovated.

Apartments in apartment buildings and single-family houses renovated by 31 December 2019

Description	Apartments in apartment buildings	Apartments in single-family houses	Total
SODB 2011	931 605	1 008 795	1 940 400
Renovation by SODB 2011	382 319	272 415	654 734
Renovation by 31. 12. 2019	632 301	431 864	1 064 165
Share of renovation by 31. 12. 2019 in %	**67,87**	**44,97**	**54,84**

Table 18 - Apartments in apartment buildings and single-family houses renovated by 31 December 2019

5.2.3.2 Renovation of non-residential buildings

The pace of renovation of non-residential buildings lags significantly behind that of residential buildings, mainly due to the lack of systemic support in the past. The positive effect of the introduction of the energy support service has not yet helped to kick-start the renovation of the non-residential building stock. Energy efficiency contracts for the public sector provide a suitable basis for initiating renovations, but only future developments will show the effectiveness of this measure. The Energy Certificates (ECs) processed since 2008 provide some indication of the extent of renovation of non-residential buildings.

Since 2010, the central registry records ECs separately for each building category and the energy class achieved. Between 2010 and 2019, a total of 5 814 buildings were renovated by EC, including 1 784 office buildings (31%), 1 599 schools and educational buildings (28%), 867 commercial services buildings (15%), 525 hotel and accommodation buildings (9%), 150 hospital buildings (3%), 128 sports halls and other buildings used for sports (2%) and 761 other mixed-use buildings (13%).

5.2.3.3 Renovation of residential and non-residential buildings according to data from energy certificates

Energy Certificates (hereafter "ECs"), processed since 2008, have some indicative power on the extent of renovation of buildings. Since 2010, ECs have been recorded in a central register separately for each building category and the energy class achieved. For the years 2010 to 2019 included a total of 27 661 buildings have been renovated according to the number of ECs, of which 21 847 (79 %) are residential buildings and 5 814 (21 %) are non-residential buildings.

Of the ECs issued for non-residential buildings for the period 2010 to 2019 included, 31% are ECs for office buildings, 28% ECs for schools and educational buildings, 15% ECs for commercial services buildings, 9% ECs for hotel and accommodation buildings, 3% ECs for hospital buildings, 2% ECs for sports halls and other buildings used for sports and 13% ECs for other mixed-use buildings.

Detailed data on the numbers of renovated buildings from the energy certificate database for the period 2010 to 2019 included, are presented in Tables 19 and 20.

Renovation of buildings according to data from the energy certificate database for the period 2010 to 2013 including

ENERGY CERTIFICATES 2010 - 2013								
Building category	**ENERGY CLASS**							**Total**
	A	**B**	**C**	**D**	**E**	**F**	**G**	
Single-family houses	65	2 085	1 255	341	96	36	46	3 924
Apartment buildings	3	2 446	1 613	99	13	2	0	4 176
RESIDENTIAL BUILDINGS – TOTAL	***68***	***4 531***	***2 868***	***440***	***109***	***38***	***46***	***8 100***
Administrative buildings	5	301	255	76	20	15	8	680
Schools and educational facilities	2	161	384	140	38	18	12	755
Hospital buildings	1	45	22	5	1	0	0	74
Hotel and restaurant buildings	5	138	38	11	4	1	0	197
Sport halls and other sport buildings	2	18	22	16	5	1	1	65
Buildings for wholesale and retail services	7	135	82	28	10	8	3	273
Other mixed-purpose buildings	6	145	109	26	5	0	2	293
NON-RESIDENTIAL BUILDINGS - TOTAL	***28***	***943***	***912***	***302***	***83***	***43***	***26***	***2 337***
ENERGY CERTIFICATES 2010 - 2013 - TOTAL	**96**	**5 474**	**3 780**	**742**	**192**	**81**	**72**	**10 437**

Table 19 - Renovation of buildings according to data from the energy certificate database for the period 2010 to 2013 including

Renovation of buildings according to data from the energy certificate database for the period 2014 to 2019 including

ENERGY CERTIFICATES 2014 - 2019		
Building category	**ENERGY CLASS**	**Total**

	A0	A1	B	C	D	E	F	G	
Single-family houses	1 124	2 944	3 177	554	141	43	18	10	8 011
Apartment buildings	631	1 102	3 427	480	64	20	6	6	5 736
RESIDENTIAL BUILDINGS – TOTAL	***1 755***	***4 046***	***6 604***	***1 034***	***205***	***63***	***24***	***16***	***13 747***
Administrative buildings	96	378	429	148	28	12	3	8	1 102
Schools and educational facilities	33	228	321	176	54	17	9	7	845
Hospital buildings	2	19	48	12	2	0	0	0	83
Hotel and restaurant buildings	17	68	166	47	12	9	1	2	322
Sport halls and other sport buildings	1	20	26	16	6	2	0	1	72
Buildings for wholesale and retail services	33	161	241	107	31	8	5	5	591
Other mixed-purpose buildings	18	128	238	63	8	6	1	0	462
NON-RESIDENTIAL BUILDINGS - TOTAL	***200***	***1 002***	***1 469***	***569***	***141***	***54***	***19***	***23***	***3 477***
ENERGY CERTIFICATES 2014 - 2019 - TOTAL	**1 955**	**5 048**	**8 073**	**1 603**	**346**	**117**	**43**	**39**	**17 224**

Table 20 - Renovation of buildings according to data from the energy certificate database for the period 2014 to 2019 including

6 Current state of vocational education and training

6.1 National system of vocational education and training for the construction sector in the lifelong learning system

The right to education for all citizens is guaranteed by the Constitution of the Slovak Republic, Art. 46. Lifelong education includes both educational and educational activities carried out in the school subsystem of education as formal education - kindergarten, primary, secondary, and higher schools and in the subsystem of further extracurricular education as informal education - corporate, departmental, interest, civic and other education.

Further professional education is directly linked to formal school education and is implemented in institutions of further education. Such training allows obtaining a partial or full qualification. A graduate of such education can also supplement, expand, or deepen already acquired qualifications. According to the Law on Lifelong Education, it is not possible to obtain a degree by successfully completing further education.

6.1.1 Responsible authorities

Coordination of vocational education and training for the labor market according to § 28 of Act 61/2015 Coll. on vocational education and training (VET) and on the amendment of certain laws is carried out at the national level and at the level of the self-governing region.

The following participate in the coordination of vocational education and training for the labor market at the national level:

Central bodies of state administration

- The field of lifelong education as well as vocational education is under the competence of the Ministry of Education, Science, Research and Sport of the Slovak Republic (MŠVVaŠ SR, hereinafter referred to as the "Ministry of Education")
- The Ministry of Education is the central body of the state administration of the Slovak Republic for kindergartens, primary schools, secondary schools and universities, school facilities, lifelong learning, science, and technology, for state welfare of youth and sports. The Ministry of Education is responsible for lifelong learning. In cooperation with interested ministries, state administration, self-government, social partners, it coordinates and implements measures and prepares a sequence of steps in accordance with the approved lifelong learning strategy.

As part of its competence at the level of professional education, it ensures and creates:

- strategic, conceptual and methodological documents for the field of professional education and training;
- issues and publishes state educational programs, framework curricula and educational standards;
- approves textbooks, professional teaching texts and didactic materials;
- manages a network of schools, school facilities, practical teaching centers and practical teaching workplaces;
- determines the system of study fields and teaching fields of vocational education and training;
- determines the content of vocational education and training in cooperation with state organizations, professional organizations and self-governing regions;
- processes standards for spatial, material and equipment of schools, school facilities, practical teaching centers and practical teaching workplaces;
- ensures financing of schools;
- in cooperation with state organizations and professional organizations determines the list of study fields and learning fields that are beyond the scope of the labor market needs plan.

Within the framework of its competence in the field of lifelong education, it ensures and carries out:

- implements the strategy of lifelong learning and lifelong counseling;
- carries out accreditation of educational programs of further education;
- establishes rules and procedures for verification and recognition of the results of further education aimed at acquiring partial qualifications and full qualifications;
- creates a national system of qualifications;
- creates, uses and makes available to the public an information system of further education;
- creates a system for monitoring and forecasting the educational needs of further education.

At the national level, vocational training is also coordinated by other central state administration bodies. Pursuant to §28 of the Act on Vocational Education, ministries are coordinators of vocational education and training for the labor market at the national level in their sectoral scope:

The Ministry of Transport of the Slovak Republic actively cooperates in the creation of systemic changes in vocational education, the creation of a system of study and learning fields and in the preparation for professional and craft activities within the department and in the updating of the National System of Qualifications NSK and the preparation of the system of verification of SOK qualifications.

The Ministry of Labour, Social Affairs and Family of the Slovak Republic fulfills tasks related to employment support, coordinates the preparation of Sector Strategies for the development of human resources until 2030, coordinates the updating of National Employment Standards and fulfills tasks according to a special regulation.

The Ministry of the Interior of the Slovak Republic adequately fulfills study fields in the field of security services and fire protection. It directs the implementation of professional training in the field of fire protection.

Self-governing regions

Within its jurisdiction, the self-governing region creates a regional VET strategy, determines for each secondary school within its territorial jurisdiction the highest number of first-year students in the full-time form of study, establishes and cancels schools and educational facilities (secondary schools, professional practice centers, interest-based educational facilities, practical teaching facilities, we manage schools and school facilities within their scope of establishment and ensure the conditions for carrying out the educational process.

Within the self-governing regions - the Regional Council for Vocational Education and Training (KROVaP) is the chairman's advisory body in the field of vocational education and training. It arose as a result of the need to involve social and economic partners in cooperation on the economic and social development of the region, as well as the constantly growing importance of the coordination of secondary education and preparation for the labor market. KROVaP comments on the proposals for the inclusion or exclusion of secondary vocational schools, centers of practical education and other workplaces of practical education in the network of

schools and educational facilities of the Slovak Republic. Discusses and recommends to the self-governing region the inclusion or exclusion of study fields within the system of education fields.

Guilds and professional organizations

The guilds and the professional organization provide cooperation to the Central Office of Labour, Social Affairs and Family in the creation of analyses and forecasts of developments in the labour market. They consulted on educational program, participate in development of standards for material-technical provision, participates in development of profiles of graduates of individual study fields and teaching fields, ensure the training of instructors, participate in assessing the content of textbooks and teaching texts.

The Council of Employers for Vocational Education and Training is an organization that coordinates the procedure for exercising the powers of state organizations and professional organizations in the system of dual education and vocational training.

The Council of Employers for the dual education system was created under the management of employers based on the vocational education reform and Act no. 61/2015 Coll. on Vocational Education and Training (OVP), is a union of representative state and professional organizations for the purpose of joint actions and representation of employers' interests in the field of vocational education and vocational training at the national and regional level. With the aim of ensuring a functional system of professional education aimed at preparing for a profession according to the needs of the labour market.

According to decree no. 251/2018 Coll. on the system of fields of education in secondary schools and on the substantive scope of the fields of education, for the group of study and teaching fields in Section 36 – Construction, geodesy and cartography, the relevant professional organization is the National Employers' Union. The cooperating professional organization is the Slovak Chamber of Commerce and Industry, the Slovak Chamber of Commerce, the Association of Employers' Unions and Associations of the Slovak Republic and the Slovak Mining Chamber.

The Council of the Government of the Slovak Republic for Vocational Education and Training is an advisory body of the Government of the Slovak Republic in the field of vocational education and training. Assesses and discusses:

- strategic and conceptual documents in the field of vocational education and training;
- analyses and forecasts of developments in the labour market, sectoral concepts of vocational education and training, regional strategies of education and training in secondary schools;
- a list of study and teaching fields with an insufficient number of graduates for the needs of the labour market;
- a list of study and learning fields above the scope of market needs;
- state educational programs for professional education and training and comments on spatial, material and equipment provision standards;

- comments on the financing of vocational education and training and recommends measures in the field of vocational education and training.

The State Institute of Vocational Education (ŠIOV) is a directly managed organization of the Ministry of Education (MŠVVaŠ SR). It is responsible for the management and coordination of vocational education and training, and adult education in Slovakia. In the field of education, it helps introduce new trends and innovations, supports the development of national policies in vocational education and training and adult education. It focuses on activities for pupils, teaching, and professional staff, considering the needs of employers.
ŠIOV manages EU initiatives in the field of vocational education and training and adult education in Slovakia, namely:

- National contact point for the European Qualifications Framework
- EUROPASS National Center
- EQAVET national reference point
- EPALE national support service
- National coordinator of the European Adult Education Program
- National system of qualifications
- Slovak center of training companies
- EuroSkills national contact point
- UNESCO-UNEVOC Centre.

Alliance of Sector Councils and Sector Councils

As of February 1, 2023, the alliance of sector councils was established as an interest association of legal entities. Its activity without legal subjectivity lasted for ten years under the management of the Ministry of Internal Affairs and Communications of the Slovak Republic and was defined by the Employment Services Act 5/2004 Coll.

Sector Skills Council for Construction, Geodesy and Cartography and Sector Council for Energy, Gas and Electricity.

One of the main objectives of the sector skills council is to connect the education system with the labour market, to monitor the development of the market in terms of requirements for skills and professional training, and thus to harmonize the system of lifelong education with the needs of the labour market. It is mainly focused on supporting the sustainability of Sector-Driven Innovations (hereinafter referred to as "SRI"), in direct connection with the National System of Occupations (hereinafter referred to as "NSP") and the National System of Qualifications (hereinafter referred to as "NSK"). It started its activities in 2012. It is a voluntary, independent professional association. It is made up of representatives of employers, professional associations, schools and the Ministry of Transport and Construction of the Slovak Republic. Since June 2019, the Sector Council has been operating within the national SRI project. Its main tasks include the creation and revision of guaranteed national employment standards, the creation of a sectoral strategy for the development of human resources, and the updating of the SK ISCO-08 national employment classification. The Sectoral Council for Construction, Geodesy and Cartography guaranteed, processed, and updated a total of 70

national employment standards and the Sectoral Council for Energy, Gas and Electricity 79 jobs within the NSP.

6.1.2 Relevant regulations and accreditation bodies

The basic legal regulation governing the issue of vocational education and training at secondary vocational schools is Act 61/2015 Coll. on vocational education and training (VET) and on amendments to certain laws. The Act entered into force on 1 April 2015 and replaced Act No. 184/2009 Coll. on vocational education and training.

This law regulates the vocational education and training of secondary vocational school students, defines the types of secondary vocational schools, forms, and methods of practical teaching. It introduces the possibility of training students in the dual education system and characterizes and defines this dual education system. It allows employers to provide practical training in the dual education system and thus enter the VET process with the aim of better applying secondary vocational school pupils to the labor market. It thus enables preparation according to the specific requirements and needs of employers. It allows the employer to enter the vocational training process, but at the same time takes responsibility for the organization, content and quality of practical training. The uniform scope and content of the practical teaching of individual branches is ensured according to model curricula and curricula developed in cooperation with relevant professional associations and organizations and are binding.

However, the construction sector is specific and this system of dual education, which on the one hand is an opportunity, on the other hand is difficult to apply and use in some areas and fields with a construction focus. Employers are not able to ensure uniform conditions of professional practice due to different places of performance and realization of work. They are not able to secure a permanent place and conditions for practical teaching in advance, which we see as one of the main obstacles to the use of dual education in the construction sector.

Within the group of 36 disciplines Construction, geodesy, and cartography, in the 2017/2018 school year, 4 secondary schools and 28 employers participated in dual education, and in the 2021/2022 school year, 20 secondary schools and 70 employers, which offer practical training in 11 disciplines.

Formal education is governed by so-called school laws:

Law no. 245/2008 Coll. on education and training (school law) and on amendments to certain laws, which establishes the principles, goals, conditions, scope, content, forms and organization of education and training in schools and in school facilities, levels of education, educational programs that define mainly the goals of education and educational standards and educational objectives, framework curricula and educational standards for basic education, secondary education and higher vocational education. State educational programs are issued and

published by the Ministry of Education. Vocational education is implemented mainly within secondary vocational schools and related forms of vocational education and training, such as additional studies and in vocational schools that provide vocational training for the performance of undemanding work activities.

Law no. 596/2003 Coll. on State Administration in Education and School Self-Government and on Amendments and Supplements to Certain Acts defines the founders of primary schools, which are cities and municipalities, the founders of special schools are regional authorities, and the founders of secondary schools are higher territorial units. The founders are responsible for their functioning and financing, the task of the schools is to ensure the proper operation of the education and training process.

Act 138/2019 Coll. on pedagogical employees and professional employees and on amendments and additions to certain laws regulates the rights and obligations of pedagogical employees and professional employees, their work activities and professional development. Rights, obligations and prerequisites of a pedagogical employee and professional employee.

Act 597/2003 Coll. on the financing of primary schools, secondary schools and school facilities, regulates the financing of schools in which education is considered continuous preparation for a profession, and defines the sources of financing. Vocational education and training is financed primarily from the state budget and from the funds of the VÚC.

Law no. 293/2007 Coll. on the recognition of professional qualifications regulates the conditions for the recognition of documents on professional qualifications issued by schools or other authorized bodies according to the legislation of the member states of the European Union or states that are parties to the Agreement on the European Economic Area and the Swiss Confederation (hereinafter referred to as the "member state") for the purposes of exercising regulated professions and regulated professional activities (hereinafter referred to as "regulated profession") and for the purpose of freely providing services in the Slovak Republic.

Law no. 131/2002 Coll. on higher education institutions and on amendments to certain laws, as amended, regulates the status and tasks of public, state and private higher education institutions and their components, establishes rules for studying at a higher education institution, the status of students and employees of higher education institutions, the composition, activities and powers of the accreditation commission , establishes the rules for the financing of higher education institutions and the system of social support for students, responsibilities of public authorities and representative bodies of tertiary educational institutions.

Non-formal education and the field of continuous and further professional education

Act 568/2009 Coll. on lifelong learning and on the amendment of certain laws regulates and defines lifelong education, in which further education follows the level of education achieved

in school education, regulates the accreditation of educational programs of further education, rules and procedures for the verification and recognition of the results of further education aimed at the acquisition of partial qualifications and of full qualifications, national system of qualifications, further education information system, system for monitoring and forecasting educational needs of further education. It defines the types, forms and scope of further education, educational institutions of further education and their obligations.

Informal education is regulated by Act no. 386/1997 Coll. on further education and on the addition of certain laws and its amendment no. 567/2001. This law regulates and defines further education as a part of lifelong learning (LLE), characterizes its types, establishes institutions for further education, conditions for accreditation of further education and the status and activities of the Accreditation Commission of the Ministry of Education of the Slovak Republic for further education. It regulates the issuing of educational certificates and defines the sources of funding for further education.

Further education also means preparation for obtaining a degree in addition to a higher education degree, professional education and training that enables the participant to expand, deepen or renew knowledge and skills, to gain the ability to perform an activity. Retraining is also considered vocational training. The certificate of the education obtained by its graduates is issued by institutions of further education accredited according to this law. The law here also regulates interest education, civic education and other education.

Non-formal education is also regulated by other laws such as the Trades Act, the Employment Act and the Labor Code.

Law no. 126/1998 Coll. The Act on the Slovak Chamber of Commerce and on Amendments and Supplements to Certain Acts regulates the establishment, status, scope and organizational structure of the Slovak Chamber of Commerce.

Law no. 311/2001 Coll. Labor Code as amended. In addition to the basic and general provisions, this law also regulates the rights and obligations of the employer and the employee in connection with deepening the qualification of employees or increasing it. For employees without qualifications, the employer ensures the acquisition of qualifications through training or apprenticeship. The employer is obliged to retrain an employee who moves to a new workplace or to a new type of work. It enables employees to deepen their qualifications, maintain and renew them. Regulates the employer's opportunities to participate in further education, in which the employee must acquire the prerequisites or fulfill the requirements necessary for the proper performance of the work agreed in the employment contract.

Law no. 595/2003 Coll. The Income Tax Act, as amended, defines as tax expenditure expenditure on working and social conditions and health care of employees, such as expenditure on education and retraining of employees and own educational facilities and on the material security of pupils (according to § 26 of Act No. 61 /2015 Coll. on Vocational

Education and Training as amended) and for the provision of practical teaching and from September 1, 2018 also expenses for remuneration for productive work (according to § 27 paragraph 1 of Act No. 61/2015 Coll. on Vocational Education and Training, as amended) up to 100% of the hourly minimum wage, costs (expenses) for a company scholarship (according to § 27, paragraph 6 of the Act on Vocational Education and Training) and for the operation of a secondary vocational school beyond the scope provided normative funds (§ 4, § 6 and § 6a of Act No. 597/2003 Coll. on the financing of primary schools, secondary schools and school facilities, as amended).

Law no. 124/2006 Coll. on safety and health protection at work and on amendments and additions to certain laws establishes general principles of prevention and basic conditions for ensuring safety and health protection at work and for the exclusion of risks and factors that condition the occurrence of occupational accidents, occupational diseases and other occupational health damage. This law applies to employers and employees in all sectors of the manufacturing and non-manufacturing sectors. For the purposes of this Act, an employer is also a natural person or a legal entity that conducts practical teaching of secondary school pupils, vocational secondary school pupils, secondary school pupils and university students, and an employee is also a secondary school pupil, vocational secondary school pupil, secondary school pupil during practical teaching and college student during practical teaching.

Other generally binding legal regulations that regulate the issue of vocational education and training:

Decree no. 147/2013 Coll. Decree of the Ministry of Labour, Social Affairs and Family establishing details for ensuring safety and health protection in construction works and works related to them and details about professional competence to perform certain work activities.

Decree no. 251/2018 Coll. Ministry of Education, Science, Research and Sports of the Slovak Republic on the system of education departments for secondary schools and on the substantive scope of education departments

Decree no. 287/2022 Coll. Decree of the Ministry of Education, Science, Research and Sport of the Slovak Republic on the system of education departments for secondary schools and on the substantive scope of education departments.

Act 422/2015 Coll. on the recognition of educational documents and on the recognition of professional qualifications and on the amendment of certain laws.

6.1.3 Overview of relevant secondary schools, study and teaching departments and VET centres

Vocational education in the construction sector is provided by the following types of secondary vocational schools:

- SOŠ – secondary vocational school (focusing on specific qualifications in one sector)

- STS – Secondary technical School

- Joint school (SOŠ as an organizational component of the joint school focused on several sectors)

It is mainly carried out through SOŠ. The following table shows the types of schools and their share in providing professional education in the resort.

Table 21 - Schools providing vocational education in the sector, breakdown by region and type of vocational school [16]

Type of school	BA	TT	TN	NR	ZA	BB	PO	KE	SR
Secondary vocational school	10	16	11	22	17	19	23	24	**143**
Secondary industrial school	2	2	2	2	1	3	5	3	**20**
Hotel academy	1	2	1	0	2	2	3	3	**14**
Business academy	1	1	0	0	1	0	1	1	**5**
United school	1	0	1	2	2	3	7	3	**19**
Total schools in the sector in 2021	15	21	15	26	23	27	39	35	**201**
Of which total schools providing education for a group of fields of education 36 Construction, geodesy and cartography in 2021									**82**
Total schools in the sector in 2020	16	23	15	26	26	27	38	35	**206**
Total schools in the sector in 2019	16	23	15	27	25	29	40	35	**210**
Total schools in the sector in 2018	17	23	16	28	27	29	42	35	**217**
Total schools in the sector in 2017	18	23	16	28	26	29	44	31	**215**
Of which total schools providing education for a group of fields of education 36 Construction, geodesy and cartography in 2021									**84**

[16] Odvetvová koncepcia odborného vzdelávania a prípravy žiakov na výkon povolania, skupiny povolaní a odborných činností v rezorte dopravy a výstavby Slovenskej republiky 2022, 2018

Total schools in the sector in 2016	18	25	17	28	28	29	44	38	**227**
Total schools in the sector in 2015	19	25	18	27	27	30	44	38	**228**
Total schools in the sector in 2014	20	26	20	27	29	30	46	35	**233**

Despite the persistent shortage of labour and the low number of qualified employees in the construction sector, we see an annual decrease in the number of vocational schools. Vocational education should respond to the needs of the labour market. Continuity can also be ensured through centres of vocational education and training (VET), which are under the competence of vocational schools and with the cooperation of the school with the relevant professional organization. They provide practical vocational education and training as well as re-skilling courses for interested parties and companies in the system of lifelong learning for the needs of the labour market. It also includes conceptual and professional activities in the field of qualification of teachers of vocational subjects and instructors of vocational education. In accordance with the Strategy of lifelong education and counselling for the years 2021-2030 and the Action Plan of the strategy, the so-called centres of excellence in vocational education and training (hereinafter referred to as "CEOVP") will be created by transformation of selected COVPs. In the following table, we offer a list of relevant COVPs.

Table 22 - Overview of vocational education and training centres for the construction sector [17]

Group of fields	COVP name	Name and address of the school authorised to use the COVP label
36	COVP for construction	SVS, Ivanská cesta 21, Bratislava
	COVP for construction	SVS for construction Emila Belluša, Staničná 4, Trenčín
	COVP for construction	SVS, Nábrežie mládeže 1, Nitra
	COVP for construction	SVS of construction, Tulipánová 2, Žilina
	COVP for construction	SS, Kremnička 10, Banská Bystrica
	COVP for construction	SVS technical, Volgogradská 1, Prešov
	COVP for construction	SVS technical, Kukučínová 23, Košice

[17] Odvetvová koncepcia odborného vzdelávania a prípravy žiakov na výkon povolania, skupiny povolaní a odborných činností v rezorte dopravy a výstavby Slovenskej republiky, Jun2022

Overview of study and learning fields within the groups of fields of education 36 Construction, geodesy and cartography and other related fields such as 26 - Electrical engineering and 24 - Mechanical engineering and other metalworking production, which are approved in the school year 2022/2023, by completing which the student will obtain the appropriate level of professional education and qualifications according to the Slovak Qualification Framework (SKR) and the European Qualification Framework (EKR) are shown in the following table.[18]

Table 23 - Overview of relevant fields of study and training for 2022/2023

Code of department	Name of department
36 - Construction, geodesy and cartography	
3650M00	Construction
3692M00	Geodesy, cartography and cadastre
3686F00	Construction production
3661H00	Bricklayer
3663H00	Carpenter
3668H00	Dry construction fitter
3672H00	Stonemason
3673H00	Tile maker
3675H00	Painter
3678H00	Installer
3679H00	Glazier
3680H00	Flooring engineer
3684H00	Roofer
3688H00	Chimney sweeper
3656K00	Construction production operator
3658K00	Mechanic of construction and installation equipment
3667K00	Water technician, water engineer
3693K00	Building energy equipment technician
3659L00	Construction
24 – Mechanical engineering and other metalworking	
2435H00	Plumber
2435H01	Plumber - construction production
2435H02	Plumber - construction production
2419K00	Operator of ecological equipment
26 - Electrical engineering	
2675 M00	Electrical engineering

[18] Vyhláška č. 287/2022 Z.z. MŠVVaŠ SR o sústave odborov vzdelávania a o vecnej pôsobnosti k odborom vzdelávania s účinnosťou od 1.9.2022

2675 L00 2675Q00	Electrical engineering
2683 H00	Electrical engineer
2675 L01	Electrical engineering - energetics
2683 H11	Electrical engineer - high current technology
2683 H12	Electrical engineer – automation technology
2683 H15	Electrical engineer – utility technology
2683 H17	Electrical engineer – refrigeration equipment and heat pumps
33 - Wood processing	
3349 K00	Wood construction technician

MŠVVaŠ SR, based on the obligation arising from the Act on Vocational Education, prepares and publishes on its website a list of study and teaching fields with an insufficient number of graduates for the needs of the labour market once every 3 years. In the list with an insufficient number of graduates for the labour market with effect from September 1, 2020, 5 departments from the field of construction are listed: 3675 H painter, 3658 K construction and installation equipment mechanic, 3661 Bricklayer, 3678 H plumber, 3692 M geodesy, cartography and cadastre. Therefore, support for increasing the number of students in these deficient fields is needed. In the following table, we show the list of the most numerous study fields and teaching fields with the largest number of students preparing for selected professions in the 2021/2022 school year and the number of graduates.

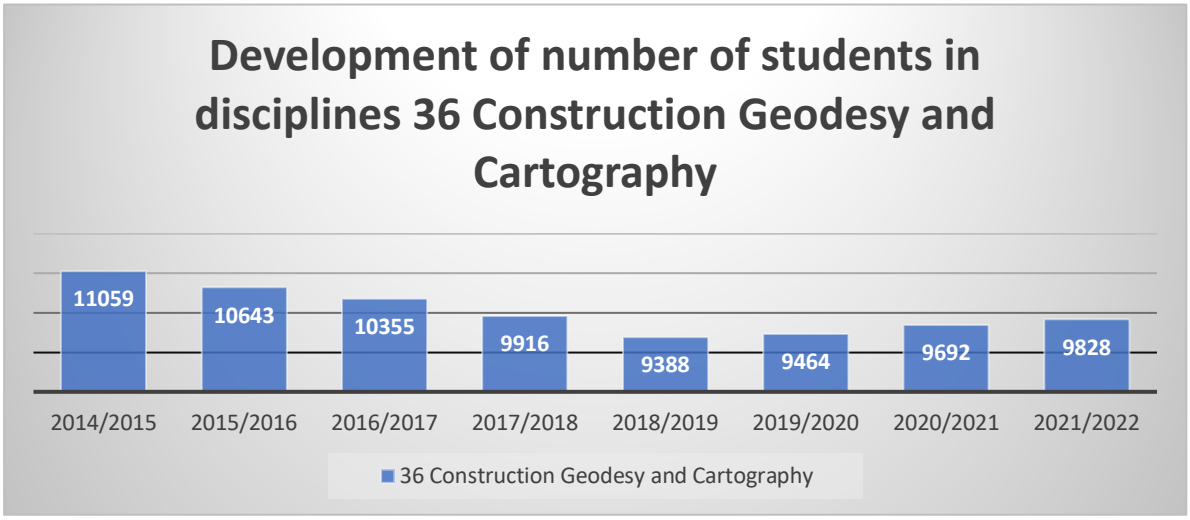
Table 24 - list of the most numerous fields of study and apprenticeship preparing for selected professions in the school year 2021/2022 and the number of graduates.[19]

Group of education fields	Code of department	Name of department	Number of students	Number of graduates
36 Construction, geodesy and cartography	**3650 M**	**Construction**	**3115**	**744**
	3686 F	Construction production	1352	504
	3661 H	Bricklayer	1030	288
	3678 H	Installer	790	266
	3686 G	Construction production - bricklaying	559	123

[19] Sectoral Concept of Vocational Education and Training of Students for Occupations, Groups of Occupations and Vocational Activities in the Department of Transport and Construction of the Slovak Republic 2022

In the following graph, we see the development in terms of the number of students studying at SOŠ and other secondary schools preparing for the field 36 Civil engineering, geodesy, and cartography. There was a significant drop in the number of students in the 2018/2019 school year. The number then increases slightly from the 2019/2020 school year (2019/2020 + 76 students, 2020/2021 + 228 students, and 2021/2022 + 136 students). Despite the gradual, moderate increase in the number of students, it is still necessary to pay increased attention to the solution to the overall decrease in the number of students in departmental professions. Of course, it also affects the demographic development, which in recent years was characterized by a decrease in the number of children in the Slovak Republic. According to forecasts, the decline in the number of secondary school pupils should be completed in 2019, and an increase in secondary school pupils, including pupils of departmental schools, is expected in the following years. The Ukrainian migration crisis can also affect the temporary or long-term increase.

Graph 15 - Development of the number of students in the study and teaching disciplines 36 Construction Geodesy and Cartography (Source: Sectoral Concept of Vocational Education and Training of Students for Occupations, Groups of Occupations and Vocational Activities in the Department of Transport and Construction of the Slovak Republic 2018, 2022)



6.1.4 Accreditation bodies and education providers in the system of informal education - further professional education

In informal education, educational activities are carried out by various educational institutions. They can also be schools, educational institutions, educational institutions of companies, employers, estate organizations, private educational institutions, and other entities such as professional unions, guilds, associations and chambers. The main group consists of further commercial education providers that provide educational activities on a commercial basis depending on demand.

The exact number of institutions that operate and implement training within the continuing education system is not known. From the data collected as part of the annual statistical survey on further education (DALV), which is carried out by the Centre for Scientific and Technical

Information of the Slovak Republic (CVT SR), we can obtain some data. However, it should be considered that, despite the legal obligation, in the case of entities that do not accredit their programs, the actual data provided by these entities is considerably limited, almost non-existent. We processed the situation in this area mainly based on the last accessible data processed for the years 2019-2021.

The years 2020 and 2021, like all areas, were significantly affected by the COVID-19 pandemic. Therefore, the implementation of educational activities within further education was affected by anti-pandemic measures, which significantly affected the course, forms, and possibilities of implementing education at all levels. These were mainly restrictions related to the provision of face-to-face educational activities. In some cases, activity, and business itself were made impossible and limited. The activities that required professional practice in face-to-face form turned out to be the riskiest. Educational entities reacted by changing the form of education to distance education, especially by using e-learning. The content focus of the courses was also affected. In many cases, they had to react by cancelling or interrupting educational activities. The restrictions clearly had a negative impact, which is also shown by the data in the table.

Table 25 - Impact of COVID-19 containment measures on entrepreneurial activities in further education

Impact of COVID-19 containment measures on entrepreneurial activities in further education	Number	Share
The number of participants in the educational activities offered has significantly decreased	68	40,0%
We have toned down business in this area	49	28,8%
The number of participants in the educational activities offered has slightly decreased	29	17,1%
No impact on our business	13	7,6%
It had devastating consequences for us	7	4,1%
We have seen a positive increase in the number of training activities/participants	3	1,8%
No answer	1	0,6%
Total	170	100.0%

*Source of data: CVTI SR, survey on the impact of the COVID-19 pandemic on the field of further education in Slovakia [20]

According to the data processed by the Centre for Scientific and Technical Information for 2019, we know that in 2019 a total of 540 entities operating in the field of further education provided

[20] The impact of the COVID-19 pandemic on further education in Slovakia.
Interim survey report.

data on their activities, while 73 (13,5%) entities submitted a so-called negative report, which in practice means that in 2019 they did not carry out any educational activities and therefore did not provide any additional data. Compared to 2018, almost eleven percent more entities provided data on their activities[21].

Table 26 - Number of educational entities by regions of the Slovak Republic in 2019

Region	Number	Share
Bratislava region	117	25,1%
Trnava region	38	8,1%
Trenčín region	28	6,0%
Nitra region	46	9,9%
Žilina region	59	12,6%
Banská Bystrica region	53	11,3%
Prešov region	48	10,3%
Košice region	78	16,7%
SR Total	**467**	**100,0**

Educational entities reported a total of **2345 educational activities implemented in 2019**. The highest number of educational activities was implemented in the Bratislava region (877), the lowest number (104) in the Trenčín region.

Table 27 - Basic data on educational activities (VA) of educational institutions (VI) by regions of the Slovak Republic

Region	Number of realized VA	Number of reported but not realized VA	VI with at least one reported VA	VI with at least one realized VA
Bratislava region	877	171	113	78
Trnava region	238	36	37	34
Trenčín region	104	23	28	19
Nitra region	180	106	43	32
Žilina region	215	65	57	35
Banská Bystrica region	234	54	52	44
Prešov region	177	46	46	35
Košice region	320	97	77	55
SR Total	**2 345**	**598**	**453**	**332**

*The VIs with at least one implemented educational activity included those entities that reported non-zero numbers of participants and/or graduates.[22]

In 2019, according to data provided by educational entities through the DALV report, a total of 709 educational activities were implemented, which were accredited according to Act

[21] Further education in numbers 2019
[22] Further education in numbers 2019

568/2009 Coll. about lifelong learning. In addition, 35 entities reported a total of 277 implemented activities that were accredited under other legal regulations than the Lifelong Learning Act. According to the reported data, in 2019 a total of 130,866 participants took part in educational activities implemented as part of further education, of which 56.0% were women.[23]

For the year 2019, educational entities reported the total sources of financing their educational activity in the field of further education at the level of €45,860,704.90. At the same time, more than a third of all funds (35.9%, €16,191,413.97) came from the public sector, in which funds from employment offices clearly dominated.

Table 28 - Sources of funding of further education

Region	Training participants	Private enterprises	Public sector	From the state budget for organisations connected to to the SR	From foundations and non-profit organisations	From EU funds	Other sources of funding	Total
BA	3 763 150,80	603 079,93	11 984 362,17	7 046 294,52	10 200,00	7 601 463,82	470 365,05	31 478 916,29
TT	635 801,48	404 571,91	353 243,65	8 131,80	3 340,00	27 548,00	105 334,06	1 537 970,90
TN	167 474,75	312 787,40	69 180,60	3 250,00	0,00	194 970,50	0,00	747 663,25
NR	385 111,50	376 826,17	462 567,80	61 743,78	60,00	182 901,00	2 000,00	1 471 210,25
ZA	1 217 483,55	159 837,43	1 293 298,20	18 420,00	470,00	227 408,60	6 855,00	2 923 772,78
BB	896 042,60	110 746,10	130 644,09	258 527,60	0,00	601 159,02	24 359,55	2 021 478,96
PO	698 051,00	82 336,50	544 965,52	744 781,22	550,00	3 077,00	880,00	2 074 641,24
KE	635 795,13	633 264,90	1 353 151,94	631 658,41	7 702,00	283 284,28	60 194,57	3 605 051,23
SR	8 398 910,81	2 683 450,34	16 191 413,97	8 772 807,33	22 322,00	9 121 812,22	669 988,23	45 860 704,90

From the point of view of the focus of educational activities, out of the total number of 2,345 implemented educational activities, educational activities focused on teacher training and pedagogy (broader programs) had the largest representation, the share of which in the total number of implemented courses was at the level of 11.0%. Programs focused on construction and energy accounted for a total of only 2.47%.

Table 29 - Basic data on educational activities by content of education

Content of education	Number of educational activities implemented	Number of reported non-implemented educational activities	Educational institutions with at least one reported educational activity	Educational institutions with at least one educational activity implemented
Electrical engineering and energetics	23	1	8	8
Construction	35	0	7	7

[23] Further education in numbers 2019

Other focuses total	2287	597	438	317
Total	2 345	598	453	332

*Overview of statistical indicators for 2019 collected in the framework of the annual DALV survey.[24]

Accreditation of an educational activity can be a quality assessment criterion to a certain extent, but it is not mandatory for every activity. The legal obligation concerns retraining for labour, social affairs and family offices, further education of employees and elected representatives in public administration, as well as other educational activities for which financial resources are provided from the state budget.

Accredited programs go through a system of approval and quality control according to Act 568/2009 on lifelong learning Coll. Such programs may lead to the acquisition of full or partial qualifications necessary to perform certain activities or professions. Within the further education system, however, an important area is precisely the area of programs without formal accreditation. When education providers can flexibly respond to needs. In the subsystem of non-formal education, a more liberal approach applies and the functioning is left to supply and demand relations.

The importance of education in the European context and adult education continues to grow. New challenges related to industrial revolution 4.0, digitization and automation, climate change, place ever higher demands on individuals. It requires an increase in adaptability and flexibility to new conditions on the labour market. However, the current legislative environment does not create sufficient conditions for development and changes, for example in the area of financing, quality assessment and recognition of education. At the same time, it must be noted that sufficient conditions are not created for a clearer connection between formal and informal education.

The national project System of verification of qualifications in the Slovak Republic is the first step for transparency and easier access to the CŽV system, and it is also proving to be essential for the area in the construction sector. It sets up a system of verification of qualifications and results of informal education and informal learning in the Slovak Republic. The effort should also be to increase the motivation of people to enter the educational process, by accepting various and partial educational outputs obtained through informal education and their recognition in the system of verification of qualifications, supported by a network of authorized institutions and persons leading to the recognition of education and obtaining documents about education comparable to a document from a formal education. This would ensure horizontal permeability between systems and the openness of both educational subsystems.

[24] Further education in numbers 2019

6.1.5 Education providers and other entities providing a system of informal education in the construction and energy sector

New technologies, materials, construction procedures and the overall development of the construction industry also bring new, higher requirements for education and practice. Even the simplest construction activities are digitized, automated and robotized. The long-term shortage of craftsmen on the labour market can be solved by increasing the level of education of craftsmen and other qualified workers.

In the construction sector, guilds and other professional unions, associations and chambers actively participate in the system of further professional training and education, focusing mainly on expanding and supplementing the knowledge and skills of already acquired qualifications.

a) Guilds

Guild of Roofers of Slovakia (CSS)

Education, as one of the main activities of the guild, concerns those who participate in the design and construction of roofs in order to familiarize themselves with new trends, technologies in the construction of roofs and on the market, they also pay attention to the new generation of craftsmen. Guild education is provided in cooperation with partner members. Among the guild's main educational activities are professional seminars such as Guild Days. Each year, through expert lectures and various processed materials, CSS members and the entire construction public will receive up-to-date information on new modern technologies, new products in the product range, and problems during design and implementation. Professional seminars are usually held in 4 cities in Slovakia.

Professional International Bratislava Symposium ROOFS is a professional symposium on roofs that has a long-standing tradition in Slovakia. It is intended for the professional public and representatives of science and research from universities meet here, representatives of roof implementers and production resp. trading companies with materials and accessories for roofs. (participation has been increasing and is around 145 participants)

Support for the vocational education of primary school students, their teachers and vocational training masters

CSS participates in improving the quality of practical teaching with the aim of introducing the most modern technologies that are commonly used on construction sites into the school curriculum, and thus the materials and products of the partner members are brought to the attention of young future craftsmen, in the form of professional lectures to students at all schools associated in CSS.

Slovakian championship of primary school pupils in roofing professions - CONECO with international participation. CSS annually organizes the Slovak Primary School Championship as

part of the CONECO Bratislava international construction fair. The competition is attended by two-member teams of pupils together with their masters in the newly conceived profession of roofer. Here, the profession of ROOFING becomes known to the public, so the competition can also help to recruit students to schools, which still lack a sufficient number of students interested in the professions covered by the guild.

CSS continuously provides and publishes various professional publications and magazines, such as the guild newsletter STRECHÁR, members of the guild receive a monthly - professional magazine ROOFS - FACADE - INSULATION and participate in the creation of other professional publications.

CSS other activities such as participation in national international fairs and exhibitions, organizes, for example, the annual Roof of the Year competition, summer seminars and other activities within the framework of national and international cooperation.

Flooring Guild (CPS)

The guild cooperates with the SOŠ in the form of professional lectures, in the preparation of curricula, in the involvement of young apprentices in international competitions organized by similar cooperating guilds abroad. For direct financial support, SOŠ Cech does not have enough funds, as it manages itself only from membership contributions and from occasional contributions from partners for their promotion. The cooperation with the university was limited to help in issuing CPS Expert Opinions, respectively. when they are increased to Forensic expert opinions.

CPS helps the lay public by providing free advice at construction exhibitions or via blogs on the CPS website. Since the education of the Podlahár trade has been absent from the SOŠ for several years, CPS obtained the Accreditation of the Kindergarten for Education as well as for the subsequent Verification of Professional Competence (OOS). However, there is little interest in this accredited education, as there is still a parallel free trade for the execution of the profession of Flooring (Laying tiled floor coverings). CPS has been fighting against this fact for many years, also on the basis of numerous construction errors caused by unprofessional laying by just such "self-proclaimed "experts". From In 2018, at least the restriction of free trade to free laying without full-surface gluing of floor coverings was achieved.

The importance of the Flooring trade and our efforts to preserve it is also supported by the involvement of CPS in the Qualification Verification System (SOK) as an Authorized Institution (AI) or some members of CPS as Authorized Persons (AO). In this direction, the cooperation with the Secondary School of Education, which joined this project as an AI for our craft, will continue.

Tilers' guild

The tiler's guild focuses, among other things, on the educational activities of its members, but also on the care of other young professionals. It also provides professional training and consultancy in areas related to the business activities of its members. It also provides an educational program in the field of tiling for obtaining a certificate for opening a business.

b) Chambers and associations

The Slovak Chamber of Civil Engineers (SKSI) is a professional organization that organizes and conducts authorization tests and tests of professional competence for construction managers, construction supervision and energy certification, issues authorizations for authorization and professional competence, maintains a list of authorized engineers, a register of visiting persons and records of professionally qualified persons for the performance of the activities of construction manager, construction supervision and energy certification, recognizes the professional qualification for construction engineers, submits statements on the recognition of professional qualification for the activity of construction manager, construction supervision and energy certification of buildings. It organizes professional educational events and preparatory seminars for authorized civil engineers and thus supports the lifelong education of experts in the construction sector, also supports the publication of professional publications and magazines and provides useful and important information for civil engineers.

The Slovak Chamber of Commerce represents and represents the interests of entrepreneurs, small and medium-sized entrepreneurs and participates in improving the overall conditions for doing business. It enters the educational process mainly by representing experts in the commissions of final and matriculation exams, and within the framework of the dual education system, it coordinates this process as a state-level professional organization.

As part of its activities, it also offers several accredited courses, but it does not currently offer any courses or training in the field of construction. However, within its scope, it provides examinations to verify professional competence for crafts and personal services. Such as for qualifications such as bricklayer, plumber, carpenter, roofer, joiner, insulator and tinker.

Slovak Trade Union

The SŽZ provides advisory services to its members and the public, organizes professional seminars, and prepares professional publications.

The construction sector has long been trying to improve the quality of the work carried out. The professional public agrees that the current situation with the setting of requirements for education and experience in construction activities within the framework of the regulation of trades is set very low. There are a large number of so-called free trades, where it is not necessary to prove the relevant education or course, which does not guarantee the quality of the work carried out. That is why the effort to change is also in cooperation with the Slovak Trade Union.

c) **Professional bodies**

Other professional bodies also intervene in the education process.

The Slovak Council for Green Buildings has been active since 2010 (also known by the abbreviation SKGBC from the English Slovak Green Building Council). He is the main ambassador of sustainable construction in Slovakia. With the aim that both newly built and renovated buildings are implemented according to sustainable standards, which reduces energy consumption, eliminates the impact of buildings on the environment and minimizes the carbon footprint. He also directs his professional activities and events in this field. It implements professional seminars and webinars focused on the topic of energy class A0, water recycling and green roofs and facades. In 2022, they started a series of webinars focused on sustainable construction called Green Building Academy 2022, where they deal in individual modules with the basic definitions and principles of sustainability in the construction industry, but also with good examples from practice and individual areas and phases of construction in relation to sustainability. In the framework of the project "Preparation of students for practice in the field of sustainable buildings", educational activities focused on sustainable construction were carried out by Slovak secondary schools. For secondary schools. In Slovakia, they mediated and organized 117 online lectures focusing on the topic of basic principles of sustainable construction. Members and partners of the council actively participated in further education. They organized 130 lectures and 8 interactive excursions with workshops. In total, they recorded approximately 3,100 participations in 2021-2022 in these professional activities. The goal was to increase the professional readiness and motivation of students, while also spreading awareness about sustainable and high-quality construction. The project was launched in November 2019. Other professional activities include the annual organization of the Sustainability in Architecture and Construction conference. The 11th Green Building Week included, for example, the Sustainable Buildings and Sustainable Materials event focused on sustainable construction and increasing the efficiency of off-site construction with an emphasis on the pre-project and project phases. Here, experts also focused on optimizing processes, reducing the carbon footprint and reducing waste. In addition to circular waste management, the topic was also modular construction. The week also included an event focused on a healthy indoor environment and an event focused on the topics of green financing and investing in sustainable projects and the EU taxonomy.

Buildings for the Future is the largest professional interest association for the building sector in Slovakia. Through our 9 member organizations, we represent almost 900 entities active in the field of quality construction, renovation and operation of buildings. Since the establishment of the association in 2013, the main mission has been to actively participate in the creation of public policies that affect the construction and renovation of buildings, with an emphasis on energy efficiency, a healthy indoor environment and sustainability.

The Association for the Support of the Renewal of Apartment Buildings focuses on supporting activities aimed at helping cities and municipalities in the Slovak Republic to restore their housing stock and its immediate surroundings so that it meets current requirements and modern trends. It supports professional growth and personal development through professional conferences and educational activities and other social events.

The Association for the Insulation of Buildings (OZ ZPZ) is a civil, professional association of legal and natural persons working in the field of insulation of building envelopes. It focuses on raising the awareness of the professional and non-specialist public about the benefits and conditions of applying thermal insulation systems for the benefit of the final consumer and on supporting the use of thermal insulation systems leading to long-term ecologically, economically, and energetically positive effects. The goal is to support a high standard of compliance with the quality conditions for the production and implementation of thermal insulation systems and to support the harmonization of standards and regulations on thermal insulation systems and standards with the standards and regulations of the European Union.

The Slovak Society for Environmental Technology (SSTP) is a voluntary association that brings together scientific and technical workers, educators, students, and practitioners from the field of environmental technology and technical building equipment. It mainly focuses its activities on educational, publishing, and international activities. Every year we organize around 30 professional events, some of which already have a long-standing tradition, such as conferences Heating, Ventilation, and air conditioning, Sanhyga, Indoor climate of buildings, Measurement and calculation of heat. SSTP is a member of the Association of Slovak Scientific and Technical Societies (ZSVTS) and a member of the European Federation of Heating, Ventilation and Air Conditioning Companies REHVA SSTP is also a guarantor of professional activities in the field of TZB and environmental technology in Slovakia.

SLOVENERGOokno, an association of manufacturers and sellers of windows, doors, glazed walls, light exterior cladding and suppliers of related components, technologies and materials for installing windows. It prepares conferences, seminars and workshops for members and supporters, they are also a contractual organization of the accredited inspection body TSÚS, n.o. for the training of window and door installers to obtain a license for the installation of external opening structures, which is necessary for proving applicants for subsidies for insulation and replacement of window structures.

The Association for Better Administration of Apartment Buildings is an association in the field of administration in Slovakia. It organizes seminars and workshops and the BETTER FACILITY MANAGEMENT congress, aimed at increasing awareness and supporting the quality of administration in apartment buildings.

Other associations and interest associations operating in the field of energy and electromobility:

- Slovak Association of Photovoltaic Industry and RES (SAPI),
- Association of energy suppliers
- Slovak Battery Association (SBaA),
- Slovak Association for Electromobility (SEVA),
- Cluster of Energy Communities of Slovakia (KEKS)
- Consumer protection society

d) Companies

Companies in the construction and energy sectors themselves are also involved in education. They are mainly manufacturers and suppliers of various building materials, technologies, and systems of technical building equipment. However, their activity is coordinated to a large extent through the various associations already mentioned above operating in the subject area.

7 RELEVANT PROJECTS

7.1 Introduction

For over decade, buildings have been identified as key sector for clean energy transition, key for twin climate-digital transition and for achieving the climate neutrality by 2050. Consequently, the needed skills, knowledge, and competences for facilitating this transition have been in the focus of the stakeholders participating in the Build Up Skills Initiative since its start. In 2013, the stakeholders in Slovakia agreed on a roadmap aimed at making a step change in education and training of craftsmen, on-site workers, middle and senior level specialists in the buildings sector.

The present report aims at evaluating effectiveness of this roadmap in the meaning of the level of results from the actions of stakeholders it triggered in years 2013-2020. The following rating of the effectiveness were adopted for the assessment:

Level 1: The action was completed, and the expected impact and outcomes were delivered;

Level 2: The action was completed partially but the expected impact and outcomes were delivered;

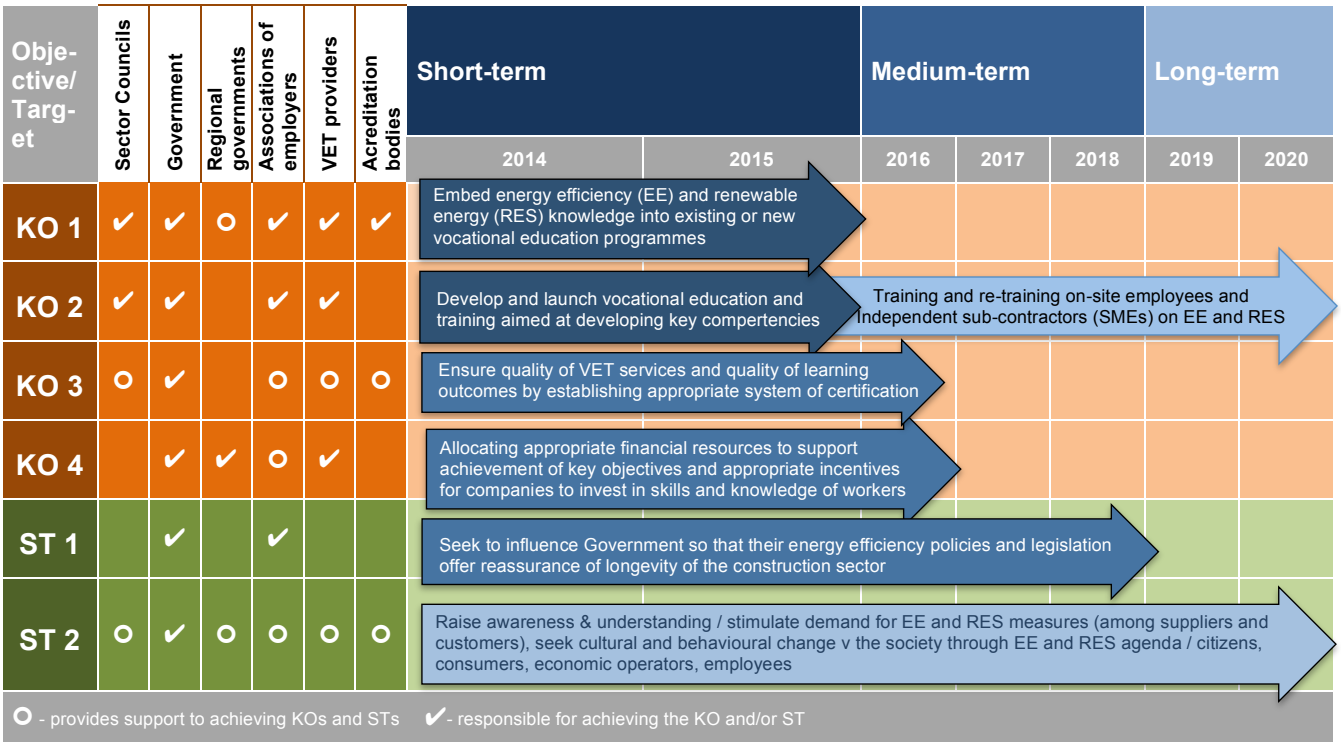
Level 3: The action was completed partially, and the expected impact and outcomes were partially delivered;

Level 4: The action was completed partially, and the expected impact and outcomes were not delivered;

Level 5: The action is still in implementation and the impacts and outcomes cannot be assessed yet;

Level 6: The action was not taken because circumstances changed, and the action was not needed;

Level 7: Action not taken because support from key stakeholders has waned.



The stakeholders agreed in the roadmap on **4 key structural and operational objectives (KO)**.

These objectives, including the identification of the stakeholders responsible for achieving them and/or providing support, and respective deadlines are:

The structural objectives were to be delivered through implementing measures focusing on systematic changes (new programmes, changes in the content of the existing programmes) and qualification and certification schemes. Operational objectives were focused on activities concerning vocational education and re-training of workers in the building sector.

The stakeholders also identified **2 supporting objectives (SO)**. Supporting objectives were focused on supporting the need of new intelligent solutions and use of renewable energy sources (focusing on customers served by the construction and energy sectors). These objectives were also focused on the total change in the population behaviour, without which it would be not realistic to achieve the 2020 energy objectives.

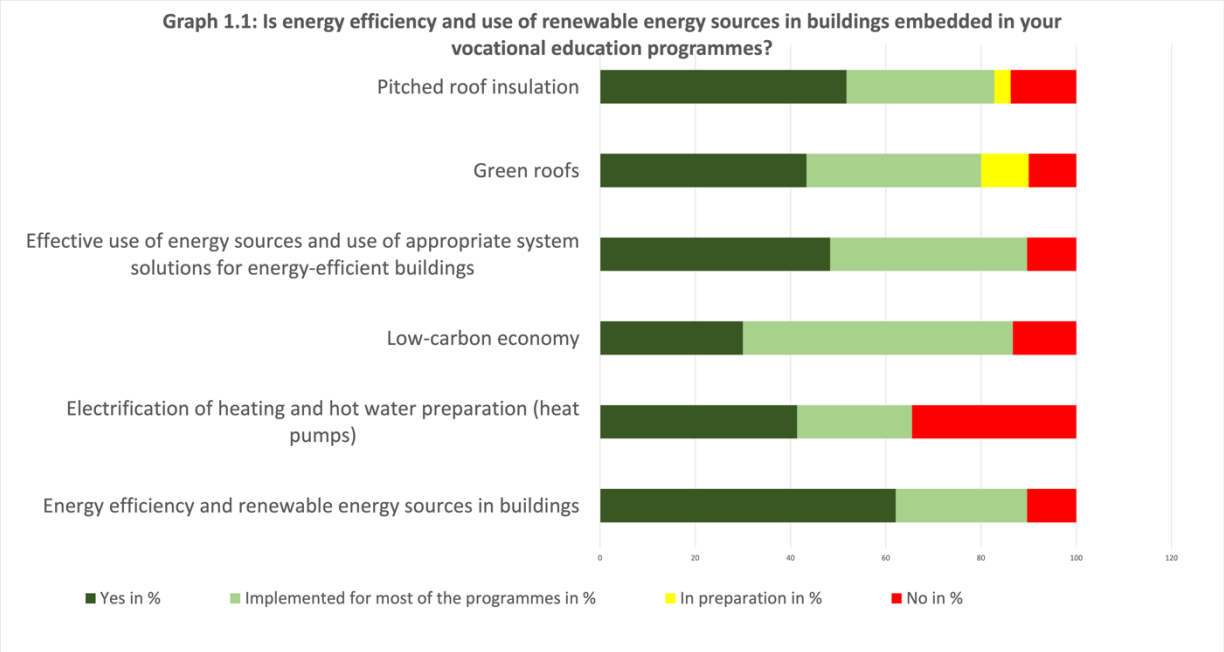
For achieving these objectives, the stakeholders agreed on 21 measures to be implemented.

The outcome of the assessment is:

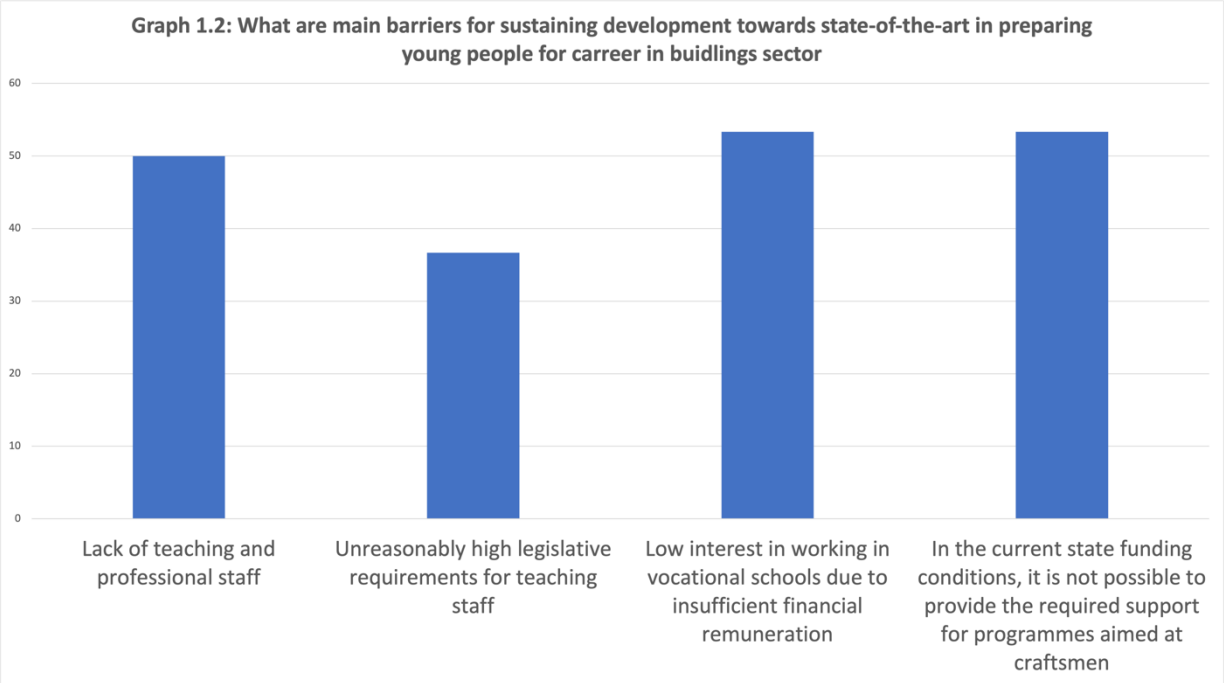
Objectives	Level of Effectiveness	Description of the objective	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
KO1	**1**	Embed energy efficiency (EE) and renewable energy sources (RES) in existing or new further vocational training	✓	✓	✓		O	✓
KO2	**1**	Develop and launch further education and training aimed at developing key competences	✓	✓	✓	O		✓
KO3	**1**	Ensure quality of further vocational training and effectiveness of acquiring the targeted learning outcomes by establishing appropriate system of certification	✓	✓	O			✓
KO4	**3**	Allocating appropriate financial resources to support achievement of key objectives appropriate incentives for companies to invest in skills and knowledge of on-site workers	✓		O	✓	O	
KO5	**5**	Embedding the energy efficiency and use of RES in buildings in vocational programmes for apprentices.	✓	✓	✓	✓	✓	✓
SO1	**1**	Seek to influence the government so that their energy efficiency policies and legislation offers reassurance of longevity of the construction sector	✓	✓				
SO2	**2**	Raise awareness and understanding / stimulate demand for EE and RES measures (among suppliers and customers), seek cultural and behavioural change in the society through EE and RES agenda (among citizens, consumers, economic operators, employees)	✓			✓	O	

The details and justification of the assessment are provided in Sections 3 to 5 of this report. They include details on the assessment of effectiveness of all 21 measures agreed in the roadmap.

The outcomes of the assessment carried out were independently confirmed in the survey among educational institutions involved in vocational training. As is shown in Graph 1.1, the energy efficiency and use of renewable energy sources is well embedded in the education and training programmes.



The main barrier remains financing of the vocational schools at secondary level. The 4 top barriers are shown in Graph 1.2.



7.2 Build Up Skills in Slovakia

The overall national strategies in the building sector to contribute to the EU 2020 energy targets were underpinned by two pillars of the national energy policy – energy efficiency and sustainable development. Two key priorities followed by these strategies are:

- Increasing energy efficiency of buildings in life-cycle perspective and decrease energy needs:
    a) in primary energy consumption, and
    b) in final energy consumption considering the overall CO2 footprint of buildings;
- Increasing the share of renewable sources of energy in saturating the energy needs of buildings in life-cycle perspective.

In 2012 and 2013, Slovakia participated in the Build Up Skills Pillar I project managed by EACI (later EASME, now CINEA) to analyse a status quo in the level of competencies available in the Slovak buildings sector, future needs and obstacles for improvement and investments needed in skills and knowledge of human resource in the buildings sector. Although the Pillar I project was aimed at craftsmen and on-site workers in the sector of buildings, the Slovak team used this opportunity to address also several middle and senior level professionals, as the needs in this area were of the same urgency and needed to be addressed should the objectives in energy efficiency of buildings and use of renewable energy sources be delivered. Moreover, considering the specific situation in Slovakia, not addressing these needs in middle and senior level professions in the sector of buildings would undermine the effectiveness of achieving the expected impact of the action focused on craftsmen and on-site workers.

The agreed and endorsed roadmap anticipated leadership of employers in the process, with support of universities, accreditation bodies (ministries in charge of education), file managers of relevant governmental policies (ministries in charge of energy policies, including achievement of EU 2020 targets, ministries in charge of the construction sector etc.), social partners and suppliers of services related to preparing and delivering construction works, construction materials, machinery, technology and equipment that is essential for achieving the set objectives.

The roadmap considered the major obstacles identified in status quo analysis and triggered major follow-up activities, including but limited to numerous projects and:

- Facilitated dialogue and cooperation between world of continuing education and training, world of work and policy makers in the area of continuing education and training, essential for triggering a qualitative and quantitative step-change in delivering continuing education and training on energy efficiency and use of renewables in buildings for craftsmen, on-site workers, middle and senior level professionals;
- Increased transparency of companies' needs in developing skills, knowledge and competencies in the energy efficiency and use of renewables in buildings, so educational institutions could effectively build programmes targeting specific needs and demand of companies;
- Triggered the flow of information on new technologies, materials, machinery and equipment, as well as on qualitative requirements, technology, work safety and protection of human health from construction companies, suppliers of materials, machinery, technology and equipment to education institutions to ensure continuous improvement of their training programmes;
- Increased accessibility of continuing education and training for learners and educational institutions, and access to study materials on the subject and facilitated efficient

investments of companies in improving competencies of their craftsmen and other on-site workers, middle and senior level professionals.

This report is providing assessment of effectiveness of the roadmap in the meaning of the level of results from the actions of stakeholders it triggered. After consulting the stakeholders from the NQP, the following rating of the effectiveness were adopted for the assessment:

Level 1: The action was completed, and the expected impact and outcomes were delivered;

Level 2: The action was completed partially but the expected impact and outcomes were delivered;

Level 3: The action was completed partially, and the expected impact and outcomes were partially delivered;

Level 4: The action was completed partially, and the expected impact and outcomes were not delivered;

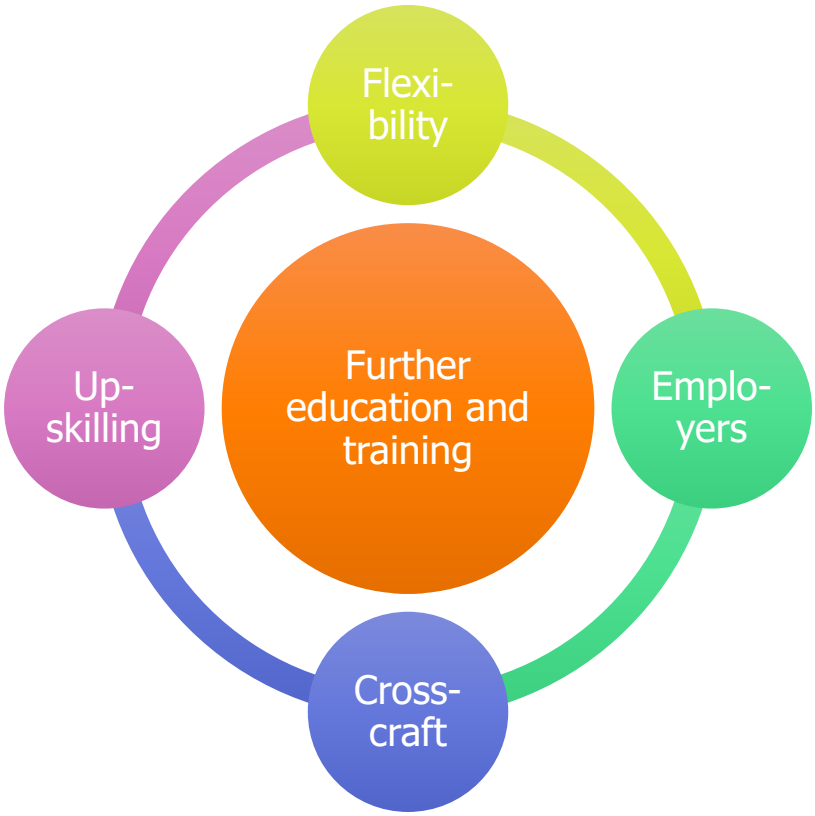
Level 5: The action is still in implementation and the impacts and outcomes cannot be assessed yet;

Level 6: The action was not taken because circumstances changed, and the action was not needed;

Level 7: Action not taken because support from key stakeholders has waned.

7.3 Implementing the set strategy

The strategy to overcome the barriers identified in Build Up Skills Status Quo Analysis (SQA) has been providing support to continuing education and training to the targeted learners on energy efficiency and use of renewable energy sources in buildings that will bring an added value to the learners and the companies in the Slovak building sector. It has been underpinned by four pillars:



Involving employers in continuing education and training to tailor-made education and training for the needs of enterprises and adapted to practical conditions of companies to increase the practical aspects of training and efficiency of invested costs on employee education and training. This has been effectively achieved by involving employers as coordinators and/or partners and/or collaborators on the projects developing and testing continuing education and training programmes, for example involving:

- Employers such as Association of Construction Entrepreneurs of Slovakia (ZSPS) – StavEdu, ingREeS, CraftEdu, NewCom, Net-Ubiep;
- Sector Skills Council for the Construction Sector chaired by ZSPS and affiliating not only employers but also social partners and other key stakeholders;
- Professionals' organisations such as Slovak Chamber of Civil Engineers (SKSI) – ingREeS, SeeTheSkills;
- Guilds such as Guild of Roofers, guild of window installers SLOVENERGOOKNO – StavEdu, CraftEdu.

Moreover, these employers' associations, professional organisations and guilds were drivers of the actions triggered by the project and key contributors on the skills, knowledge and competences needs.

Education flexibility: modular training courses with the possibility of cumulating credits, and education making use of the latest information and communication technologies, e.g., e-learning. Such approach was the basis for ingREeS, Net-Ubiep and CraftEdu projects allowing to tailor the courses to the specific audience by creating training modules/clusters that can be combined to create these tailor-made courses. This modular structure also provides easy

possibility to add new modules or update modules integrating new knowledge and technical progress or remove obsolete modules from the courses.

Cross-sectoral approach to education and training focused on energy efficiency and use of renewable energy sources in buildings to motivate innovations in the target area was achieved by:

- Building a cross-sectoral training courses for groups of craftsmen, where close collaboration is needed due to sequence of works in the workflow – e.g., StavEdu, Net-Ubiep;
- Embedding cross-sectoral aspects in the training courses for specific craft to ensure good cooperation with other crafts on-site critical to the quality of the work and ensuring technological compliance with the relevant standards (CraftEdu, ingREeS, Net-Ubiep).

Retraining, upskilling: specific programs were be implemented considering the economic and social situation in Slovakia. Retraining included existing employees and tradesmen providing work and services in the building sector with the established trades (by completing the relevant 3- or 4-year long vocational education and training or with recognised prior learning) and aimed at developing new skills, knowledge and competences specifically linked to increasing energy performance of buildings and use of renewable energy sources in the energy mix of buildings. This was the case in all projects implemented in Slovakia under Build Up Skills initiative.

Retraining of unemployed persons has been the competence of the state and the employers did not have access to these activities. There is no knowledge such retraining led to fil the gaps on the labour market in respect of targeted qualifications/professions.

The activities under Build Up Skills initiative were underpinned by key actors that was organised into two groups:

- **Network of stakeholders** underpinning the dissemination of the training – this network was formed by active members of the National Qualification Platform (NQP), adding new stakeholders, for example, companies from the building sector and vocational schools (providers of the vocational education and training). This network was reinforced by the projects StavEdu and CraftEdu. This network was aided by two key state agencies: National Institute of Lifelong Education (NUCZV) and Slovak Innovation and Energy Agency (SIEA). These agencies participated to the project StavEdu, ingREeS and CraftEdu as partners;
- **Competence Centre** consisting of experts from ZSPS, UVS (Institute of Education and Services) and ViaEuropa Competence Centre that collaborated on developing and implementing new initiatives and projects. The impact of the activity of this competence centre was enhanced through cooperation with the above-mentioned state agencies and Sector Skills Council in the Construction Sector.

As of today, the network of stakeholders includes companies, universities, vocational schools, and operators in building value chain summarised in Table 3.1.

Table 3.1

No.	Name of the organisation	City
1	Stredná odborná škola stavebná, Nitra	Nitra
2	Innovia, s.r.o.	Trnava
3	Stavoinvesta Dunajská Streda, s.r.o.	Dunajská Streda
4	Ipeľské tehelne, a.s.	Lučenec
5	STU BA, Stavebná fakulta	Bratislava
6	Slovenergookno, n.o.	Bratislava
7	SCHIEDEL Slovensko, s.r.o	Zamarovce
8	STRABAG Pozemné a inžinierske staviteľstvo, s.r.o.	Bratislava
9	Chemostav, a.s.	Poprad
10	Stredná odborná škola stavebná - ÉSzKI	Nové Zámky
11	Cech strechárov Slovenska	Bratislava
12	Kerkotherm, a.s.	Košice
13	STU BA, Stavebná fakulta	Bratislava
14	IMOS – Systemair, a.s.	Kalinkovo
15	HERZ, spol. s.r.o.	Bernolákovo
16	Ústav vzdelávania a služieb, s.r.o.	Bratislava
17	VIEGA, s.r.o.	Praha
18	ZEUS PB, s.r.o.	Dunajská Streda
19	Beztech, s.r.o.	Miloslavov
20	TERRASTROJ spol. s.r.o.	Bratislava
21	KUHN – SLOVAKIA, s.r.o.	Senec
22	MTS – com, s.r.o.	Stupava
23	Stredná odborná škola stavebná,	Nové Zámky
24	Stredná odborná škola technická, Prešov	Prešov
25	Technická univerzita v Košiciach – Stavebná fakulta	Košice
26	Stredná odborná škola technológií a remesiel	Bratislava
27	Stredná priemyselná škola elektrotechnická	Bratislava
28	Stredná odborná škola elektrotechnická	Liptovský Hrádok
29	Stredná odborná škole elektrotechnická Trnava	Trnava
30	Spojená škola Kremnička 10	Banská Bystrica
31	Stredná priemyselná škola, Mnoheľova 828	Poprad
32	Stredná odborná škola technická, Nitrianska 1731/81	Šurany
33	Stredná odborná škola polytechnická, SNP 2049/2	Zlaté Moravce
34	Stredná priemyselná škola, Komenského 5	Bardejov
35	SOŠ elektrotechnická, Zvolenská cesta 18	Banská Bystrica
36	Stredná priemyselná škola J. Murgaša	Banská Bystrica
37	Spojená škola, Medvedzie 1	Tvrdošín
38	Stredná odborná škola technická, Komenského 37	Námestovo
39	SPŠ stavebná v Žiline	Žilina

No.	Name of the organisation	City
40	Stredná odborná škola elektrotechnická Žilina	Žilina
41	SOŠ polytechnická	Humenné
42	Stredná priemyselná škola elektrotechnická, Komenského 44	Košice
43	SOŠ techniky a služieb, Pod amfiteátrom 7	Levice
44	SOŠ Tisovec, Jesenského 903	Tisovec
45	SOŠ Handlová, Lipová 8	Handlová
46	SOŠ techniky a služieb, Cintorínska 4	Nitra
47	SPŠ Stavebná, Konkolyho 8	Hurbanovo
48	SOŠ technická, Hviezdoslavova 5	Rožňava
49	SOŠ technická, Dukelských hrdinov 2	Lučenec
50	Stredná odborná škola technická	Stará Ľubovňa
51	Stredná odborná škola technická	Nižná
52	SOŠ, Terézie Vansovej 32	Prievidza
53	SOŠ Poľná 1	Veľký Krtíš
54	SOŠ Revúca	Revúca

The activities and projects triggered by BUS initiative were closely connected mainly with the following relevant projects and initiatives in the field of VET:

- The creation of regional training centres for the construction industry on the basis of secondary vocational schools under auspices of the umbrella employers' association to which ZSPS was member;
- Completion of the register of skills, knowledge and competences, qualifications, and occupations under auspices of the Sector Skills Council in the Construction Sector, chaired by ZSPS;
- Cooperation at European level through participating in the initiatives led by FIEC, including European Sector Skills Councils.

Effectiveness level achieved: Level 1 – The action was completed, and the expected impact and outcomes were delivered.

7.4 Reaching to the target groups identified in the roadmap

The roadmap identified a long list of professions linked to increasing energy efficiency and use of renewable energy sources in buildings. The following table summarises the professions from this list covered by projects developed and implemented under BUS initiative and activities to which BUS initiative contributed:

Table 4.1

No.	Profession	Covered by BUS project
1	Bricklayer (bulk production), incl. insulator and plasterer	StavEdu
2	Roofer	StavEdu, NEWCOM, CraftEdu

No.	Profession	Covered by BUS project
3	Window installer/construction opening filling installer	StavEdu, CraftEdu
4	Hydro insulator	StavEdu, CraftEdu
5	Assembler of light building envelopes	StavEdu
6	Concrete and steel worker	StavEdu
7	Construction machinery operator	StavEdu
8	Crane operator	StavEdu
9	Scaffolding assembler	StavEdu
10	Assemblers of concrete and steel structures	StavEdu
11	Wooden structure assembler	StavEdu
12	Mason	StavEdu
13	Chimney sweeper and builder (installer)	StavEdu, CraftEdu
14	Floorer	StavEdu
15	Painter, paperhanger, tile setter, paver	StavEdu
16	Dry mounting assembler, plasterer	StavEdu
17	Construction locksmith	StavEdu
18	Plumber, installer of sanitary equipment	StavEdu
19	Installer of heating, cooling and water preparation equipment	StavEdu
20	Construction carpenter, carpenter	StavEdu, CraftEdu
21	Locksmith (for heritage buildings)	PRO-Heritage
22	Electrician of power distribution systems	StavEdu, CraftEdu
23	HVAC installer	StavEdu, NEWCOM
24	Building energy equipment technician	StavEdu, CraftEdu
25	Photovoltaic system installer	StavEdu, CraftEdu
26	Building lighting system installer	StavEdu
27	Solar energy technician	StavEdu
28	Renewable energy technician	StavEdu
29	Technician of low-carbon operations	CraftEdu
30	Low-current electrician	StavEdu, CraftEdu

Besides these professions, BUS projects to which Slovakia participated responded to the changing environment and new emerging needs and covered additional professions and functions:

- Electrician for smart electro installations (CraftEdu project);
- Building Information Management (BIM) – BIM for public administration, BIM for building owners, BIM for facility managers, BIM for technicians, BIM for professionals (Net-Ubiep project).

Although the scope of the BUS Pillar 1 project was limited to on-site workers and crafts persons, the roadmap identified several middle and senior level professionals as essential for achieving the objectives in increasing energy performance of buildings. The BUS projects to which Slovakia participated, covered those which were not covered by a special procedure regulated by the state, for example:

- Architects/planners (ingREeS project);
- Site managers (ingREeS project);
- Site supervisor (ingREeS project);
- Sustainability/Energy Advisor (ingREeS project);
- Assessor of the achieved energy performance (ingREeS project).

Effectiveness level achieved: Level 1 – The action was completed, and the expected impact and outcomes were delivered.

7.5 Achieving the overall objectives of the roadmap

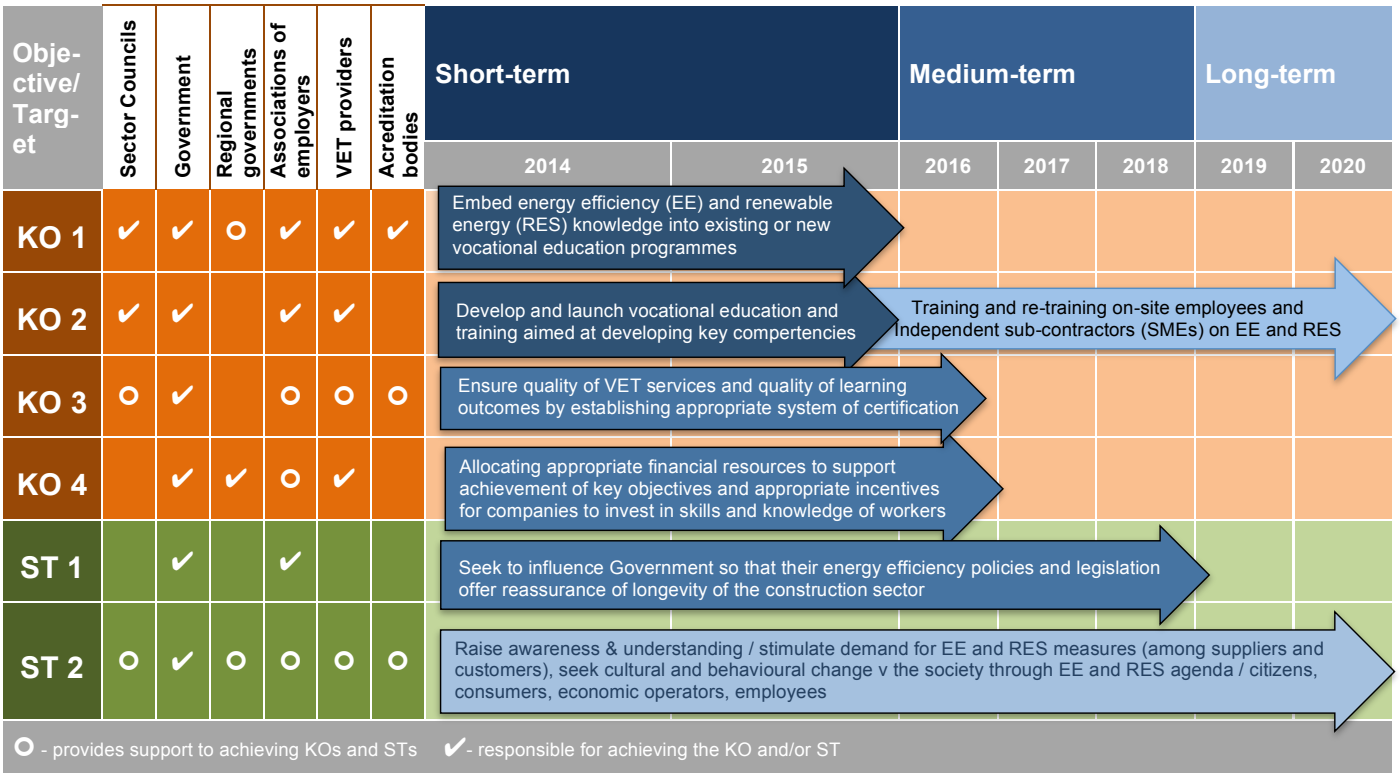
In the 2013 roadmap, the key structural and operation objectives were agreed together with supportive objectives, as shown in Picture 5.1. This picture illustrates:

- Four key structural and operational objectives (KO) and two supporting objectives (ST) which represented the basis of the roadmap;
- Recommended milestones, in which the defined objectives were to be achieved to meet the EU2020 energy targets (the objectives were divided into short-term ones: 2014 – 2015, medium-term objectives: 2016 – 2018 and long-term objectives: 2019-2020);
- Involvement of the main stakeholders who were responsible for achieving the objectives or who were to play an important role in the process of achieving these objectives.

Key objectives were divided into two groups:

1) Key structural and operational objectives (KO). The structural objectives were to be delivered through implementing measures focusing on systematic changes (new programmes, changes in the content of the existing programmes) and qualification and certification schemes. Operational objectives were focused on activities concerning vocational education and re-training of workers in the building sector.
2) Supporting objectives (SO). Supporting objectives were focused on supporting the need of new intelligent solutions and use of renewable energy sources (focusing on customers served by the construction and energy sectors). These objectives were also focused on the total change in the population behaviour, without which it would be not realistic to achieve the 2020 energy objectives.

Picture 5.1



The next two sub-sections are providing the assessment of the effectiveness of the measures that were agreed in the 2013 roadmap to deliver the set objectives illustrated in Picture 5.1.

7.6 Assessment of the effectiveness of the measures aimed at achieving the key structural and operational objectives

The assessment is summarised in Table 5.1.

Table 5.1

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
KO1	**1**	Embed energy efficiency (EE) and renewable energy sources (RES) in existing	Objective achieved, BUS StavEdu, H2020 ingREeS, CraftEdu, Net-Ubiep, NEWCOM projects developed new further vocational training for craftsmen and on-site workers on EE	✓	✓	✓		O	✓

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
		or new further vocational training	and use of RES in buildings. Moreover, H2020 ingREeS developed new further vocational training for middle and senior level construction professionals on EE and use of RES in buildings. These projects were implemented in close collaboration with the educational institutions, for example 2nd grade vocational schools (certified as training centres). This is why the projects had a spill-over effect to the vocational education. The defined ULOs, training material and the resources developed and collected (also internationally) were used for developing vocational education and training programmes. In most cases, the projects were the first and key source of up-to-date knowledge, material and practice that provided vital input to these programmes. Today, the vocational schools can ensure continuity of the work on adapting the training programmes. Nevertheless, they are lacking again the resources on the latest innovations such as digital layer, modular and off-site construction, Zero Emission Buildings etc.						
KO2	**1**	Develop and launch further education and training aimed at developing key competences	BUS StavEdu launched the National Qualification and Further Education Scheme for craftsmen and on-site workers on EE and use of RES in buildings and piloted the programmes. H2020 ingREeS project set up new National Qualification and Training Scheme for middle and senior level	✓	✓	✓	O		✓

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
			construction professionals on EE and use of RES in buildings and trained 400 professionals in Slovakia. These schemes were complemented by new modules such as Construction 4.0. H2020 projects Net-Ubiep, NEWOM and CraftEdu further developed programmes for continuing training of craftsmen, on-site workers, and technicians defined in the 2013 roadmap.						
KO3	**1**	Ensure quality of further vocational training and effectiveness of acquiring the targeted learning outcomes by establishing appropriate system of certification	The objective was achieved. Both national schemes established are qualification schemes with assessment of the acquired learning outcomes based on the agreed assessment standards. The projects facilitated developing solutions for cross-craft qualifications of craftsmen ("nano degrees"), accreditation of cross-craft training programmes according to EU and national legislation. Valorisation of the qualifications acquired will has been increased through mutual recognition of qualifications tested by H2020 NEWCOM project that will build basis for EU-wide mutual recognition of qualifications.	✓	✓	O			✓
KO4	**3**	Allocating appropriate financial resources to support achievement of	Objective still in delivery phase. The financial resources for supporting further education and training have been identified in ESF national operational programme "Human Resources", priority axes 1 and 3.	✓		O	✓	O	

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
		key objectives appropriate incentives for companies to invest in skills and knowledge of on-site workers	Ministry of Labour and Social Affairs of the Slovak Republic, however, failed to publish the relevant calls for proposals. At the time of this assessment, new promises were made in respect to the new operational programmes. Further efforts are needed to secure financial resources and in motivating operators to invest in skills. Proposals for motivation measures will be further discussed and implemented.						
KO5	**5**	Embedding the energy efficiency and use of RES in buildings in vocational programmes for apprentices.	**NEW OBJECTIVE added in 2017 review of the roadmap.** Developing cross-craft vocational training programme for operators in the construction sector as inception programme for all apprentices and developing specific vocational training programmes for apprentices in cooperation with SMEs. Although aimed at continuing training for craftsmen already having working experience, the H2020 project CraftEdu provided input to the apprentice programmes. The objective is still in implementation.	✓	✓	✓	✓	✓	✓
SO1	**1**	Seek to influence the government so that their energy efficiency policies and legislation offers reassurance of longevity of the	Objective achieved. Ministry of Transport, Construction and Regional Development adopted all necessary policies and implemented supporting policy instrument to meet the Slovakia's commitments under the EPBD.	✓	✓				

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
		construction sector	The H2020 project GreenDeal4Buildings developed wide stakeholders' dialogue on how the objectives of the European Green Deal, REPowerEU action plan and other policies can be achieved by industry.						
SO2	**2**	Raise awareness and understanding / stimulate demand for EE and RES measures (among suppliers and customers), seek cultural and behavioural change in the society through EE and RES agenda (among citizens, consumers, economic operators, employees)	Implementation of this objective started in 2018 with support of the H2020 projects CraftEdu and NEWCOM. Both projects involved operators and other stakeholders to raise their awareness of the EU requirements linked to the objectives of the European Green Deal, REPowerEU action plan and other policies. This is also promulgated by the new H2020 project GreenDeal4Buildings. This project promotes individual and collective ownership of the energy assets (e.g., by Energy Communities) and smart energy systems that involve the consumers in the energy markets, as outlined in the Commissions Communication "Clean Energy for All Europeans". The new LIFE project BungEES is also focusing on engaging consumers in the energy markets and facilitates their understanding the benefits of the clean energy transition and promotes investments in energy assets at consumer level and thus changing the role of consumers to prosumers.	✓			✓	O	

7.7 Assessment of the effectiveness of the measures aimed at achieving the key structural and operational objectives

The assessment is summarised in Table 5.2.

Table 5.2

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
1.1	1	**Ensure the mandate and the pilot phase of work of the Competence Centre for education in EE and use of RES in buildings (KCEB):** The Competence Centre is a team of professionals and a network of specialised subjects active in VET, which, under the mandate and coordination of employers´ associations in the sector of buildings, develops methodological and educational/training materials in a form of specific projects supported from public resources (EU funds, state budget).	Completed. The Competence Centre is defined and includes today the partners of Build Up Skills and Horizon 2020-construction skills projects. It has no legal personality. Specific objectives were set in the projects that were implemented by the organisations forming the competence centre. The work of the competence centre is underpinned by the network of supporting organisations and companies established by BUS StavEdu project and further developed under follow-up projects as reported in Section 3 of this report.
1.2	1	**Finalise /develop new qualification standards and assessment standards** for the professions included in the Roadmap on EE and RES essential for achieving EU 2020 targets. Incorporate outputs into national system of occupations.	Completed. The qualification standards were reviewed, and the measure triggered the need to develop new qualification standards (QS) and assessment standards (AS). BUS StavEdu and H2020 ingREeS, NEWCOM, Net-Ubiep and CraftEdu developed new QS to include the key skills and knowledge on EE and use of RES. These QS are part of the work of the Sector Skills Council in the Slovak construction sector that is reviewing Slovak NQF linked to EQF.
1.3		**Develop a programme for further professional**	Completed.

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
	1	**development of employees and craftsmen in the sector of buildings.**	StavEdu National Qualification and Training Scheme for craftsmen and on-site workers laid the base for further training of craftsmen and on-site workers in the sector of buildings. This scheme was further developed by the H2020 projects CraftEdu, NEWCOM, and Net-Ubiep.
1.4	1	**Develop teaching and methodological materials for embedding intelligent energy solutions in vocational curricula.**	Completed. BUS StavEdu project developed the needed teaching and methodological materials for vocational training at secondary level and H2020 ingREeS project developed the needed materials for vocational training at tertiary level. These resources were further developed and complemented by the H2020 projects CraftEdu, NEWCOM, and Net-Ubiep.
1.5	7	**Develop cross-craft training programmes for apprentices**	Implementation not started yet, as there was not support by the relevant stakeholders.
1.6	7	**Develop programme for improving skills and re-qualification.**	Objective still in delivery phase. The financial resources for supporting further education and training have been identified in ESF national operational programme “Human Resources”, priority axes 1 and 3. Ministry of Labour and Social Affairs of the Slovak Republic, however, failed to publish the relevant calls for proposals. At the time of this assessment, new promises were made in respect to the new operational programmes.
1.7	1	**Monitor the level of professional skills and knowledge of the workforce in the building sector.**	Completed. Slovak Sector Skills Council in the construction sector renewed its work and ensures the needed monitoring. The projects implemented under BUS and H2020 provided input to the work of the Council and closely collaborated with the members of the Council on implementing the project.

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
1.8	1	**Increase the transparency of the labour market and skills requirements of employers.**	Completed and 2020 objectives achieved. The work on further adaptations of the NQF linked to EQF to technical progress continues. Slovak NQP increases the transparency of the requirements, and the Slovak Sector Skills Council supports cooperation among social partners in developing and upgrading the qualification standards.
1.9	1	**Ensure training and certification in accordance with the Article 14(3) of Directive 2009/28/EC.**	Completed. Established in compliance with Order 133/2012 Coll. Issued by the Slovak Ministry of Economy.
1.10	1	**Ensure training and licensing for ETICS ensuring implementation of requirements of Directive 2010/31/EU.**	Completed. For example, TSUS (partner in Build Up Skills Pilar I project) offers the training and licensing. Further efforts are needed to review the system and lowering price of the licensing to avoid market barriers and barriers to competition.
1.11	7	**Introducing ECVET system in vocational training of apprentices.**	Implementation not started yet, as there was not support by the relevant stakeholders.
1.12	7	**Allocation of necessary resources:** Allocate resources for implementing the measures in this Roadmap. Ensure transparency in the use of ESF for education in Slovakia.	Objective still in delivery phase. The financial resources for supporting further education and training have been identified in ESF national operational programme “Human Resources”, priority axes 1 and 3. Ministry of Labour and Social Affairs of the Slovak Republic, however, failed to publish the relevant calls for proposals. At the time of this assessment, new promises were made in respect to the new operational programmes.
1.13	5	**Dialogue of employers and government on financing further education and training.**	Implementation in progress. The dialogue is facilitated by the H2020 project GreenDeal4Buildings.

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
1.14	5	**Introduce motivational tools for investments in education:** Introducing motivational tools (tax, grants) for employers involved in cooperation with providers of vocational education and supporting forms of cooperation for vocational education and practical education.	Implementation not started yet. The dialogue on motivational tools is facilitated by the H2020 project GreenDeal4Buildings.
1.15	7	**Use of receipts from the sale of CO_2 allowances for vocational education and training:** Under the current legislation, the receipts from the sale of CO_2 Allowances could be used for supporting measures aimed EE and use of RES, including vocational education in this area.	Implementation not started yet. The responsible authorities did not accept any proposals in this respect. Further dialogue on this measure is facilitated by the H2020 project GreenDeal4Buildings.
1.16	1	**Secure financial resources, support mechanisms and other tools for energy renovation of buildings.**	Completed. As published in the Information by the Slovak Ministry of Transport and Construction, the needed resources are secured, and support mechanisms were established to deliver on the Slovak commitments on energy renovation of public buildings according to EPBD.

7.8 Assessment of the effectiveness of the measures aimed at achieving the supporting objectives

The assessment is summarised in Table 5.3.

Table 5.3

Measure no.	Level of effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
2.1	5	**Creating working and advisory groups for the government on EE and use of RES in building:** Working and advisory groups for the Slovak government for increasing energy performance of buildings and use of renewable energy sources in the energy mix of buildings.	Implementation in progress. Discussions on the action plan are in progress. Measures were agreed for certification of companies for complex new buildings and renovation of existing buildings and compliance with the permit, reviewing the conditions for authorisation of regulated professions (to also include aspects of EE and use of RES in buildings) and setting up quality criteria for construction projects (related to the efforts to pursue multi-criteria public procurement, as current lowest price principle does not deliver quality). Further dialogue on this measure is facilitated by the H2020 project GreenDeal4Buildings.
2.2	1	**Developing national strategy for EE and RES education and training.**	Completed. Slovak Ministry of Transport, and Construction, Ministry of Education, Research and Development and Ministry of Economics agreed on national strategy for education and training in EE and RES in buildings.
2.3	1	**Ensure impact assessment of new legislation relevant to the sector of buildings.**	Completed. Stakeholders are consulted on legislative proposals relevant to the sector of buildings.
2.4	1	**Monitor implementation of the roadmap.**	Implementation in progress. Stakeholders' dialogue triggered with the BUS StavEdu project and H2020 ingREeS project made mid-term evaluation of implementing the roadmap. Final evaluation has been carried out for in 2022 and summarised in this report.
2.5	2	**Increase awareness of the public about EE and use of RES in buildings.**	Implementation of this measure started in 2018 with support of the H2020 projects CraftEdu and NEWCOM. Both projects involved operators and other stakeholders to raise their awareness of the EU requirements linked to the objectives of the European Green Deal, REPowerEU action plan and

Measure no.	Level of effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
			other policies. This is also promulgated by the new H2020 project GreenDeal4Buildings. This project promotes individual and collective ownership of the energy assets (e.g., by Energy Communities) and smart energy systems that involve the consumers in the energy markets, as outlined in the Commissions Communication "Clean Energy for All Europeans". The new LIFE project BungEES is also focusing on engaging consumers in the energy markets and facilitates their understanding the benefits of the clean energy transition and promotes investments in energy assets at consumer level and thus changing the role of consumers to prosumers.
2.6	1	**Increase awareness about EE and use of RES in buildings among employers in the sector of buildings.**	Completed. BUS StavEdu project disseminated information via dissemination and communication activities, specialised conferences, and workshops, and H2020 ingREeS, Net-Ubiep and CraftEdu projects targeting craftsmen, on-site workers, middle and senior level construction professionals with training to increase their knowledge in this area.
2.7	1	**Amend the conditions of the public procurement in Slovakia:** Amending rules to allow multi-criteria public procurement to pursue quality and effectivity of the measures aimed at increasing EE of buildings and use of RES in the energy mix in buildings.	Completed. BUS StavEdu and H2020 ingREeS project triggered (within the stakeholders' dialogue) discussion to initiate pilot multi-criteria public procurement. A conference was organised under ZSPS leadership with stakeholders on 7 November 2017. Further dialogue on this measure is facilitated by the H2020 project GreenDeal4Buildings, including guidance and relevant implementation measures.
2.8	1	**Information portal about EE and use of RES in buildings:**	Completed. The H2020 project CraftEdu developed such portal that includes many instructional videos and e-

Measure no.	Level of effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
		Setting up and operate a portal providing professional information about EE of buildings and use of RES to the public.	learning for professionals, and all interested parties.
2.9	5	**Developing strategy for vocational education of apprentices in EE and use of RES in buildings.**	Implementation in progress. A working group was created by the Ministry of Transport, Construction and Regional Development of the Slovak Republic and stakeholders were included in the discussion. Further dialogue on this measure is facilitated by the H2020 project GreenDeal4Buildings, including relevant implementation measures
2.10	5	**Prepare a new Roadmap for achieving the objectives of the EU 2050 Energy Roadmap.**	Implementation in progress. The several partners of the 2013 roadmap succeeded with new project proposal under LIFE programme and the discussion is ongoing in the framework of the BUS DoubleDecker project that triggered this report.

7.9 Main projects contributing to delivering the objectives

7.9.1 StavEdu

The overall objective of the project has been to commence implementation of the roadmap established and endorsed under Pillar I Build Up Skills project in Slovakia. The roadmap identified key measures for setting up a national scheme and other measures for ensuring development of skills essential for the field of buildings to contribute to the fulfilment of the Europe 2020 targets. The project particularly focused on measures 1.3 and 1.4, and facilitated implementation of measures 1.1, 1.2, 1.6, 1.12, 1.13, 1.14 and 1.16 of the roadmap[25].

[25] Roadmap established in Pillar I of Build Up Skills initiative, part 5, see also in Strategy on Setting up Complex System of Further Education and Training in the Sector of Buildings prepared by the Slovak Government, Annex I.

The Project set up the national qualification and training scheme for on-site workers in the field of buildings focused on energy efficiency and use of renewables in buildings. This strengthened the qualification of craftsmen, construction workers, system installers and other professions identified as priority target group in the roadmap. The project further facilitated further investments in the skills anticipated in the EU Roadmap to a Resource Efficient Europe[26].

The main activities of the project were focused on:

- Developing 9 cross-trade training programmes for further education and training and transfer of 1 training programme for on-site trainers and assessors[27] from Build Up Skills CrossCraft project implemented in Austria;
- Setting up permanent network of trainers delivering the training[28];
- Training of trainers for delivery of the programmes[29];
- Setting up the network of companies cooperating in delivering cross-trade training programmes based on agreements negotiated under the project[30];
- Developing a follow-up project to be financed under ESF operational programme "Human Resources" established by the Ministry of Labour, Social Affairs and Family of the Slovak Republic[3132];
- Review of the Roadmap to address proposals to Slovak Government for incentives boosting demand for highly qualified workers[33];
- Set up of the database of trained professionals to be accessed by construction companies for recruitment of skilled professionals[34].

The project delivered the following results: Table 1.1

1	The national qualification and training scheme for on-site workers in the field of buildings with national network of supporting employers in the field of buildings.
2	9 cross-trade training programmes for on-site workers and transferred 1 training programme for on-site trainers and evaluators with defined matrix of learning outcomes and testing for validation of the learning outcomes and certification.

[26] COM(2011) 571 final, p.19.
[27] Key measure 1.4 agreed in the Roadmap: Develop learning resources for further education and training of on-site workers and micro-entrepreneurs in the sector of buildings on energy efficiency and use of renewables in buildings.
[28] dtto
[29] dtto
[30] Key measure 1.3 agreed in the Roadmap: "Build up programme of further professional development on-site workers and micro-entrepreneurs" and key measure 1.6 in the Roadmap: "Rollout programmes of developing qualification and re-qualification"
[31] Key measure 1.14 agreed in the Roadmap: "Implement incentives for Investments in Skills"
[32] Key measure 1.12 agreed in the Roadmap
[33] Key measure 1.13 agreed in the Roadmap: "Dialogue of employers and competent authorities on financing of further education and training" and 1.14 agreed in the Roadmap (see foot note 7)
[34] Key measure 1.6 agreed in the Roadmap

3	Network of trained trainers for delivering cross-trade training programmes for on-site workers in the field of buildings and testing the learning outcomes.
4	Network of on-site trainers and internal evaluators of issues to be addressed in on-site inception training.
5	Proposal for a follow-up project to be financed under ESF operational programme "Human Resources" established by the Ministry of Labour, Social Affairs and Family of the Slovak Republic to facilitate the participation of craftsmen and other target groups to training programmes.
6	Review of the Roadmap to address proposals to Slovak Government for incentives boosting demand for highly qualified workers.
7	1 database of trained on-site workers to be accessed by employers for verification of their training and awarded certificates. This database also includes register of all trained trainers for delivering cross-trade training programmes on energy efficiency and use of renewables in buildings. Moreover, the database includes trained on-site trainers and assessors of critical issues to be addressed in inception on-site training.
8	10 presentation courses on energy efficiency and use of renewables in buildings delivered to provide demonstration of competencies developed through the national qualification and training scheme for on-site workers in the field of buildings with national network of supporting employers in the field of buildings.
9	9 qualification and assessment standards for identifying targeted competencies and assessing the learning outcomes of the cross-trade training programmes.
10	1 voluntary initiative of employers aimed at developing competencies of craftsmen and on-site workers in the field of buildings.

The project established the necessary resources and prepare technical, organizational and financial conditions for training and re-training on energy efficiency and use of renewables of craftsmen and on-site workers in the Slovak field of buildings in the period until 2020.

The project partners learned several lessons from implementing the project that reflect situation in developing human resources for the construction sector and obstacles that needed to be overcome and/or persists:

- There is higher interest in training among craftsmen (including self-employed) than it is generally expected and perceived by the market players;
- General practice of working with ULO was rather formal and they are developed after developing curriculum and content of the training programme to document content not as a tool that defines the content of the programme – the project used ULOs correctly for defining targeted learning outcomes;
- Companies in Slovakia start to feel grave impact of missing qualified craftsmen after the critical generation of craftsmen retired and call for more actions to be taken to fill the skills gaps;

- Promotion of the training is more effective if it targets directly trainees, for example self-employed craftsmen, and not only employers;
- Qualification requirements for craftsmen and on-site workers are not set adequately in the NQF, access to qualification is limited due to missing certification schemes, prior learning and informal learning recognition;
- New licencing/certification requirements relevant to energy efficiency and use of renewable energy sources in buildings are creating barriers through prohibitive pricing of the required training and certification/licencing. Moreover, if applied to be supplier-specific, they restrict competition and are illegal under EU competition law;
- Development of NQF without European standardisation and/or harmonisation of qualification standards for the common professions leads to lack of transparency and high complexity of the requirements and creates barriers to free movement of people in the Internal Market and mutual recognition of qualifications.

The project activities also have shown that further actions are needed, particularly to:

- Embed training on energy efficiency and use of renewable energy sources also in the vocational education and training for pupils and apprentices;
- Review of the NQF in the construction qualification and develop certification schemes for craftsmen and construction professions;
- Address new barriers raised by new licencing schemes (for example ETICS).

7.9.2 ingREeS

The ingREeS project have materialised the measures in the roadmaps established based on these analyses and endorsed under Pillar I Build Up Skills project in Slovakia and the Czech Republic relevant to middle and senior level professionals. The project particularly was focused on key measure 1.3 and facilitate implementation of key measures 1.1, 1.2, 1.5 and 2.2 of the roadmap endorsed in Slovakia, and on priority 4.3.1 and measures 1,2 and 4 of the Roadmap endorsed in the Czech Republic.

The project set up national qualification and further training schemes in Slovakia and the Czech Republic for middle and senior level construction professionals on energy efficiency and use of renewable energy sources in buildings.

Particularly the project led to:

- Development of 16 training modules that are building blocks of 5 education and training programmes;
- Setting up permanent network of trainers delivering the training programmes developed under the project;
- Training of trainers for delivery of the programmes;
- Creating a database of the offered training and awarded certificates to trainees;
- Proposal for policy and financial measures to be implemented to facilitate adequate demand response for intelligent energy solutions that would motivate middle and

senior level professionals in participating to training programmes, boosting demand for highly qualified professionals and SMEs to invest into continuing education.

The project established necessary resources and prepared technical, organizational and financial conditions for training and re-training middle and senior level construction professionals on energy efficiency and use of renewables of in buildings during the project and beyond its expiry, as all partners will continue in further delivering the training and continuously improve and develop the further training schemes that were set up (as their open and modular structure supports continuous improvement and development).

The project succeeded to deliver training to over 900 middle and senior level professionals (the project target was to train 700 professionals) during the project lifetime, while the scheme continues deliver training to further professionals since 1 March 2018 (i.e. beyond the project expiry).

The training was delivered through in-class training combined with distance learning delivered using ICT, such as e-learning, on-line conferencing, video on demand and special sessions and workshops with practical demonstrations.

The learning outcomes are assessed using on-line testing, while the participants could prepare for the assessment using the simulated tests available for each module.

The training in the Czech Republic is a credited training by the Czech Chamber of Chartered Engineers and Technicians. In Slovakia, Slovak Chamber of Civil Engineers (SKSI) works with the competent authorities to include the competences in the energy performance of buildings in the requirements for the mandatory certification of civil engineers for regulated professions. The topic of energy efficiency and use of renewable energy sources in buildings will be embedded in the university curricula and SKSI will help universities to embrace this agenda and where practicable and feasible, SKSI will provide access to the e-learning and testing system.

Although the focus was on Slovakia and the Czech Republic, the project led to developing specific programme for Austrian civil engineers and complemented the training offer in Austria.

In Slovakia, the main hurdle was missing culture of continuing education and training among civil engineers. SKSI had to promote the need in having good understanding of the energy performance subject in the sector of building for delivering quality and the targeted performance in the buildings (renovated existing buildings or new buildings that must comply with nZEB standard).

In the Czech Republic, the culture of continuing education and training was already developed, and the local Construction Academy organises weekly one or more training sessions on the topics relevant to the civil engineers. Here, however, the training on energy efficiency and use of renewable energy sources was missing and the project perfectly fit the necessary training into the training offer and success of the project was almost inevitable. The project also helped the university teachers (involved as trainers) to develop their university teaching and therefore the project has wider impact that was targeted by its activities.

To succeed in this effort, the partners had to pay extra attention to the innovativeness of the programmes, easy access to the training and quality in delivering the training to the participants. Moreover, the information included in the training had to be up-to-date and

accurate. Therefore, the system was built to be easily updated and one module was created to bring newsworthy content to the trainees.

The success of the project in overcoming these hurdles was measured by higher than expected participation in the training (over 900 instead anticipated 700) and the feed-back from the participants showing that over 60% of the information they learned during the training were completely new to them, while the rest of the information help them better understand the information they already knew, which helped them to turn it into knowledge.

The project also triggered cooperation among stakeholders to tackle the efforts needed for achieving the EU 2020 Energy Targets. For example, the Association of Construction Entrepreneurs of Slovakia (ZSPS) presented the benefits of the multi-factor public procurement to procure construction of new building and energy renovation of existing buildings not only by price, but also quality, environmental impact, including energy performance. The conference organised by ZSPS triggered wide attention from private and public sectors and ZSPS will continue in the efforts to promote "value for money" in the construction sector. (Comment: *In Slovakia, unlike in other countries and at EU level, the public procurement is solely based on lowest price. Although "green procurement" is allowed by the law, it does not provide legal certainty for organisations/institutions procuring works and services and for the result of the particular procurement process.*)

The partners in Slovakia also reviewed implementation of the roadmap established in 2013. It was concluded that implementation of the roadmap progressed substantially and all measures due to this day were implemented with exemption of one - legislative requirements on quality of the works and services and related level of qualification of the construction professionals.

7.9.3 NEWCOM

Main objective of NEWCOM was to develop needed training schemes to enable construction workers and building professionals to build the nearly zero-energy building standard. By implementing the training modules developed by the project construction workers and building professionals are getting skilled to construct the nearly zero-energy building and to renovate the existing building stock up to a very high energy standard. Furthermore, building professionals are qualified to ensure the energy standard qualities of renovated and new buildings. Respective "train the trainer" trainings were implemented in the participating countries.

The project had set itself the task of identifying existing training offers for the correct execution of the building envelope, the installation of ventilation systems as well as for the quality control accompanying the planning and construction process for the new construction of and renovation to nearly zero-energy buildings or nZEBs in Austria, Hungary, the Netherlands, and Slovakia. Based on this task content and structure of existing trainings were examined regarding their accordance to the needs. Upon the findings, the missing training contents were identified.

In the inception phase of the project, it was confirmed, that the importance of personal certifications in the construction sector is not particularly high. This is illustrated by the decline in demand for personal certification according to ISO 17024 in the field of building services engineering and the end of personal certification for passive house craftsmen within the CertCraft project in Austria. Only binding certifications for safety-relevant work can assert

themselves on the market. This applies to all four partner countries of NEWCOM. The project partners found out the certifications developed by educational institutions in general have better chances.

This allowed the following conclusions to be drawn for the further development of the project:

- Completely new development of qualifications in the form of personal certification has little chance of being accepted by the market. The development of modules and qualifications as a supplement to already established courses was considered significantly more successful.
- Moreover, the greatest similarities in needs and thus prospects of success for the development of training modules in the partner countries (Austria, Hungary, the Netherlands, and Slovakia) arise in the following areas and trades:
  - Flat roof and structural waterproofing;
  - Comfort ventilation (low energy ventilation and air conditioning);
  - Quality assurance and quality control of near zero-energy buildings (building inspection).

The identification and collection of relevant existing training material was a central issue of the project, to ensure that already available material can be optimally used. For collecting the training materials, a Moodle platform was established. This platform offers existing training material in English, German, Dutch, Hungarian and Slovak and is structured in the chapters “building envelope”, “building techniques” (TBS) and “building inspections”. The Moodle platform was used as a knowledge hub for the trainers trained in NEWCOM.

To ensure maximum flexibility, the trainings were designed in modules so that they can be used both as stand-alone units and as a complement to already established courses. The training blocks were conceived in cooperation with further education institutes as well as public and private stakeholders.

Another key objective of NEWCOM was that course participants must have clear advantages on the European market after the successful completion of the developed training modules. In this context, the project supports the increase of the labour market transparency and application of skills’ requirements of employees in new competences in increasing the energy efficiency and use of renewable energy sources in buildings. For this reason, NEWCOM created a basis for the mutual recognition of the developed training modules.

7.9.4 Net-UBIEP

The Net-UBIEP project focused on increasing the energy efficiency of buildings by expanding and strengthening the use of BIM (Building Information Modelling) throughout the life cycle of buildings. The use of the BIM system makes it possible to simulate the energy efficiency of buildings using various materials and components that will be used in the design of new buildings and/or in the reconstruction of existing buildings. The BIM system, which serves to model building information, is a process that takes place throughout the life cycle of buildings from the design phase through construction, management, maintenance, and demolition. In each of these phases, it is very important to consider all energy aspects to reduce the environmental impact of buildings during their life cycle.

As part of the project, the net-Ubiep BIM School was implemented in Slovakia from June 1, 2019, which in the first phase offered 7 modules for public administration workers, construction authorities, building owners and managers, professionals (architects, civil engineers) and craftsmen. The modules, supplemented by the buildingSMART Certification, consisted of:

- Basic module for public administration;
- Basic module for owners of public buildings;
- Basic module for managers of public buildings;
- Module for technicians and craftsmen;
- Introduction to BIM for professionals;
- Work with BIM software;
- Designing fire protection for professionals.

7.9.5 CraftEdu

The CraftEdu project successfully launched national qualification and further training scheme for craftsmen on energy efficiency and renewable energy sources in buildings in the Czech Republic and complemented the already established national schemes (established with support of previous Build Up Skills projects) with new training programmes that were requested by the construction sector due to lack of qualified craftsmen in the targeted professions.

In numbers, the project consortium developed ULOs, qualification and assessment standards, content, and methodological aspects for:

- 8 training programmes in Czech Republic,
- 5 training programmes in Slovakia,
- 2 training programmes in Austria,
- 2 training programmes in Bulgaria.

The following training resources were developed to underpin delivery of these programmes:

Resource	Student textbooks	Testing tools	Qualification standards**	Assessment standards**	e-learning programmes	Video lectures	Trainers' handbooks
Czechia	6 + 1*	6	8	8	6 + 3*	16	8
Slovakia	5 + 1*	5	5	5	5 + 3*	37	5
Austria	3	2	-	-	5	-	2
Bulgaria	2	2	-	-	3	-	2
TOTAL	**17**	**15**	**13**	**13**	**22**	**53**	**17**

* Shared by Czechia and Slovakia (calculated in total only once)

** For Austria and Bulgaria, the qualifications covered by CraftEdu were guaranteed by already existing qualification and assessment standards

The training is supported by the **CraftEdu database** developed by the project that is hosting register of trainers, trainees, e-learning server, video lectures, student textbooks and trainers' handbooks, provides for developing tailor made training courses, registration for training courses and testing to receive digital certificate.

For delivering training, **94 trainers** were trained by the project that form a further developing network of trainers registered in the CraftEdu database.

The training programmes were demonstrated and tested through pilot courses delivered mainly online due to Covid-19 restrictions (detailed explanations are later in this report). The results of these pilot online courses are:

Programme number	Qualification	Number of participants	Number of issued certificates (based on testing)
P1	HVAC Installer	44	27
P2	Carpenter	104	36
P3	Electrician for 50V-1000V	120	28
P4	Window/fillings-for-construction-openings installer	117	31
P5	Hydro-insulator	72	29
P6	Electrician for up to 50V/smart electro installations	105	24
P7/P8	Chimney sweeper/inspector	84	30
SE	Airtightness/Ventilation/HVAC introduction only	25*	23
TOTAL		**671**	**228**

The developed resources were used also in individually compiled educational programs and conferences. The use of videos prepared within the CraftEdu program and freely available on the ABF Stream Channel on YouTube has been (as of end of the project):

Number of individual educational programs	6
Number of followers online in real-time	1,381
Followers online in a shifted time	695
Total followers	2,076

The programmes were successfully exploited also by external providers, for example PC Revue that is streaming 6 video lectures from the programme for electricians for smart electro installation from the CraftEdu project having till today **7,779** views.

The project facilitated stakeholders' dialogue that led to discussion on the key topics relevant to energy renovation of buildings and qualification of craftsmen working on construction sites in 216 bilateral and multilateral meetings organised either by the partners or by other stakeholders.

SPS launched voluntary initiative "Building Future" aimed at sustainable construction reducing impact on the environment, final energy consumption in buildings, CO_2, and other greenhouse gas emissions. It is seeking to create the basis and conditions for dialogue with the government and the public tom promote education and training of relevant professionals in the sector of buildings aimed at increasing the energy efficiency of buildings and the use of renewable energy sources, as well as implementing the related concepts of smart cities and intelligent buildings.

SPS has built on the experience and practice of ZSPS that launched and developed such programme with support of earlier BUS projects.

7.9.6 SEEtheSkills

The SEEtheSkills project seamlessly follows the topics of the ingREeS project with the aim of supporting energy efficiency in buildings, especially regarding the use of information and communication technologies and raising awareness of solutions related to renewable energy sources. The project dealt with increasing skills in the field of energy-efficient construction of new and renovation of existing buildings using the innovative 3V approach - visibility, validation, and value. 10 organizations from 5 European countries participate in the solution and its duration is until the end of May 2024.

8 Skills gaps to achieve the 2030 targets

Will be part of the final version.

9 Barriers

Will be part of the final version

10 Conclusions

Will be part of the final version

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13 Glossary

Will be part of the final version.

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