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Title: Report on the effectiveness of the first Slovak National Roadmap implementation

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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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1. Executive Summary

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:

Objective/ Target	Sector Councils	Government	Regional governments	Associations of employers	VET providers	Accreditation bodies	Short-term		Medium-term			Long-term	
							2014	2015	2016	2017	2018	2019	2020
KO 1	✓	✓	○	✓	✓	✓	Embed energy efficiency (EE) and renewable energy (RES) knowledge into existing or new vocational education programmes						
KO 2	✓	✓		✓	✓		Develop and launch vocational education and training aimed at developing key competencies		Training and re-training on-site employees and independent sub-contractors (SMEs) on EE and RES				
KO 3	○	✓		○	○	○	Ensure quality of VET services and quality of learning outcomes by establishing appropriate system of certification						
KO 4		✓	✓	○	✓		Allocating appropriate financial resources to support achievement of key objectives and appropriate incentives for companies to invest in skills and knowledge of workers						
ST 1		✓		✓			Seek to influence Government so that their energy efficiency policies and legislation offer reassurance of longevity of the construction sector						
ST 2	○	✓	○	○	○	○	Raise awareness & understanding / stimulate demand for EE and RES measures (among suppliers and customers), seek cultural and behavioural change v the society through EE and RES agenda / citizens, consumers, economic operators, employees						

○ - provides support to achieving KOs and STs ✓ - responsible for achieving the KO and/or ST

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.

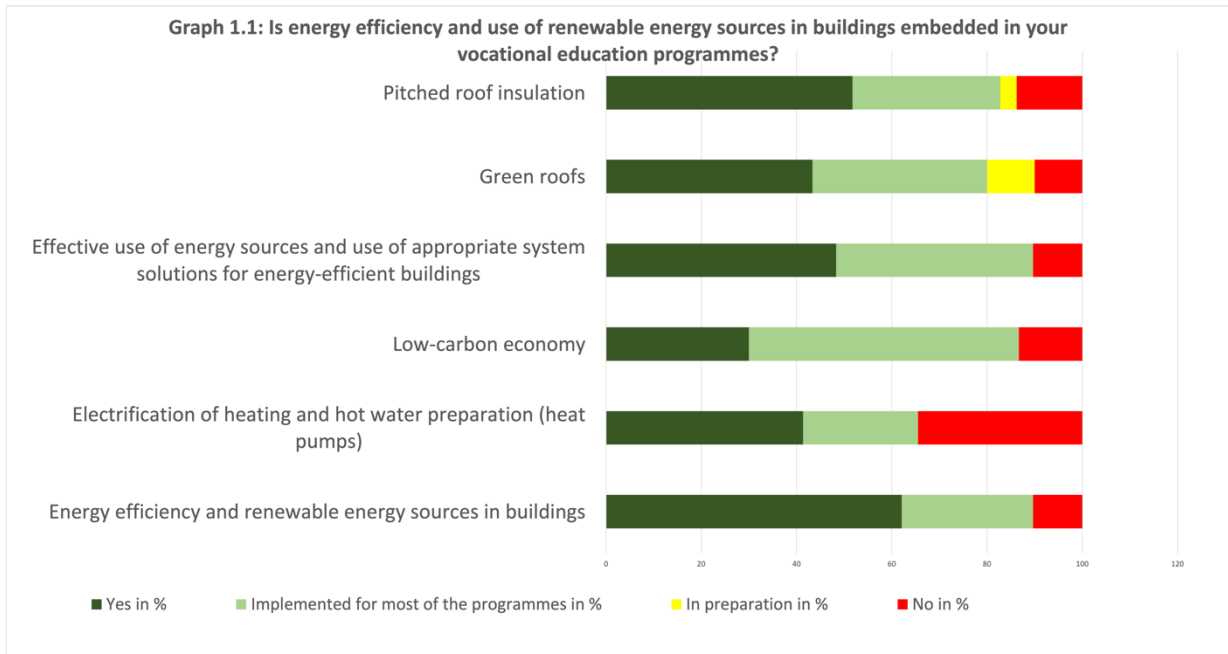
For achieving these objectives, the stakeholders agreed on 21 measures to be implemented.

The outcome of the assessment is:

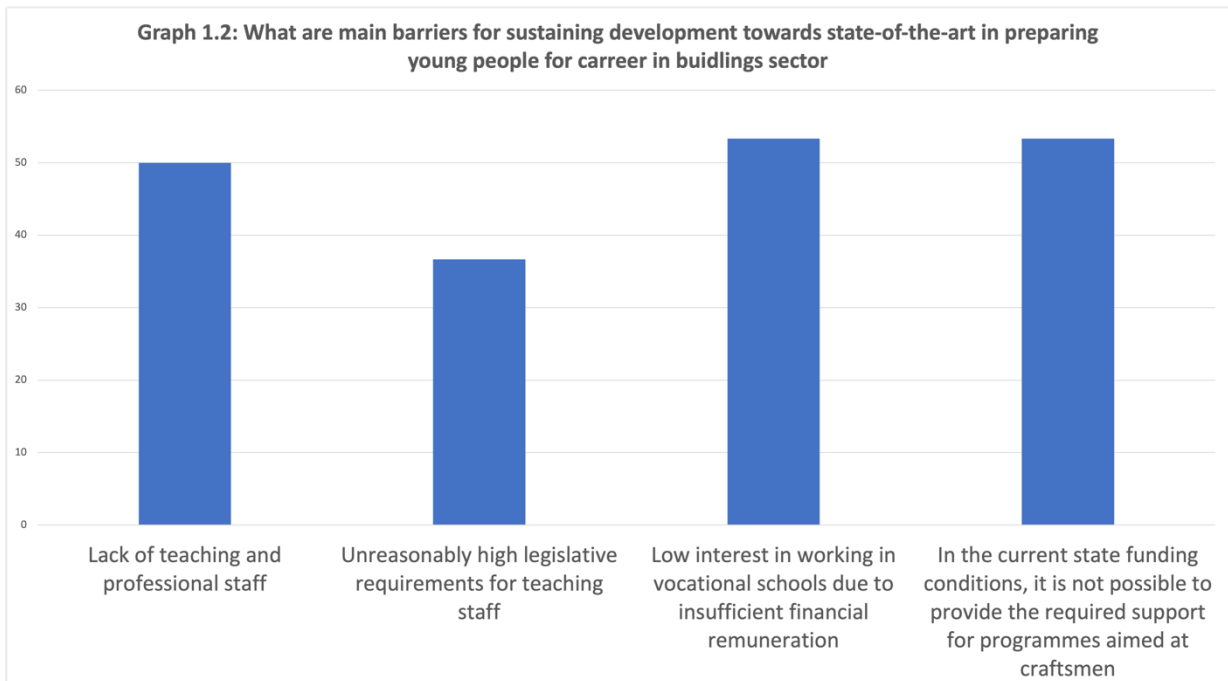
Objectives	Level of Effectiveness	Description of the objective	Employers	Sector Skills Councils	Training providers	Government	Regional governments	Accreditation bodies
KO1	1	Embed energy efficiency (EE) and renewable energy sources (RES) in existing or new further vocational training	✓	✓	✓		0	✓
KO2	1	Develop and launch further education and training aimed at developing key competences	✓	✓	✓	0		✓
KO3	1	Ensure quality of further vocational training and effectiveness of acquiring the targeted learning outcomes by establishing appropriate system of certification	✓	✓	0			✓
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	✓		0	✓	0	
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)	✓			✓	0	

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.



2. Introduction

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:

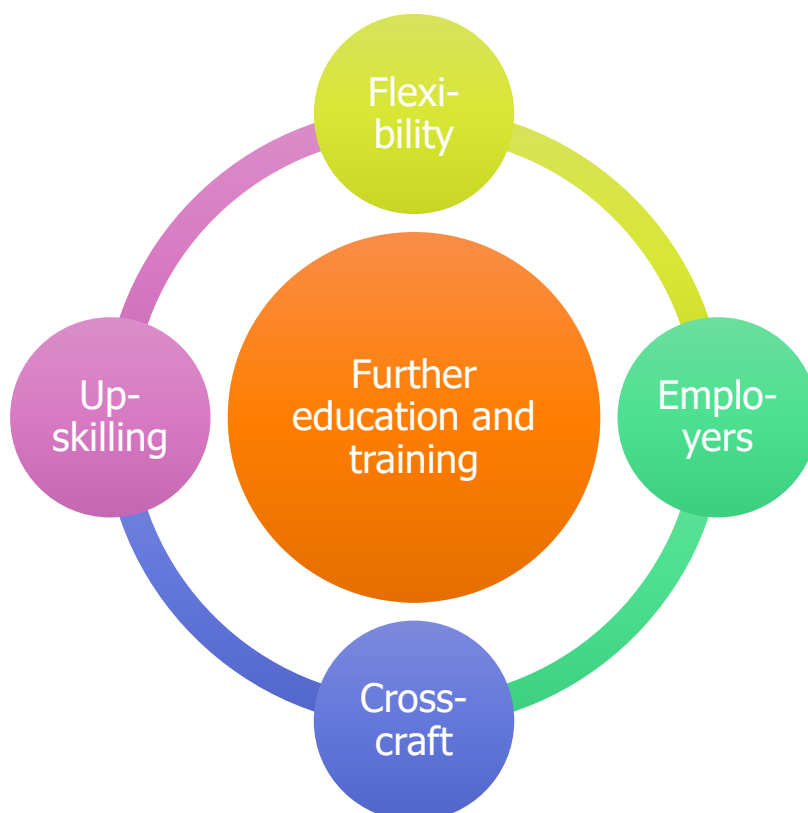
- Facilitated dialogue and cooperation between world of continuing education and training, world of work and policy makers in the area of continuing education and training, essential for triggering a qualitative and quantitative step-change in delivering continuing education and training on energy efficiency 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.

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 fill 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 - ĚSzKI	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 škola 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
40	Stredná odborná škola elektrotechnická Žilina	Žilina
41	SOŠ polytechnická	Humenné

No.	Name of the organisation	City
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.

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
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

No.	Profession	Covered by BUS project
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.

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

Objective/Target	Sector Councils	Government	Regional governments	Associations of employers	VET providers	Accreditation bodies	Short-term		Medium-term			Long-term	
							2014	2015	2016	2017	2018	2019	2020
KO 1	✓	✓	○	✓	✓	✓	Embed energy efficiency (EE) and renewable energy (RES) knowledge into existing or new vocational education programmes						
KO 2	✓	✓		✓	✓		Develop and launch vocational education and training aimed at developing key competencies		Training and re-training on-site employees and independent sub-contractors (SMEs) on EE and RES				
KO 3	○	✓		○	○	○	Ensure quality of VET services and quality of learning outcomes by establishing appropriate system of certification						
KO 4		✓	✓	○	✓		Allocating appropriate financial resources to support achievement of key objectives and appropriate incentives for companies to invest in skills and knowledge of workers						
ST 1		✓		✓			Seek to influence Government so that their energy efficiency policies and legislation offer reassurance of longevity of the construction sector						
ST 2	○	✓	○	○	○	○	Raise awareness & understanding / stimulate demand for EE and RES measures (among suppliers and customers), seek cultural and behavioural change v the society through EE and RES agenda / citizens, consumers, economic operators, employees						

○ - provides support to achieving KOs and STs ✓ - responsible for achieving the KO and/or ST

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. This assessment is using the following criteria of effectiveness:

- 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.

5.1 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 or new further vocational training	Objective achieved, BUS StavEdu, H2020 ingREeS, CraftEdu, Net-Ubiep, NEWCOM projects developed new further vocational training for craftsmen and on-site workers on EE 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 2 nd 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	✓	✓	✓		0	✓

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
			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 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.	✓	✓	✓	0		✓
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.	✓	✓	0			✓

Objectives	Level of Effectiveness	Description of the objective	Assessment of implementation	Employers	Sector Skills Councils	Training providers	Government	Regional	Accreditation bodies
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	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. 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.	✓		0	✓	0	
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	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
		of longevity of the 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)	<p>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".</p> <p>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.</p>	✓			✓	O	

5.2 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	<p>Ensure the mandate and the pilot phase of work of the Competence Centre for education in EE and use of RES in buildings (KCEB):</p> <p>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).</p>	<p>Completed.</p> <p>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.</p> <p>Specific objectives were set in the projects that were implemented by the organisations forming the competence centre.</p> <p>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.</p>
1.2	1	<p>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.</p>	<p>Completed.</p> <p>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.</p>
1.3	1	<p>Develop a programme for further professional development of employees and craftsmen in the sector of buildings.</p>	<p>Completed.</p> <p>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.</p>

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
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.
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.

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
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.
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 CO₂ 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.

Measure no.	Level of Effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
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.

5.3 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.

Measure no.	Level of effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
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 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.

Measure no.	Level of effectiveness	Measure adopted in 2013 Roadmap, its scope, and targets	Progress achieved
			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: Setting up and operate a portal providing professional information about EE of buildings and use of RES to the public.	Completed. The H2020 project CraftEdu developed such portal that includes many instructional videos and e-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.

5.4 Main projects contributing to delivering the objectives

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 roadmap¹.

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 Europe².

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 assessors³ from Build Up Skills CrossCraft project implemented in Austria;
- Setting up permanent network of trainers delivering the training⁴;
- Training of trainers for delivery of the programmes⁵;
- Setting up the network of companies cooperating in delivering cross-trade training programmes based on agreements negotiated under the project⁶;
- 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 Republic⁷;
- Review of the Roadmap to address proposals to Slovak Government for incentives boosting demand for highly qualified workers⁹;
- Set up of the database of trained professionals to be accessed by construction companies for recruitment of skilled professionals¹⁰.

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.

¹ 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.

² COM(2011) 571 final, p.19.

³ 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.

⁴ dtto

⁵ dtto

⁶ 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”

⁷ Key measure 1.14 agreed in the Roadmap: “Implement incentives for Investments in Skills”

⁸ Key measure 1.12 agreed in the Roadmap

⁹ 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)

¹⁰ 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).

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.

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.

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.

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.



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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, CO₂, and other greenhouse gas emissions. It is seeking to create the basis and conditions for dialogue with the government and the public to 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.

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.



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