

DELIVERABLE: 2.5

Curricula for 9 training programmes for targeted craftsmen and on-site workers

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Setting up national qualification and training scheme for craftsmen in the Czech Republic and developing the further offer of training courses in Slovakia, Austria and Bulgaria.

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1 Executive summary

This curricula (D2.5) further develop and concretize content of training programmes. Based on units of learning outcomes (D2.1), particular training programmes are defined and their parameters set – what is to be learnt, which methods are to be used, how much time is to be spent for each topic and who would sponsor each programme.

There are national sections that overarch all professions and individual professions for each country. Though we tried to keep common topics together in order to avoid needless redundancies, national particularities demanded splitting the professions into their respective national variants. Structure of this document reflects this approach.

This allows us to tailor each programme to specific needs and context in each country. It is also the reason why there are in fact 17 training programmes instead of 9 stated in the designation of this deliverable that originates in the Grant agreement. Consortium partners decided this augmentation during countless discussions in working groups. Two-stage workshops took place in order to design and confirm the final form of the programmes (development and validation workshops).

Developed curricula for training programmes are relevant to the expected learning outcomes to be acquired by the targeted craftsmen and on-site workers participating in the training relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings. These curricula will be prepared with support of the National Qualification Platforms' (NQP) members.

Partners have chosen professions depending on current situation in their countries. Thus only windows installer and hydro-insulator curricula were developed for both Austria and Bulgaria because other professions had already been tackled by other projects. Profession assignment is depicted in following table.

Table 1 Assignment of professions

No.	Profession	Assignment			
		CZ	SK	AT	BG
P1	HVAC Installer	X			
P2	Carpenter	X	X	X ¹	
P3	Electrician (high-voltage)	X	X		
P4	Windows installer	X	X		X
P5	Hydro-insulator	X	X	X	X
P6	Electrician (low-voltage)	X	X		
P7	Chimney sweeper (installation)	X			
P8	Chimney sweeper (inspection)	X			

For the sake of clarity, we labelled each curriculum iteration with two-letter-prefix designating country (i.e. CZ, SK, AT or BG) and profession designation (i.e. P1-P8). This makes orientation in many similar

¹In Austria, blow-in installation of renewable insulation materials as a part of the carpenter will be developed.



curricula easier. It is also the reason why Slovakian, Austrian and Bulgarian curricula begin with professions other than number 1 (i.e. SKP2 – Carpenter, ATP4 and BGP4 – Windows installer).

For each profession and country a partner is assigned, who will be responsible for developing curricula for those programs. Assignment is marked in the following table.

Table 2 Partners for developing curricula

No.	Profession	Assignment			
		Partner/ CZ	Partner/ SK	Partner/ AT	Partner/ BG
P1	HVAC Installer	SPS			
P2	Carpenter	CVUT	UVS	17&4	
P3	Electrician (high-voltage)	SPS	SIEA		
P4	Windows installer	CVUT	UVS		ENEFFECT
P5	Hydro-insulator	SEVEN	UVS	17&4	ENEFFECT
P6	Electrician (low-voltage)	SPS	SIEA		
P7	Chimney sweeper (installation)	ABF			
P8	Chimney sweeper (inspection)	ABF			

2 National specifications

National section describes four sets of national-specific attributes of curricula. These are then, in effect, common for all professions dealt with in each country. Each set consists of:

- Form of education;
- Required education (entry level) and;
- Teaching method.

At the very beginning of the section, there is an introductory text explaining context and particularities of each country that are to be taken into account.

2.1 Czech Republic

Curricula for Czech Republic cover all professions. Most of them are shared with other countries apart from HVAC Installer and two Chimney installer professions. The reason for this is that there had been a gap in nZEB education for blue collars construction workers so far compared to other project countries. CraftEdu project is first comprehensive activity aimed at improving the situation.

Definitions of shared professions are comparable to that of other countries with some exceptions. High and low-voltage electricians split differently in the Czech Republic and Slovakia (for Slovakian delimitation see section 6). Hydro-insulator in the Czech Republic comprise expertise in dealing with both roof and foundation of the building, because both parts influence airtightness of the structure significantly.

2.1.1 Required education

Secondary vocational education (certificate of apprenticeship) or practice in the field, minimum 1 year.

2.1.2 Form of education

Education will be performed by several methods

1. **Classroom courses** max one day – 6/8 hours including excursion EE models

Courses would take place at ABF or other place (Chamber meetings, exhibition etc.) Focused on current topics, material, technologies, EE approaches and necessary skills to apply these in practice. Teaching the theoretical orientation especially universally, common to several professions with the interpretation of the principle of energy-saving principles of buildings, with examples of their penetration and influence between individual professions including visiting EE construction technology models.

2. **E-learning** via database at SEVEN server 10 hours

Professional scope and marketing of e-learning are yet to be determined. E-learning tools will be available on-line at the SEVEN website in order to ensure the continuity of both forms.

3. **Video materials** by ABF Audio-visual centre 2 hours



ABF is to produce short video programs in its Audiovisual Center. Videos will present individual skills and knowledge that would enhance self-study. They will be presented on the ABF website (alternatively linked to the SEVEN website).

4. **Self-study** For each profession it is necessary to prepare a suitable list of materials (publications, links to educational websites, exhibitions, excursions and special programs, etc.), which would enable a suitable form of self-study.
5. **Exhibition trade expo** lectured visit 4/6 hours Excursion to interesting buildings, construction, or possible visit at trade, manufacturer's demonstration centre also in cooperation with technical schools and vocational schools.
6. **One-day project conference** for all professions organized by ABF 6 hours

2.1.3 Methods

The teaching methods used to carry out the educational activity are aimed at acquiring new theoretical knowledge and practical skills, in particular:

1. Verbal methods: independent speech, dialogical, textbook and method of work.
2. Illustrative, demonstrative and practical methods, video.
3. Problem methods: creating simulated situations a troubleshooting from practice.
4. Practical exercises.

2.2 Slovakia

In 2012 and 2013, Slovakia participated in the Build Up Skills Pillar I project managed by EACI (now EASME) to analyse a status quo in the level of competencies available in the sector of buildings, future needs and obstacles for improvement and investments in the skills and knowledge of human resource in the sector of buildings.

The agreed and endorsed BUS National Roadmap have 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.

In implementing the Roadmap, **StavEdu** – National Qualification and Training Scheme was set up for Craftsmen and On-site Workers on Energy Efficiency and Use of Renewable Energy Sources in Buildings (resulting from the BUS StavEdu project supported by Intelligent Energy Europe).

The StavEdu scheme offers 10 cross-trade training programmes of further education and training of craftsmen and on-site workers in the field of buildings on energy efficiency and use of renewables in buildings.



The CraftEdu training programmes will complement StavEdu scheme with 5 one-craft programmes that were identified in implementing StavEdu scheme as needed to address several specific issues and needs of Slovak construction sector.

For example, the lack of quality in flat roofing led to low trust towards flat roofs and the leaking roofs were named as one of the most frequent problems in Slovakia during the survey among the experts carried out in November 2018 among stakeholders.

Flat roofs in Slovakia emerged through extensive construction of multi-family apartment housing using prefabricated elements. In the 1970s and 1980s, flat roofs started to be used also in the construction of single-family houses. In the case of public administrative buildings, it is the most used type of roof. From 1990s, flat roofs have been almost not used, but they are re-emerging due to more stringent energy efficiency requirements and the consequent implementation of passive house concept.

The scope of further training for low- and high-voltage electricians was divided into two groups – electricians for voltage up to 50V and for voltage from 50V to 1000V. The Slovak Norm STN EN 50160 (33 0121) replaced previous norm and introduced new meaning to the terms “high-voltage” and “low-voltage”. According to the norm, the voltage is divided into 6 categories. Therefore, the terms “high-voltage” and “low-voltage” are not used anymore with regard to the electrical networks in buildings.

This is why, in Slovakia, the training programmes for electricians will be titled “electrician for smart electro installations” (up to 50 V, EQF/NQF level 3) and “electrician” (from 50V to 1000V, EQF/NQF level 4). These programmes will be focused on key aspects of smart buildings, including smart electro installations, connecting buildings to smart grids, electromobility (e.g. charging stations in buildings) assessment of smart readiness of the buildings.

The remaining two programmes that will be implemented in Slovakia is focusing on carpentry and windows installation. These two programmes were identified already during StavEdu scheme implementation as single-craft programmes that need to be offered to complement cross-craft training programmes implemented in StavEdu scheme. They will deliver certified programmes that will be offered to craftsmen that completed the vocational training at secondary level to present the state of the art in areas relevant to nZEB.

The SK module is adapted to support the legislative changes and certification requirements for companies delivering chartered construction works and services (as per draft Building Code). The new provision will require adequate qualification earned through formal or non-formal training, as well as work experience (informal training). The modules will provide training programmes and recognition of prior learning in combination with certification of prior learning provided by accredited bodies, among them several vocational schools at secondary level that have been involved in the project via National Qualification Platform (NPQ) established by BUS Pillar I project.

2.2.1 Form of education

Education will be organized by several forms:

1. **In class courses** – min 3 days/24 hours, including practice and summary of acquired information and skills.



2. **Distance learning** – using study of learning materials and E-learning via database at SEVEN server.

The SK module is adapted to support the legislative changes and certification requirements for companies delivering chartered construction works and services (as per draft Building Code).

2.2.2 Required education

Secondary vocational education (certificate of apprenticeship) or practice in the field, minimum 1 year.

2.2.3 Methods

The teaching methods used to carry out the educational activity are aimed at acquiring new theoretical knowledge and practical skills, in particular:

1. Verbal methods: independent speech, dialogical, textbook and method of work;
2. Illustrative, demonstrative and practical methods, video;
3. Problem methods: creating simulated situations a troubleshooting from practice;
4. Practical exercises.

2.3 Austria

Certified Installer of blow-in insulation

Continuous new requirements and stringent conditions for building constructions call for improved energy indicators of ceilings and wall superstructures. Blown-in insulation provides a very fast, reasonably priced and efficient option. Due to the arising amount of wooden constructions in Austria, there is a rising demand for insulation materials made of renewables.

The cellulose based injectable insulation material offers numerous essential product features that allow for an effective and energy cost reducing insulation that also considers the environmental perspective.

The insulation is pumped under air pressure and filled into voids within the building fabric to create a compacted, uniform and seamless insulation layer that contributes to the overall airtightness of the building. Cracks, cavities and corners are completely filled. The result: a comfortable indoor environment all year round. In this way, the loose-fill insulation made of newspaper furthermore successfully reduces energy costs for heating in winter and air condition in summer.

Application possibilities for blown-in insulation

Basically, each construction component can be equipped with an injectable insulation. Compared to conventional insulation systems, it differs just in the sequence of the various working steps.

Only specially trained installers using blowing machines specifically equipped for the job are allowed to process the material. To provide this training, the course for certified Installer of blow-in insulation will be developed within this project.



Flatroofing and Waterproofing

In the area of flat roof construction and waterproofing, in Austria there is also a great need for training and further education. The largest training provider in Austria is the “Institut für Flachdachbau und Bauwerksabdichtung” (IFB), which itself or in cooperation with educational institutions (e.g. building academies) tries to cover the demand. Within this project, in close cooperation with the IFB, the development of modules, which are particularly relevant to nZEB – topics, "Green roof as a contribution to climate change adaptation", "Integration of renewable energy systems in flat roofs" as well as "Renovation of flat roofs to nZEB standard" are planned. The existing training materials will be extended to include ULOs and adapted for incorporation into the e-learning system or newly developed for these modules.

2.3.1 Form of education

Education will be organized in two forms:

1. In class courses – min 3 days/24 hours, including practice and summary of acquired information and skills.
2. Distance learning – using study of learning materials and E-learning via Moodle.

2.3.2 Required education

At least one year of practical work on the construction site.

2.3.3 Methods

The teaching methods used to carry out the educational activity are aimed at acquiring new theoretical knowledge and practical skills, in particular:

1. Verbal methods: independent speech, dialogical, textbook and method of work;
2. illustrative, demonstrative and practical methods, video;
3. problem methods: creating simulated situations a troubleshooting from practice;
4. practical exercises.

2.4 Bulgaria

Regarding education of construction professions, many activities has been done in Bulgaria so far. Within the BUILD UP Skills EnerPro project, through the development of training programmes for “acquiring of qualification on part of profession” (i.e. specialization) as per the national requirements, the nZEB-relevant knowledge, skills and competences were organized in streamlined units of learning outcomes. The Bulgarian BUILD UP Skills projects also paved the way for a review of the State Educational Standards regarding the professions within the Architecture and Construction professional direction, resulting in recent changes in the training plans and curricula of the professional high schools and introduction of a new discipline – “Ecologic and Energy Efficient Construction”.

That is why there was just one profession assigned to Bulgaria in CraftEdu project. Within the process of practical implementation (supported to a big extent by the Train-to-NZEB and Fit-to-NZEB projects),



it came up, however, that other professions were also relevant and there is a pressing need for improvement, especially for adult professionals. So in the end two professions, windows installer and hydro-insulator, were prepared to be used in Bulgaria, and another one - HVAC Installer, is under consideration, although outside the scope of the current document.

2.4.1 Form of education

The suggested curricula is applicable for courses for acquiring of qualification on part of profession, as shorter versions are also prepared for upskilling already qualified professionals with only nZEB-relevant ULOs. The curricula is suitable for a blended learning system, as depending on the available resources and equipment of the VET provider, education could be performed by a mix of the following methods:

Classroom courses: up to 16 hours:

Courses would take place at the premises of any VET provider licenced to conduct qualification courses for professions in the Architecture and Construction professional direction, or at other specialized premises such as the Bulgarian Building Knowledge Hub (BKH) or the training centers of major suppliers of construction products and materials. The teaching process should be focused on the selected topics, material, technologies, EE approaches and necessary skills to apply these in practice, and should apply a universal approach and share commonalities with all professions through the interpretation of the energy-saving principles of buildings, with examples of their penetration and influence between individual crafts (e.g. as demonstrated by the BKH demonstration models).

E-learning via database of EnEffect or possible e-learning tools set up by the Ministry of Education: 8-10 hours

The professional scope and marketing of e-learning are yet to be determined. E-learning tools will be available on-line at the EnEffect website in order to ensure the continuity of both forms. In addition, EnEffect is preparing an electronic set of training materials for the Ministry of Education which could be easily transformed in an e-learning tool, if there is continuing commitment by the Ministry.

Practical training (16 hours): Hands-on training using demonstration and practical training models under specifications available through Train-to-NZEB and Fit-to-NZEB projects. Where applicable, organization of on-site training

Video materials: available through international projects: 2 hours

A number of video training materials are at disposal of EnEffect and publicly available for other training providers through the BUS EnerPro, Train-to-NZEB, ConClip and other EU-supported projects, many of them translated in Bulgarian. In addition, several smartphone apps are also available, although currently only in English.

Self-study: 8 hours. For each profession it is necessary to prepare a suitable list of materials (publications, links to educational websites, exhibitions, excursions and special programs, etc.), which would enable a suitable form of self-study.



Study visits: lectured visit **4/6 hours**. Excursion to interesting buildings, construction, or possible visit at trade, manufacturer's demonstration centre also in cooperation with technical schools and vocational schools.

One-day project conference for all professions organized by EnEffect or relevant professional chambers and branch associations: **6 hours**.

2.4.2 Required education

Secondary vocational education (2nd or 3rd level under the national EQF) or proven practice in the field, minimum 1 year.

2.4.3 Methods

The teaching methods used to carry out the educational activity are aimed at acquiring new theoretical knowledge and practical skills, in particular:

1. Verbal methods: independent speech, dialogical, textbook and method of work.
2. Illustrative, demonstrative and practical methods, video.
3. Problem methods: creating simulated situations a troubleshooting from practice.
4. Practical exercises, including hands-on experience with components and materials in either real (on-site) or demo (training center) conditions.



3 Curricula – Czech Republic

3.1 HVAC Installer – CZP1

Name of the programme: **nZEB Training Programme for HVAC Installer**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Bohuslav Málek, CSc.**

3.1.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.1.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems and problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in accordance with company law.

3.1.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			
↓ HVAC Installer in construction of nZEB and in nZEB level renovation of existing buildings <u>TOTAL</u> :	29	15	14
- To formulate a logical process / sequence of work focusing on the precise execution of HVAC installations with links to other building	-	-	-

Title of the topic	Number of hours	Of which: Theory	Practice
professions with differentiation of buildings for new buildings and for renovations. - HVAC installation according to required documentation and according to safety and fire protection criteria. - Continuous monitoring of the correct design and implementation of HVAC installations.			
Materials - Plumbing materials- classification, types. - Modern plumbing materials.	3	3	0
Building constructions - Roof structures- sloping roofs, flat roofs; - Repairs of existing roof trusses; - Formwork of concrete structures.	2	2	0
Technology - Design drawings for construction, assembly, disassembly and repair of HVEC installations. - Hand-held power tools, tools, aids, machinery and equipment. - OHS at work (OHS- health and safety at work). - Positioning of HVEC installations on building structures. - Display of building structures and connections in buildings. - Design of HVEC installations. - Technological procedures for HVEC installations. - Repair of HVEC installations. - Technological conditions for HVEC installations.	10	10	0
Practice and summary of acquired knowledge and skills - Hand and mechanized tools, tools, aids, machines, equipment. - New technologies, EEW principles. - OSH. - Essential knowledge of linked professions.	14	0	14
Total:	32	18	14

3.1.4 Trainers available

- | | | |
|--------------------|------------------|------------------|
| - Bureš Michal | - Karásek Jiří | - Šála Jiří |
| - Čejka Jan | - Klečka Jan | - Šubrt Roman |
| - Kabrhel Michal | - Málek Bohuslav | - Urban Miroslav |
| - Kalčev Petr | - Pojar Jan | - Veleba Jan |
| - Kaločai Ladislav | - Rod Karel | |

3.2 Carpenter – CZP2

Name of the programme: **nZEB Training Programme for Carpenter**

Lesson duration: **45 min**

Allocated hours: **32.00**



Professional sponsor: Ing. Jan Pojar

3.2.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.2.2 Graduate profile

The graduate is a qualified professional who is capable of independent work and has the required and enough knowledge and skills in the field of carpenters. He/she has enough knowledge and comprehension of reading technical documentations and construction details. He/she is responsible for designing workflows for the manufacture, assembly, disassembly and repair of any carpentry. He/she is able to apply acquired knowledge and practical skills in problem solving, he can work independently or in a team. He/she want continue education, constantly interested in the development of building materials and technologies. He/she has enough knowledge of the properties of wood and wood elements, is manually skilled in working with wood and manufacturing building structures.

3.2.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Carpenter in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
Materials - Wooden materials- classification, types; - Materials for joining structures; - Materials for the protection of wooden building structures; - Modern insulation materials, materials for airtightness.	3	3	0
Building constructions - Roof structures- sloping roofs, flat roofs; - Repairs of existing roof trusses; - Formwork of concrete structures.	2	2	0
Technology	10	10	0



Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Implementation drawings for construction, assembly, dismantling and repair of roof structures and substructures; - Hand a mechanized tools, tools, aids, machines and equipment; - OSH at work at heights (OSH- occupational safety and health); - Proper stability and strength of wooden building structures; - Design of roof structures; - Technological procedures for the installation of carpentry construction; - Repair of roof construction; - Perform inspection measurements and functional tests of building structures. 			
Practice and summary of acquired knowledge and skills <ul style="list-style-type: none"> - Hand and mechanized tools, tools, aids, machines and equipment - Processing and machining of structural elements - New technologies, EEW principles - OSH (OSH- occupational safety and health) - General knowledge of related professions - Measurements and functional tests of building structures 	14	0	14
Total:	32	18	14

3.2.4 Trainers available

- | | | |
|------------------|----------------|------------------|
| - Bureš Michal | - Matějka Petr | - Šubrt Roman |
| - Čejka Jan | - Pojar Jan | - Urban Miroslav |
| - Kabrhel Michal | - Rod Karel | - Veleba Jan |
| - Karásek Jiří | - Šála Jiří | |

3.3 Electrician (high voltage) – CZP3

Name of the programme: **nZEB Training Programme for Electrician (high voltage)**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Zdeněk Krpelán**

3.3.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.3.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems



and problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in accordance with company law.

3.3.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Electrician (high voltage) in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
Materials - High voltage electrical materials- classification, types. - Modern high voltage electrical materials.	3	3	0
Building constructions - Roof structures- sloping roofs, flat roofs; - Repairs of existing roof trusses; - Formwork of concrete structures.	2	2	0
Technology - Design drawings for construction, assembly, disassembly and repair of installation of high voltage electrical network and equipment. - Hand-held power tools, tools, aids, machinery and equipment. - OHS at work (OHS- health and safety at work). - Positioning of installation of high voltage electrical network and equipment on building structures. - Display of building structures and connections in buildings. - Design of installation of high voltage electrical network and equipment. - Technological procedures for installation of high voltage electrical network and equipment. - Repair of installation of high voltage electrical network and equipment. - Technological conditions for installation of high voltage electrical network and equipment.	10	10	0
Practice and summary of acquired knowledge and skills - Hand and mechanized tools, tools, aids, machines, equipment. - New technologies, EEW principles. - OSH.	14	0	14



Title of the topic	Number of hours	Of which: Theory	Practice
- Essential knowledge of linked professions.			
Total:	32	18	14

3.3.4 Trainers available

- | | | |
|------------------|----------------|------------------|
| - Bureš Michal | - Karásek Jiří | - Staša Michal |
| - Čejka Jan | - Rod Karel | - Šubrt Roman |
| - Hlavatý Jan | - Šála Jiří | - Urban Miroslav |
| - Kabrhel Michal | - Sluka Jiří | - Veleba Jan |

3.4 Windows installer – CZP4

Name of the programme: **nZEB Training Programme for Windows Installer**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Jan Bedřich**

3.4.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.4.2 Graduate profile

The graduate is a qualified professional who is capable of independent work and has the required and enough knowledge and skills in the field of windows installation. He/she has enough knowledge and comprehension of reading technical documentations and construction details. He/she is responsible for designing workflows for the manufacture, assembly, disassembly and repair of any windows constructions. He/she is able to apply acquired knowledge and practical skills in problem solving, he can work independently or in a team. He/she want continue education, constantly interested in the development of building materials and technologies. He/she has advanced knowledge of the type of anchoring and fixing prefabricated parts of structures, is manually skilled in working manufacturing building structures.

3.4.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	3	3	0
Airtightness			
- basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR)			



Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - controlled ventilation system; - heat recovery; 			
Heating and cooling <ul style="list-style-type: none"> - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations. 			
↓ Windows installer in construction of nZEB and in nZEB level renovation of existing buildings <u>TOTAL:</u>	29	15	14
Materials <ul style="list-style-type: none"> - Window materials- classification, types - Materials for joining window structures - Modern insulation materials, materials for airtightness - Protective materials (during installation) - Additional constructions (blinds, outdoor blinds, window sills, ...) 	3	3	0
Building constructions <ul style="list-style-type: none"> - Window frame anchoring, installation of window sash - Repairs of existing window panels, frames, etc. - Sealing the joint between the window and the supporting structure - Cleaning of surrounding structures 	2	2	0
Technology <ul style="list-style-type: none"> - Implementation drawings for construction, assembly, dismantling and repair of windows structures and substructures - Hand a mechanized tools, tools, aids, machines and equipment - OSH at work at heights (OSH- occupational safety and health) - Proper stability and strength of wooden building structures - Design of window part structures - Technological procedures for the installation of window construction - Repair of window construction - Perform inspection measurements and functional tests of building openings construction 	10	10	0
Practical training and summary of acquired knowledge and skills <ul style="list-style-type: none"> - Hand and mechanized tools, tools, aids, machines and equipment - Processing and machining of structural elements - New technologies, EEW principles - OSH (OSH- occupational safety and health) - General knowledge of related professions - Measurements and functional tests of building structures 	14	0	14
Total:	32	18	14

3.4.4 Trainers available

- | | | |
|--------------------|------------------|------------------|
| - Bedřich Jan | - Karásek Jiří | - Šubrt Roman |
| - Bureš Michal | - Málek Bohuslav | - Takáčová Petra |
| - Čejka Jan | - Pojar Jan | - Veleba Jan |
| - Kabrhel Michal | - Rod Karel | |
| - Kaločai Ladislav | - Šála Jiří | |



3.5 Hydro-insulator – CZP5

Name of the programme: **nZEB Training Programme for Hydro-insulator**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Jiří Šála, CSc.**

3.5.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.5.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in harmony with company law.

3.5.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Hydro-insulator n construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
- formulate a logical procedure/sequence of work with focus on precise execution of all waterproofing construction details with links to other construct professions with differentiation of works for new buildings and for renovations - assembly hydro-insulation according to requested documentation and according to criteria of safeness and fire defence			

Title of the topic	Number of hours	Of which: Theory	Practice
- continuous checking of the correct design and realization of the waterproof layer			
Materials - Insulation materials- classification, types - Modern insulation materials - Hydro-insulating materials- traditional and modern materials - Insulation materials- roofs, attics, foundations, basement walls	3	3	0
Building constructions - Roof structures- sloping roofs, flat roofs - Substructures- foundations and basement walls	2	2	0
Technology - Implementation drawings for construction, assembly, dismantling and repair of roof structures and substructures - Hand a mechanized tools, tools, aids, machines and equipment - OSH at work at heights (OSH- occupational safety and health) - The importance of building structures hydro-insulation - Location of hydro-insulation on building structures - Display of building structures and wiring in buildings - Design of hydro-insulation - Technological procedures for the installation of hydro-insulation - Repair of hydro-insulation - Technological conditions for hydro-insulation of buildings	10	10	0
Practical training and summary of acquired knowledge and skills - Hand and mechanized tools, tools, aids, machines and equipment - New technologies, EEW principles - OSH (OSH- occupational safety and health) - General knowledge of related professions	14	0	14
Total:	32	18	14

3.5.4 Trainers available

- | | | |
|------------------|----------------|------------------|
| - Bureš Michal | - Pojar Jan | - Šubrt Roman |
| - Čejka Jan | - Rod Karel | - Urban Miroslav |
| - Kabrhel Michal | - Šála Jiří | - Veleba Jan |
| - Karásek Jiří | - Staša Michal | |

3.6 Electrician (low voltage) – CZP6

Name of the programme: **nZEB Training Programme for Electrician (low voltage)**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Zdeněk Krpelán**

3.6.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.



3.6.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems and problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in accordance with company law.

3.6.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			
↓ Electrician (low voltage) In construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
- To formulate a logical process / sequence of work focusing on the precise execution of installation of low voltage electrical network and equipment with links to other building professions with differentiation of buildings for new buildings and for renovations. - Installation of low voltage electrical network and equipment according to required documentation and according to safety and fire protection criteria. - Continuous monitoring of the correct design and implementation of installation of low voltage electrical network and equipment.	3	3	0
Materials - Low voltage electrical materials- classification, types. Modern low voltage electrical materials.	2	2	0
Technology - Design drawings for construction, assembly, disassembly and repair of installation of low voltage electrical network and equipment. - Hand-held power tools, tools, aids, machinery and equipment. - OHS at work (OHS- health and safety at work). - Positioning of installation of low voltage electrical network and equipment on building structures. - Display of building structures and connections in buildings.	10	10	0

Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Design of installation of low voltage electrical network and equipment. - Technological procedures for installation of low voltage electrical network and equipment. - Repair of installation of low voltage electrical network and equipment. - Technological conditions for installation of low voltage electrical network and equipment. 			
Practice and summary of acquired knowledge and skills <ul style="list-style-type: none"> - Hand and mechanized tools, tools, aids, machines, equipment. - New technologies, EEW principles. - OSH. - Essential knowledge of linked professions. 	14	0	14
Total:	32	18	14

3.6.4 Available trainers

- | | | |
|------------------|------------------|------------------|
| - Bureš Michal | - Málek Bohuslav | - Šubrt Roman |
| - Čejka Jan | - Rod Karel | - Urban Miroslav |
| - Hlavatý Jan | - Šála Jiří | - Veleba Jan |
| - Kabrhel Michal | - Sluka Jiří | |
| - Karásek Jiří | - Staša Michal | |

3.7 Chimney sweeper (installation) – CZP7

Name of the programme: **nZEB Training Programme for Chimney sweeper (installation)**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Jaroslav Schön**

3.7.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.7.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems and problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in accordance with company law.



3.7.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			
↓ Chimney sweeper (installation) n construction of nZEB and in nZEB level renovation of existing buildings <u>TOTAL</u> :	29	15	14
- Formulating a logical procedure/sequence of work including safety attitude, related to correctly prepping burn trails for application ,ensuring absolute continuity of the three key layers providing all layer of chimney, all possible control mechanisms. Prepare documentations of measuring fuel- gas and evaluate the effectivity of burning fuel- gas. - Assembly chimney according to requested documentations and rules made by Chamber of Chimney builders. Assembly the fuel tracks according to criteria of safeness and fire defence. Assembly smoke tracks for appliances according to the request of safety and fire defence in focus on appliances producer advice	15	15	0
Practice and summary of acquired knowledge and skills - Hand and mechanized tools, tools, aids, machines, equipment - New technologies, EE principles, - OSH - Essential knowledge of linked professions	14	0	14
Total:	32	18	14

3.7.4 Available trainers

- | | | |
|----------------|-----------------|------------------|
| - Bedřich Jan | - Klečka Jan | - Šubrt Roman |
| - Fibiger Jan | - Málek Robert | - Takáčová Petra |
| - Kalčev Petr | - Materna Alois | - Veleba Jan |
| - Karásek Jiří | - Šála Jiří | |

3.8 Chimney sweeper (inspection) – CZP8

Name of the programme: **nZEB Training Programme for Chimney sweeper (inspection)**

Lesson duration: **45 min**

Allocated hours: **32.00**



Professional sponsor: **Ing. Jaroslav Schön**

3.8.1 Target group

Training programme targets craftsmen and other on-site workers, persons interested in obtaining professional knowledge and professional skills relevant in the field energy efficiency (EE) and use of renewable energy sources (RES) of buildings.

3.8.2 Graduate profile

A graduate is a qualified professional who is able to work independently and has relevant knowledge and skills in the field. He/she is able to orientate himself/herself in project documentation, knows the properties of building materials and is able to choose the technological procedures of works. It is also adaptable in related fields, able to apply acquired knowledge and practical skills in solving problems and problems, can work independently and in a team, is able to continue to educate, permanently interested in the development of building materials and technologies, master important manual skills, act in accordance with company law.

3.8.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL :	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Chimney sweeper (inspection) in construction of nZEB and in nZEB level renovation of existing buildings TOTAL :	29	15	14
- formulate a logical procedure/sequence of work, correctly prepping burn trails for application and ensuring absolute continuity of the three key layers providing all layer of chimney to identify of all possible control mechanisms, pressure test and other obligatory tasks. - applying final revision, find out all obligatory factors for revision and properly fill the Inspectional report	15	15	0
Practice and summary of acquired knowledge and skills - Hand and mechanized tools, tools, aids, machines and equipment - New technologies, EEW principles - OSH - General knowledge of linked profession - Obligatory factors for revision a properly fill the report	14	0	14
Total:	32	18	14



3.8.4 Available trainers

- Bedřich Jan
- Fibiger Jan
- Kalčev Petr
- Karásek Jiří
- Klečka Jan
- Málek Robert
- Materna Alois
- Šála Jiří
- Šubrt Roman
- Takáčová Petra
- Veleba Jan



4 Curricula – Slovakia

4.1 Carpenter – SKP2

Name of the programme: **nZEB Training Programme for Carpenter**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Ľubica Hlaváčová**

4.1.1 Target group

Craftsmen and on-site workers, persons interested in obtaining professional knowledge and professional skills relevant to the construction of nZEB and/or energy renovations of existing buildings to nZEB standard.

Intended for construction professions: Roofer, Hydro-insulator, Carpenter, Tinsmith, Roofing installer

4.1.2 Graduate profile

The graduate is a qualified construction professional able to work independently and has the appropriate knowledge and skills in the field of nZEB (construction of new nZEB and energy renovations of existing buildings to nZEB standard). The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the project documentation, knows the properties of building materials, and is able to correctly choose the technological work procedures. He/she is adaptable also in related fields, is able to apply the acquired knowledge and practical skills in solving tasks and problems, to work independently and in a team, to continue education, to express a continuous interest in the development of building materials and technologies, to master important manual skills.

4.1.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			



Title of the topic	Number of hours	Of which: Theory	Practice
↓ Carpenter in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
Materials <ul style="list-style-type: none"> - Insulating materials- classification, types. - Modern insulating materials. - Insulating materials- sprayed insulation. - Insulation materials against heat loss – traditional and modern materials. - Insulating materials- roofs, attics 	5	5	0
Building structures <ul style="list-style-type: none"> - Roof structures – pitched roofs. - Carpentry structures of pitched roofs. 	2	2	0
Technology <ul style="list-style-type: none"> - Design drawings for construction, assembly, disassembly and repair of carpentry structures of pitched roofs. - Manual and power tools, tools, aids, machinery and equipment, health and safety when working at heights. - Importance and placement of insulation on building structures. - Structural design of thermal sprayed insulation. - Technological procedures for installation and repair of thermal sprayed insulation. - Repairs of thermal sprayed insulation. - Technological conditions for thermal insulation of buildings using sprayed insulation. 	8	8	0
Practice, summary of acquired information and skills <ul style="list-style-type: none"> - Manual and power tools, implements, aids, machinery and equipment. - Occupational health and safety when working at heights. - Placement of insulation on building structures. - Insulating materials-sprayed insulation. - Technological conditions for thermal insulation of buildings. - Structural design of thermal sprayed insulation. - Technological procedures for installation and repair of thermal sprayed insulation. 	14	0	14
Total	32	18	14

4.1.4 Available trainers

- Galisová Zuzana, Ing.
- Halamová Ľubica, Ing.
- Kreškóci Jozef, Bc.
- Vizi Marián, Ing.



4.2 Electrician (50V – 1000V) – SKP3

Name of the programme: **nZEB Training Programme for Electrician (50V – 1000V)**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Vladmír Andris**

4.2.1 Target group

Electrical engineers and construction site workers, persons interested in acquiring expert knowledge and skills in the field of electrical engineering and the use of renewable energy sources in buildings relevant to the construction of nZEB and/or energy renovations of existing buildings to nZEB standard.

Designed for the electrical engineering profession: electrical engineer

4.2.2 Graduate profile

The graduate is a qualified construction professional able to work independently and has the appropriate knowledge and skills in the field of nZEB (construction of new nZEB and energy renovations of existing buildings to nZEB standard). The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the project documentation and is able to correctly choose the technological work procedures. He/she is adaptable also in related fields, is able to apply the acquired knowledge and practical skills in solving tasks and problems, to work independently and in a team, to continue education, to express a continuous interest in the development of building materials and technologies, to master important manual skills.

4.2.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	3	3	0
- Airtightness			
• Basic knowledge of facts, principles, processes airtightness, vapour control and wind tightness of building and multitude of benefits they, might bring;			
• Introducing new technologies for completion of tasks related to applying tapes, membranes and flexible sealants			
- Mechanical Ventilation with heat recovery (MVHR)			
- controlled ventilation system.			
- Heating and cooling			
- modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			
↓ Electrician in construction of nZEB and in nZEB level renovation of existing buildings <u>TOTAL</u> :	29	19	10
Module 1 – Laws and Decrees	6		



Title of the topic	Number of hours	Of which: Theory	Practice
Introductory provisions <ul style="list-style-type: none"> - Laws; - Regulations; - MPSVaR Decree no. 508/2009 Coll.; - STN. 		1	
Division of technical equipment <ul style="list-style-type: none"> - Terminology in the technical documentation; - Requirements for the safe operation of dedicated technical equipment; - Determining the possibility of checking the condition of technical equipment; - Definition of individual groups of electrical equipment. 		2	
Expert competence <ul style="list-style-type: none"> - Types of expert competence; - Qualification requirements. 		1	2
Module 2 – Safety requirements for operation and work	9		
Basic principles for safe work and operation <ul style="list-style-type: none"> - The difference between operating and working on electrical equipment; - Supervised work; - Under the supervision; - Under instructions. 		1	
Work on electrical equipment without voltage and under voltage <ul style="list-style-type: none"> - 5 essential safety requirements to be observed when securing the workplace; - Hot work; - Work near live (under voltage) parts of live equipment. 		2	2
Procedures and maintenance work on electrical equipment <ul style="list-style-type: none"> - Technical and organizational measures to ensure safety at work on electrical equipment; - When the B order must and must not be issued; - B order contains; - Workplace security activities; - Practice B order completion. 		2	2
Module 3 – Power engineering	14		
Connecting appliances <ul style="list-style-type: none"> - Explain and practically connect electrical equipment in TN-C grids; - Explain and practically connect electrical equipment in TN-S grids; - Explain and practically connect electrical equipment in TT grids; - Explain and practically connect electrical equipment in IT grids. 		2	2
Smart electrical installation <ul style="list-style-type: none"> - Explain and practically install smart electrical installation of light and socket circuits via switchboards. 		3	2
Photovoltaic systems		3	

Title of the topic	Number of hours	Of which: Theory	Practice
- Advantages and disadvantages of photovoltaic systems especially in their use in family houses.			
Electro-mobility - Introduction to e-mobility and requirements for the installation of charging stations in family homes.		2	
Total	32	18	14

4.2.4 Available trainers

- Ing. Vladimír Andris
- Ing. Miroslav Gonda
- Ing. Ján Sopko-Zima
- Ing Zdeněk Urban
- Ing. Jozej Kotrus

4.3 Windows installer – SKP4

Name of the programme: **nZEB Training Programme for Windows Installer**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **prof. Ing. Anton Puškár, PhD.**

4.3.1 Target group

Craftsmen and on-site workers, persons interested in obtaining professional knowledge and professional skills in window installation relevant in the field energy efficiency (EE) and in use of renewable energy sources (RES) of buildings for achieving nZEB standard.

Intended for construction professions: Mason (secondary structural production), Joiner

4.3.2 Graduate profile

The graduate is a qualified construction professional able to work independently and has the appropriate knowledge and skills in the field of nZEB (construction of new nZEB and energy renovations of existing buildings to nZEB standard). This includes use intelligent energy solutions, measurement methods, technologies, properties and structure of materials, technical regulations for the assembly of openings structures on various material bases. The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the project documentation, knows the properties of building materials, and is able to correctly choose the technological work procedures. He/she is adaptable also in related fields, is able to apply the acquired knowledge and practical skills in solving tasks and problems, to work independently and in a team, to continue education, to express a continuous interest in the development of building materials and technologies, to master important manual skills.



4.3.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and values as well as penetrations.			
↓ Windows installer in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	13	16
Fillings for openings (windows) - Filling for openings and energy efficiency of buildings. - Functional requirements for windows, material base. - Division of windows according to design and material: a. design of wooden windows; b. design of plastic windows; c. design of metal windows; - Window glazing system: a. double pane, triple pane, heat mirror; b. vacuum glazing.	4	4	
Terminology, project documentation, standard requirements - Scope of the detailed drawings or documentation for window installation: a. composition, coordination and manufacturing dimensions of opening structures; b. details of the sash, lintel and window sill. - The terminology used and the interpretation of the requirements of the relevant standards: a. decompression cavity; b. mounting gap; c. mounting frame; d. vapour barrier; e. filling foam; f. complex sealing system. - Interpretation of applicable standards: a. STN 733134 construction works. Contact between window constructions and building envelope. Requirements and testing 2014; b. STN 730540-2 thermal properties of building structures and buildings part 2. Functional requirements, SUTN 2012 valid with change 1: 2016. - Structural and physical requirements for window installation details: a. construction opening, repair of interface areas; b. frame and base profiles; c. anchoring elements;	5	5	



Title of the topic	Number of hours	Of which: Theory	Practice
d. thermal technical requirements; e. acoustic requirements.			
Windows installation technology - Design of installation procedures: a. design of connecting joint and properties of used materials; - Measurement and preparation of openings; - Methods of anchoring windows; - Sealing profiles, material, properties: a. requirements, sealing materials; b. material compatibility; c. construction of connecting joint; d. handover of the installed opening structure to the investor; e. quality control and licensing.	8	4	4
Practical examples of window installation - In a homogeneous external wall: a. position of the window in the perimeter wall; b. anchoring methods; c. preparation of the connecting joint. - In a sandwiched external wall: a. position of the window in a sandwiched external wall with respect to the thermal insulation layer; b. off-set window installation. - Adjustment, lintel, sash and window sill.	12		12
Total:	32	16	16

4.3.4 Available trainers

- Chmúrny Ivan prof. Ing.
- Nemčok Vladimír, ILBRUCK s.r.o.
- Panáček Pavol, Ing. PhD.
- Panáček Pavol, Ing. PhD. SLOVENERGOOKNO
- Puškár Anton, prof. Ing. PhD.

4.4 Hydro-insulator – SKP5

Name of the programme: **nZEB Training Programme for Hydro-insulator**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Ľubica Hlaváčová**

4.4.1 Target group

Craftsmen and construction workers, persons interested in acquiring professional knowledge and professional skills in the field of installing and waterproofing flat roofs.



Intended for construction professions: Roofer, Hydro-insulator, Carpenter, Tinsmith, Roofing installer

4.4.2 Graduate profile

The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the building documentation and technical documentation of flat roof installation and waterproofing and repairs of flat roof water insulation. Demonstrates knowledge of basic technological procedures for water insulation for flat roofs. Design of work methods, tools, accessories and materials for assembly and repair by water insulation for flat roofs. Assessment of documentation for water insulation for flat roofs, preparation of insulating materials for water insulation for flat roofs. Ability to know waste management and observance of OHS in water insulation installation.

4.4.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Hydro-insulator in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	15	14
Materials - Insulating materials- classification, types. - Modern insulating materials. - Insulating materials against water and moisture- traditional and modern. - Insulation materials against heat loss- traditional and modern materials. - Insulating materials against noise and shocks. - Insulating materials used for flat roofs.	5	5	0
Building structures - Technical terminology and symbols used in construction, technical and project documentation. - Basic building structures of buildings and their distribution lines, related to insulation work.	2	2	0
Technology - Methods of visualizing insulation on building structures. - Importance and placement of insulating materials on building structures. - Principles of calculation of consumption of all materials used for construction of individual types of insulation of building structures.	8	8	0



Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Manual and power tools, instruments and accessories used for measuring and machining insulating materials on building structures and internal distribution lines. - Method of inspection, adjustment and takeover of the construction site before the insulation work. - Main principles and technological procedures of work in the installation of insulation layers on building structures (foundations, roofs, floors) and distribution systems in buildings, prescribed by standards, by manufacturers of building insulation materials, or by designers. - Work procedures for repair and reconstruction of old insulating layers of flat roof. 			
Practice, summary of acquired information and skills <ul style="list-style-type: none"> - Importance and placement of insulating materials on building structures. - Insulating materials- classification, types. - Manual and power tools, instruments and accessories used for measuring and machining insulating materials on building structures and internal distribution lines. - Insulating materials- used for flat roofs, characteristics, distribution, function and use. - Main principles and technological procedures of work in the installation of insulation layers on building structures. - Work procedures for repair and reconstruction of old insulating layers of flat roof. 	14	0	14
Total	32	18	14

4.4.4 Available trainers

- Galisová Zuzana, Ing.
- Vizi Marián, Ing.
- Halamová Ľubica, Ing.
- Vokel Pavol, Bc.

4.5 Electrician for smart electro-installations – SKP6

Name of the programme: **nZEB Training Programme for Electrician smart electro-installations (up to 50V)**

Lesson duration: **45 min**

Allocated hours: **32.00**

Professional sponsor: **Ing. Ján Boroš**

4.5.1 Target group

Qualification number (SK ISCO code - 08)

Advanced course, designed for workers with technical training focusing on electrical engineering – smart electro-installations for voltage up to 50V.



Intended for the electricians:

- 3113 Electrical and Power Engineering;
- 7421 Mechanics and repair technicians for electrical and electronic equipment (except information and communication technologies).

4.5.2 Graduate profile

The graduate masters and knows how to use smart energy solutions, measurement methods, technologies, properties and structure of materials, technical regulations for the installation of low-voltage parts of intelligent solutions, safety instructions for commissioning of smart technology equipment.

The graduate will acquire expert knowledge and practical skills in the following areas:

- smart technologies and installations;
- installation and repair of low-voltage cabling in buildings;
- OSH principles applicable to the installation of wiring and intelligent installation equipment;
- understanding the drawing documentation;
- photovoltaic energy sources.

4.5.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	3	3	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Electrician for smart electro-installations in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	29	19	10
Module 1 – Basics	6		
OSH - Theory: The graduate shall describe the occurrence of electric shock, can characterize the contact (single-pole, two-pole) and non-contact (step voltage, arc) type of injury. He can characterize the effects of electric current on the human body, he knows the areas of injury hazard. He knows the procedure for administering first aid in case of electric shock and anti-shock measures.		1	
Reading of technical drawings		2	

Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> Theory: The aim is to master independent reading of technical documentation, which reflects the development in the field of electrical engineering, automation (sensors, actuators, pneumatic and hydraulic elements). The course graduate is supposed to master basic symbols for the purpose of reading project documentation. 			
Basics of electrical measurements <ul style="list-style-type: none"> Theory: The graduate knows the types of measuring instruments for measuring DC and AC voltage, current. Acquires skills required to work with analogue and digital measuring instruments, measurement skills of semiconductor components and resistors. Practice: the graduate can correctly set the range of analogue measuring instruments, can measure current, voltage, resistance. 		1	2
Module 2 – Automation <ul style="list-style-type: none"> Theory: The main aim of this chapter is to teach the graduates about the principles of smart home appliances and their practical use. Students are introduced to the basic principles and benefits of smart home, architecture and system management, the most used sensors in smart home, cost management and possible scenarios. Graduate knows: 	10		
<ul style="list-style-type: none"> Automation tools <ul style="list-style-type: none"> Theoretical foundations of control systems; Implementation of basic logical functions of various technologies; Smart Home Management Architecture; 		2	
<ul style="list-style-type: none"> Sensors <ul style="list-style-type: none"> Principles of sensors and actuators; Types and principles of communication of automation devices; 		2	2
<ul style="list-style-type: none"> Control systems- PLC <ul style="list-style-type: none"> Basic types of control systems- PLC, PAC, PCS, IPC; SCADA / HIM- explanation of terms; 		2	2
<ul style="list-style-type: none"> Practice: the graduate is able to install (setup) various types of sensors (PIR, HF, optical, inductive, capacitive, and ultrasonic). 			
Module 3 – Smart Home <ul style="list-style-type: none"> Theory: The chapter introduces the graduate to the broad problems of smart house, smart technologies, installations and low-current part of photovoltaic devices. The issues of demand response-adjustment of the energy supply according to demand- are explained Graduate knows: 	13		
<ul style="list-style-type: none"> Smart home, <ol style="list-style-type: none"> definition of the term; Smart home classification (linked, learner, attentive); energy and savings (lighting management, shutters and blinds, sockets, air conditioning, heating, alternative sources); 		6	2

Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> d. security and control (security- CCTV, access system, intercom, fire-fighting systems); e. entertainment and multimedia; f. comfort and convenience; <ul style="list-style-type: none"> - Smart technologies- multimedia, internet of things, - Smart installation <ul style="list-style-type: none"> a. Definition of smart installation systems; b. description of basic systems; c. difference between standard and smart installation; d. cabling; e. wireless networks; f. topologies and bus systems; 			
<ul style="list-style-type: none"> - Low-current parts of photovoltaic systems <ul style="list-style-type: none"> a. PV systems; b. operation of PV systems (grid-connected, island, hybrid) systems; c. types of panels and converters; 		2	2
<ul style="list-style-type: none"> - Demand response <ul style="list-style-type: none"> a. system characteristics 		1	0
<ul style="list-style-type: none"> - Practice: <ul style="list-style-type: none"> a. installation of smart equipment; b. programming smart installation devices; c. connection of a photovoltaic system converter. 			
Total	32	24	8

4.5.4 Available trainers

- Ing. Ján Boroš
- Ing. Ivan Kurčík
- Ing. Jozef Ferenc



5 Curricula – Austria

5.1 Carpenter(part) – ATP2

Name of the programme: **nZEB Training Programme for Carpenter – thermal insulation with blow-in insulation of renewable materials**

Lesson duration: **45 min**

Allocated hours: **24.00**

Professional sponsor: **Dipl-Ing(FH) Bernd Lederwasch**

5.1.1 Target group

Craftsmen and on-site workers, persons interested in obtaining professional knowledge and professional skills relevant to the construction of nZEB and/or energy renovations of existing buildings to nZEB standard, especially in the field of blow –in insulation, including the related topics of airtightness

Intended for construction professions: Carpenter, Roofer, Installer of drywalls

5.1.2 Graduate profile

The graduate is a qualified construction professional able to work independently and has the appropriate knowledge and skills in the field of nZEB (construction of new nZEB and energy renovations of existing buildings to nZEB standard). The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the project documentation, knows the properties of building materials, and is able to correctly choose the technological work procedures. He/she is adaptable also in related fields, is able to apply the acquired knowledge and practical skills in solving tasks and problems, to work independently and in a team, to continue education, to express a continuous interest in the development of building materials and technologies, to master important manual skills. The graduate is certified according to ETA -06/0076, which refers to European Assessment Document (EAD) “In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres”, EAD 040138-00-1201

5.1.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable materials in nZEB <u>TOTAL</u> :	6	6	0
Energy Efficiency and climate protection - Energy consumption of the building sector, principles of NZEBs	2	2	0
Building certification, product certification Klimaaktiv – building certification, natureplus certification of products	2	2	0
Airtightness basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies	2	2	0



Title of the topic	Number of hours	Of which: Theory	Practice
↓ Carpenter in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	18	10	8
Materials <ul style="list-style-type: none"> - Insulating materials- classification, types. - Renewable insulating materials- basics Natureplus – certification of renewable insulation materials - Renewable insulating materials in different parts of the construction 	2	2	0
Building structures, carpentry and wood technology <ul style="list-style-type: none"> - Roof structures – flat roofs, pitched roofs. - Carpentry structures of wooden houses - Different types of construction in modern wooden technology 	2	2	0
Technology <ul style="list-style-type: none"> - Manual and power tools, tools, aids, machinery and equipment, health and safety when working at heights. - Importance and placement of insulation on building structures. - Structural design of blow-in thermal insulation. - Technological procedures for installation and repair of blow-in thermal insulation. - Repairs of blow-in insulation. - Technological conditions for thermal insulation of buildings using blow-in insulation - Quality assurance in installing blow-in insulation 	4	4	0
Legal framework, work safety <ul style="list-style-type: none"> - Responsibility and warranty - Work safety 	2	2	0
Practice, summary of acquired information and skills <ul style="list-style-type: none"> - Manual and power tools, implements, aids, machinery and equipment. - Occupational health and safety when working at heights. - Placement of insulation on building structures. - Insulating materials-sprayed insulation. - Technological conditions for thermal insulation of buildings. - Structural design of blow-in thermal insulation. - Technological procedures for installation and repair of blow-in thermal insulation. - Quality assurance in installing blow-in insulation 	8	0	8
Total	24	16	8

5.1.4 Available trainers

- Vinzenz Harrer
- DI (FH) Martin Maier, MSc.
- Mag. Johann Kaltenegger
- DI Ronald Setznagel



- DI (FH) Bernd Lederwasch
- Jan-Hermann Hasemann
- Andreas Haberl

5.2 Hydro-insulator – ATP5

Name of the programme: **Certified waterproofer – basics (Flatroofing and waterproofing)**

Lesson duration: **45 min**

Allocated hours: **24.00**

Professional sponsor: **not applicable**

5.2.1 Target group

Craftsmen with following prequalifications:

- Proof of at least 1 year of construction site experience;
- positive completion of a current (within the last 2 years) IFB-certified manufacturer-practice-processing training course.

5.2.2 Graduate profile

The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the building documentation and technical documentation of flat roof water waterproofing and repairs of flat roof waterproofing. Demonstrates knowledge of basic technological procedures for waterproofing for flat roofs. Design of work methods, tools, accessories and materials for assembly and repair by waterproofing for flat roofs. Assessment of documentation for water proofing for flat roofs, preparation of insulating materials for water proofing for flat roofs. Ability to know waste management and observance of OHS in water proofing installation.

5.2.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL</u> :	1	1	0
Airtightness <ul style="list-style-type: none"> - Basic knowledge of facts, principles, processes and general concepts on the necessity of airtightness, vapour control and wind tightness of building and multitude of benefits they, might bring. - “Build tight-ventilate right rules”. - OSH at work at heights (OSH-occupational safety and health). - Introducing new technologies for completion of tasks related to applying tapes, membranes and flexible sealants which do not compromise the quality of aesthetic finishes on exposed surfaces (a common example being too much tape overlapping on window frames which will not be covered later by subsequent finishes) and thus left exposed requiring subsequent removal. 			



Title of the topic	Number of hours	Of which: Theory	Practice
<p>Mechanical Ventilation with heat recovery (MVHR)</p> <ul style="list-style-type: none"> - Knowledge on facts, principles, processes and general concepts on the benefits of including a controlled ventilation system in a DER, on the principles of heat recovery from exhaust air and tempering of fresh air, use of MVHR's in DER in terms of noise levels, electrical energy requirement for the fans and impact on reduce heating and / or cooling demand, concepts on the two most common ducting arrangements used in residential ventilation systems (trunk-and-branch as well as octopus) and the impact these systems will have on the need for sound attenuators, duct types to ensure smooth air flow and avoiding sagging or kinking key components of a balanced ventilation system with heat recovery in drawings and buildings. - Ensuring that the homeowner knows why they should replace the MVHR filter at regular intervals and how they can replace them, dealing with queries and concerns from homeowners once they move in and are getting used to the MVHR system (taking the initiative to follow-up with the homeowner to make sure that everything is working well). 			
<p>Heating and cooling</p> <ul style="list-style-type: none"> - Tasks related to upgrading of heating and cooling systems, thorough and complete insulation of pipe-work, including all fittings, junctions and valves as well as through-envelope penetrations, appropriate placement of the thermostat(s) which regulates the operation of the heating and / or cooling system. 			
<p>↓ Hydro-insulator installer in construction of nZEB and in nZEB level renovation of existing buildings TOTAL:</p>	23	7	16
<ul style="list-style-type: none"> - Austrian Standards(ÖNORM) Overview - Version according to ÖNORM B3691 - Material science, roof superstructures, maintenance and care - Building physics incl. renovation - Load assumption on flat roof - Drainage of flat roofs - Construction tinsmith work on the flat roof - Liquid waterproofing - skylight dome, fire smoke vents - Leak location and verifiability of roof waterproofing - Safety Catches on Flat Roofs 	7	7	0
<p>Practice, summary of acquired information and skills</p> <ul style="list-style-type: none"> - Importance and placement of insulating and waterproofing materials on building structures. - Insulating and waterproofing materials- classification, types - Manual and power tools, instruments and accessories used for measuring and machining insulating materials on building structures and internal distribution lines - Insulating and waterproofing materials- used for flat roofs, characteristics, distribution, function and use 	16	0	16



Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Main principles and technological procedures of work in the installation of insulation and waterproofing layers on building structures - Professional laying of bitumen and polymer bitumen membranes including all application techniques (training of corners, lifts, feedthroughs, etc.) - Standards, installation regulations and installation guidelines - Construction of roof and building waterproofing systems 			
Total	24	8	16

5.2.4 Available trainers

- Hubner Wolfgang
- Setznagel Ronald
- Practical trainers from the manufacturers...



6 Curricula – Bulgaria

6.1 Windows installer – BGP4

Name of the programme: **Windows and Glazing**

Lesson duration: **40 min**

Allocated hours: **40.00**

Professional sponsor:

6.1.1 Target group

Target groups are craftsmen and on-site workers with acquired professional qualification in Profession 582040 Builder-Installer but no previous specialization in specialty 5820404 Windows and Glazing, who are interested in obtaining professional knowledge and professional skills in window installation relevant in the field energy efficiency (EE) of buildings.

6.1.2 Graduate profile

The graduate is a qualified professional who is capable of independent work and has the required and enough knowledge and skills in the field of windows installation. He/she has enough knowledge and comprehension of reading technical documentations and construction details. He/she is responsible for designing workflows for the manufacture, assembly, disassembly and repair of any windows constructions. He/she is able to apply acquired knowledge and practical skills in problem solving, he can work independently or in a team. He/she wants to continue his/her education, is constantly interested in the development of building materials and technologies. He/she has advanced knowledge of the type of anchoring and fixing prefabricated parts of structures, and is manually skilled in working manufacturing building structures.

6.1.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB <u>TOTAL:</u>	4	4	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Windows installer in construction of nZEB and in nZEB level renovation of existing buildings <u>TOTAL:</u>	36	20	16



Title of the topic	Number of hours	Of which: Theory	Practice
-			
Materials <ul style="list-style-type: none"> - Window materials- classification, types - Materials for joining window structures - Modern insulation materials, materials for airtightness - Protective materials (during installation) - Additional constructions (blinds, outdoor blinds, window sills, ...) 	4	4	0
Building constructions <ul style="list-style-type: none"> - Window frame anchoring, installation of window sash - Repairs of existing window panels, frames, etc. - Sealing the joint between the window and the supporting structure - Cleaning of surrounding structures 	4	4	0
Technology <ul style="list-style-type: none"> - Implementation drawings for construction, assembly, dismantling and repair of windows structures and substructures - Handle mechanized tools, tools, aids, machines and equipment - OSH at work at heights (OSH- occupational safety and health) - Proper stability and strength of wooden building structures - Design of window part structures - Technological procedures for the installation of window construction - Installation methods with improved noise insulation or burglary resistance - Specific door / window details at floor level (French windows, shop windows) where water can be retained for a long time - Repair of window construction - Perform inspection measurements and functional tests of building openings construction - Demonstrate understanding of certificates of windows, glazing and composite systems - Calculate thermal and lighting characteristics of windows 	12	12	0
Practical training and summary of acquired knowledge and skills <ul style="list-style-type: none"> - Hand and mechanized tools, tools, aids, machines and equipment - Processing and machining of structural elements - Application of airtight materials - New technologies, EEW principles - OSH (OSH- occupational safety and health) - General knowledge of related professions - Measurements and functional tests of building structures 	16	0	16
Total	40	24	16

6.1.4 Available trainers

- Zdravko Genchev, Alexander Genchev, Alexander Stankov, Stanislav Andreev, Ralitsa Yordanova, Petya Ivanova, Stoyanka Haralampieva, Olga Hrischeva, Svetla Manolova
- Trainers who have completed professional training of trainers under the BUS EnerPro, Train-to-NZEB and Fit-to-NZEB projects



6.2 Hydro-insulator – BGP5

Name of the programme: **Energy efficiency in buildings: flat roof waterproofing**

Lesson duration: **40 min**

Allocated hours: **40.00**

Professional sponsor:

Profession: **Builder (582030), Builder-Installer (582040)**

6.2.1 Target group

Craftsmen and construction workers, persons interested in acquiring professional knowledge and professional skills in the field of hydro insulation of flat roofs in regard to principles of energy efficiency and RES in buildings.

Intended for construction specializations: Roofer (5820312), Insulation in Construction (5820405)

6.2.2 Graduate profile

The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the building documentation and technical documentation of flat roof water insulation and repairs of flat roof water insulation. Demonstrates knowledge of basic technological procedures for water insulation for flat roofs. Design of work methods, tools, accessories and materials for assembly and repair by water insulation for flat roofs. Assessment of documentation for water insulation for flat roofs, preparation of insulating materials for water insulation for flat roofs. Ability to know waste management and observance of OHS in water insulation installation.

6.2.3 Teaching framework

Title of the topic	Number of hours	Of which: Theory	Practice
↓ Introduction to key principles of energy efficiency and use of renewable energy sources in nZEB TOTAL:	4	4	0
Airtightness - basic knowledge of facts and principles of airtightness processes, vapour control, ventilation rules, new technologies			
Mechanical Ventilation with heat recovery (MVHR) - controlled ventilation system; - heat recovery;			
Heating and cooling - modernization of heating and cooling systems, thorough and complete insulation of piping, including all fittings, junctions and valves as well as penetrations.			
↓ Hydro-insulator n construction of nZEB and in nZEB level renovation of existing buildings TOTAL:	36	20	16
Materials - Insulating materials- classification of insulating materials; - Modern insulating materials- classification, function, use;	6	6	0



Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Insulating materials against water and moisture – traditional and modern- classification, function, use; - Insulation materials against heat loss – traditional and modern materials- division of function and use; - Insulating materials against noise and shocks – classification, function and use; - Insulating materials – used for flat roofs, characteristics, distribution, function and use. 			
<p>Building structures</p> <ul style="list-style-type: none"> - Technical terminology and symbols used in construction, technical and project documentation - Basic building structures of buildings and their distribution lines, related to insulation work 	2	2	0
<p>Technology</p> <ul style="list-style-type: none"> - Methods of visualizing insulation on building structures; - Importance and placement of insulating materials on building structures using technical documentation, working instructions and manufacturer's catalogues; - Hand-held and power-operated tools used for measuring and machining insulating materials; - Tools and accessories used for measuring and machining insulating materials on building structures and internal wiring; - Types of vehicles necessary for transport of insulating materials for work at heights, principles of their operation; - Principles of calculation of consumption of all materials used for construction of individual types of insulation of building structures; - Method of inspection, adjustment and takeover of the construction site before the insulation work; - Manual and power tools, instruments and accessories used for measuring and machining insulating materials on building structures and internal distribution lines - Main principles and technological procedures of work in the installation of insulation layers on building structures (foundations, roofs, floors) and distribution systems in buildings, prescribed by standards, by manufacturers of building insulation materials, or by designers - Main principles of securing uninterrupted thermal insulation and airtightness layers; - Construction of working and protective scaffolding used for roof insulation work, occupational health and safety at work on the roof; - Work procedures for repair and reconstruction of old insulating layers of flat roof cladding, foundations, floors, and lines in buildings. 	12	12	0
<p>Practice, summary of acquired information and skills</p>	16	0	16

Title of the topic	Number of hours	Of which: Theory	Practice
<ul style="list-style-type: none"> - Read and understand the implementation drawings related to waterproofing layer structures - Surveying and checking the condition of the building - Measuring and calculating flat roof area and calculating consumption of waterproofing materials and fasteners - Importance and placement of insulating materials on building structures. - Insulating materials – classification, types - Insulating materials – used for flat roofs: characteristics, distribution, function and use - Manual and power tools, instruments and accessories used for measuring and machining insulating materials on building structures and internal distribution lines - Tools and accessories used for measuring and machining insulating materials on building structures and internal wiring - Main principles and technological procedures of work in the installation of insulation layers on building structures - Basic training. Skills- water insulation of flat roofs in the training workplace - Skills for operation of the welding equipment and tools - Proper implementation of the green roofs - Proper handling of hydro-insulation regarding rooftop PV and solar thermal systems - Work procedures for repair and reconstruction of old insulating layers of flat roof cladding. 			
Total	40	24	16

6.2.4 Available trainers

- Zdravko Genchev, Alexander Genchev, Alexander Stankov, Stanislav Andreev, Ralitsa Yordanova, Petya Ivanova, Stoyanka Haralampieva, Olga Hrischeva, Svetla Manolova
- Trainers who have completed professional training of trainers under the BUS EnerPro, Train-to-NZEB and Fit-to-NZEB projects



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