UP 4 GREEN CONCRETE
LEARNING UNITS FRAMEWORK

PREAMBULE

The European Commission aims at becoming the world's first climate-neutral continent and to do so, presented the European Green Deal last December 2019, the most ambitious package of measures that should enable European citizens and businesses to benefit from sustainable green transition. It gathers measures accompanied with an initial roadmap of key policies ranging from ambitiously cutting emissions, to investing in cutting-edge research and innovation, to preserving Europe's natural environment. This European Green Deal sets a path for a transition that is just and socially fair. It is designed in such a way as to leave no individual or region behind in the great transformation ahead. Action is required by all sectors of the economy among which Energy sector (the production and use of energy account for more than 75% of the EU's greenhouse gas emissions), construction sector which is asked to renovate buildings, to help people cut their energy bills and energy use and lower the energy consumption (40% of our energy consumption is by buildings).

Residential building construction boomed in many European countries during the post-war period as a consequence of the bombing and building destruction of the Second World War. In France for instance, the reconstruction itself lasted for 10 years. From the mid-1950s, the "baby boom" and the rural exodus led to the massive construction of "large complexes" and to an "urban renewal" which affected all medium and large cities. This is also the case in some other countries from Eastern Europe with a massive increase in the building of new housing in the late 40s and early 50s.

This wave called for new constructive processes and the massive use of concrete. These constructions, some of which are almost 70 years old, suffer from deterioration and meet standards which are outdated and now require rehabilitation works which concern not only the structure itself but also everything related to the comfort of use and energy efficiency and which requires a global approach of the real estate.

These constructions, which have not been the subject of a renovation plan, are often located in city centers with insufficient sound insulation, poor thermal insulation and therefore a significant "heating" budget. This leads their inhabitants to experiment with energy insecurity; humidity problems can also appear and with them "proliferating dry rot" which is a fast growing mushroom that appears in dark and humid places and can put at risk the structure of the building itself. Moreover, humidity can also generate serious health risks. All of which weigh on the value and attractiveness of these properties.

How to renovate this housing? probably by adopting a global approach in order to offer owners and tenants not only better insulation in order to improve the energy efficiency of buildings and thus save energy but also, a better air quality and therefore a better quality of life and a decrease in the health risks? It seems that training professionals and future professionals in these issues is one of the solutions so that they adopt new approaches when consulted to renovate such buildings. There is a good potential for energy savings.

Renovation offers a unique opportunity to rethink, redesign and modernise our buildings to make them fit for a greener and digital society and sustain economic recovery. This is really in line with the European Commission objectives; The Commission has proposed in the Climate Target Plan 2030 to cut net greenhouse gas emissions in the EU by at least 55% by 2030 compared to 1990. Energy efficiency is an essential component for action, with the building sector as one of the areas where efforts must be ramped up.

To achieve the 55% emission reduction target, by 2030 the EU should reduce buildings' greenhouse gas emissions by 60%, their final energy consumption by 14% and energy consumption for heating and cooling by 18%.

It is therefore urgent for the EU to focus on how to make our buildings more energy-efficient, less carbon-intensive over their full life-cycle and more sustainable. Applying circularity principles to building renovation will reduce materials-related greenhouse gas emissions for buildings.

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INTRODUCTION TO THE PROJECT AND ITS OBJECTIVES

UP 4 GREEN CONCRETE is an Erasmus+ project more precisely a strategic partnership gathering together VET providers, vocational associations, non-governmental organizations, a SME expert in the development of educational materials from 5 different countries.

Our project is in line with the Green Deal as it aims at reducing the gas emissions of buildings and their energy consumption. More, we are taking into account an aspect which very often is left apart, which is the comfort of the housing and the consequences of bad housing conditions on health, with the goal to improve living conditions with a more concerted rehabilitation of housing.

Our main goal is to train professionals and future professionals so that they are able to implement a global approach of the building made from concrete and to get them to think of improving its energy efficiency but not only, and take into account the comfort of residents and thus be able to provide advice to move towards a comprehensive approach : technical and also human/social-oriented which means for instance renovating concrete buildings with a better air quality and a better convenience of use.

This project aims at providing professionals and future professionals with materials and tools to carry out an analysis of concrete buildings and thus propose a renovation combining energy performance and quality of life. Upskilling of teachers and trainers to deliver this new offer should facilitate the transfer of knowledge and competences. We will focus on EQF levels 4 and 5 (nevertheless without forgetting about basics of building trades).

The partnership has worked on desk research (state of the art on the topic) in order to identify the training needs, the design of a curriculum, a mobile app which will serve as a tool to support professionals for the global analysis of a building, and a guide for professionals with the development of case studies.

With this project, our goal is to:
- raise awareness on the fact that a peculiar approach is required regarding concrete buildings if we consider the pending risks related to a bad renovation plan;
- develop updated CVET and IVET training resources in order to meet the new training needs and thus offer a pathway more suitable to the demand to support professionals and future professionals in their activity, enable them to be able to provide the customer with an appropriate renovation proposal in line with EE requirements and the improvement of living conditions (cost-cutting, health);
- develop updated CVET training resources so that VET providers can build and deliver courses to address the modern challenges of concrete building renovation;
- offer online Educational resources easily accessible and more adapted to the requirements of the market: shorter, customized, more reactive;
- design a methodology to provide each professional with tailor-made support (through practical materials and tools for the analysis of a building);

and consequently:
- help professionals understand the specificities of concrete building renovation and the added value related to energy savings and living conditions for the owners and tenants when it is carried out appropriately. It can lead to a greater effectiveness of professionals and this for the benefit of the community. Moreover, improved practices can cater for the needs of customers and address the twin challenges of energy efficiency and affordability as renovation lowers energy bills and can contribute to reducing energy poverty.

THE RESULTS EXPECTED

The expected results are:
- a greater relevance of the training system to the needs and opportunities of the community.
- a strengthening of the links between training and education systems and the socio-economic environment.
- a more strategic use of ICT and Open Educational Resources in the training system with an innovative approach (a comprehensive approach of the building).
- synergies with actions undertaken in our regions and countries : the action undertaken in Normandy with a working group piloted by the Regional authority pooling training providers, local authorities and building professionals to consider how to promote and renovate "reconstruction" housing stock ; in Estonia, the Ministry of Education and Research has identified a need to train real estate managers on energy savings and comfort in residential buildings; in 2019, the Ministry of Energy in Poland proposed the National and Climate plan (2021- 2030) to reduce energy consumption and concrete building rehabilitation is one of its crucial point.

The renovation of concrete is not a usual technique for craftsmen even if, in our regions, concrete housing stock is important and up to now, there is no specific training taking into account a global approach of the building: technical for energy efficiency and energy savings, dealing with air quality (in order to consider health aspects) and generally speaking the user friendliness or convenience of use. The need for trained professionals may rise fast as the ageing concrete housing stock will need rehabilitation and there is need for the education and training providers to be kept updated with the new needs emerging, new customers' expectations and new challenges:
- lower energy consumption through effective renovation to lower the CO2 gas emissions (to cut energy-related cost for customers);
- achieve a healthy living environment (through good air quality);
- propose a living environment consistent with new lifestyles.

LEARNING ACHIEVEMENTS

Following the desk surveys, a certain number of topics have been identified, helping the partnership to determine the topics to work on and thus the units of learning outcomes to design.
The curriculum will be made up of four units of learning outcomes.
The learning process comprises the following units:

- Unit 1: Analysis of concrete building typologies to be regenerated/retrofitted
- Unit 2: Analysis and pathologies of concrete buildings
- Unit 3: Techniques for renovation and energy regeneration of concrete buildings
- Unit 4: Energy regeneration: different heating systems and ventilation

The following chart is to define learning outcomes in relation with EQF. A learning outcome is defined as a statement of what a learner knows, understands and is able to do on completion of a learning process.

The learning achievements are specified in the shape of:

1. **Knowledge:** in the context of EQF, knowledge is described as theoretical and/or factual. Level 4: factual and theoretical knowledge in crosscutting contexts within a range of tasks undertaken in the construction sector.
2. **Skills: in** the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments). Level 4 means a range of cognitive and practical skills required to generate solutions to specific problems, a range of tasks undertaken in the construction sector.
3. **Competences:** in the context of EQF, responsibility and autonomy are described as the ability of the learner to apply knowledge and skills autonomously and with responsibility. He/she exercises self-management within the guidelines of work or study contexts that are usually predictable, but are subject to changes ; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
4. **Assessment criteria:** The quality and precision of learning outcomes descriptions is an important basis for assessment. It is up to each VET institution to develop its own method of assessment according to the training pathways and overall curriculum they undertake.

WITH REGARD TO THE UP4GREEN CONCRETE PROJECT, THE TARGET LEVELS ARE LEVELS 4 AND 5.
Given the objectives of the project, the partnership defined that for each learning unit, two levels are considered. Each unit refers to EQF level 4 or EQF level 5. Knowledge, skills and abilities referring to EQF level 5 are marked with an asterisk (*).

UNIT 1

ANALYSIS OF CONCRETE BUILDING TYPOLOGIES TO BE REGENERATED/RETROFITTED

Unit 1	**Title:** Analysis of concrete building typologies to be regenerated/retrofitted
Learning outcomes correspond to EQF level	**4 & 5***

Learning outcome

The course requires that the student has an overview of buildings and structures and technical systems necessary for the operation, use or operational safety of buildings, including energy efficiency and environmental requirements when using them to the extent necessary for future work. Finding asset values, preparing or reviewing valuation reports.

Prerequisites: Training or experience in real-estate, construction, law or in the heritage field.
Personality traits: Accuracy, correctness, specificity and analytical thinking. Communication skills, resilience and the ability to resolve conflict situations peacefully. Writing skills, politeness, rigour, autonomy, efficiency, interpersonal skills. Negotiation and argumentation skills, perseverance and decision-making skills are useful in performing the tasks.

Knowledge	**Skills**	**Competences**

The learner knows and understands:	The learner is capable of:	The learner shows the ability to:
- Communication principles / communication and information techniques - Interlocutors (customers, local authorities, various organizations, etc.)	- Expressing him/herself clearly both orally and in writing. - Presenting information in a clear and attractive way.	- Express him/herself and adapting his/her speech to the interlocutor. - Establish a positive professional relationship with the various interlocutors. - Gather information from customers and various contacts.
	- Planning and organizing appointments* - Planning and prioritizing tasks*	- Organise his/her work according to the priorities and the complexity of the requested analysis.
- Principles related to the organization of work		
- Construction principles: ● the main parts of the building (foundations, walls, fillings for openings, partitions, roof) ● the load-bearing and fence structures, the cladding structures and the fillings for openings of a building ● the different types of materials ● heating and ventilation systems ● materials used in water supply and sanitation, system parts and equipment, ● electrical safety and protection devices and their principles of operation ● the basics of a building energy efficiency model.	- Gathering technical information in order to have an overview of load-bearing and cladding structures, fillings and boundaries of buildings, as well as construction materials used in their construction and installation* - Analysing the structure and the operating principles of the technical systems necessary for the use of the building to ensure the indoor climate and the operational safety of the building* - Writing a report on the condition of the building*	- Assess a building by taking into consideration its condition, age and location. - Assess the condition of a building by assessing the structure, technical systems, roof condition and interior condition. - Analyse and systematising the information collected and issue conclusions in order to establish a renovation plan*
- Real-estate assessment and real-estate market principles (comparison method or market method, income method, replacement cost method, index method, so-called “soil and construction” method, developer or constructor report method, case law analyses)	- Analyzing the real estate market* - Using the technical vocabulary of the real estate industry, present information clearly and precisely.	
- The vocabulary related to real estate activities.	- Identifying relevant and reliable legislative and regulatory sources*	- Evaluate a property taking into account all the required parameters.

- Building and real estate legislation / heritage legislation - The different estimation methods - The various mandatory real estate diagnoses: ● Energy performance diagnostic ● Risk of exposure to lead ● Asbestos state ● Status relating to the presence of termites ● State of the internal gas installation ● State of the indoor electricity installation ● State of the non-collective sanitation installation ● State of risks and pollution ● Noise diagnosis - The expected regulatory and contractual performance in the areas of respect for the environment, reduction of energy consumption and sustainable development.	- Identifying the main elementary costs of the structures.* - Understanding the requirements established by the legislation for the construction, use, maintenance and reconstruction of buildings and related technical systems necessary for future work.	- Evaluate the feasibility or viability of the works / value of the property* ● Evaluate the conformity of the works taking into account the legislation.
Teaching method: Lecture, case study, individual work, learning video, app, Guide for Professionals (case studies)		
Performance criteria for the evaluation		
The learner is able to:	**Expected outcomes:**	

- Evaluate the building by taking into consideration its condition, age and location/ environment. - Evaluate the condition of the building by evaluating the structure, technical systems, roof condition and interior condition. - Analyse and systematise the information collected and issue conclusions in order to establish a renovation plan that allows for a renovation: - in accordance with the legislation, - to allow for better energy efficiency in the building, better air quality and improved living comfort. - Analyse the building in the light of the market and the scope of the work to be carried out in order to issue an opinion / advice on the feasibility and viability of the renovation work.	- Assessment of the building condition. - Propose advice on the feasibility and viability of the works in the light of the market. - Propose a renovation plan allowing for better energy efficiency, better air quality and improved living comfort.
Number of hours: 25 hours	
Evaluation Methods	
1. Report: The legislation related to real-estate assessment. The Report has to be prepared in the correct native language using ICT technology tools, and has to correctly present an overview of the legislation regulating the field to the extent necessary for further work. 2. Study case: Assess the value of the building of your choice considering following: Location/environment, condition of the building, current market state in the given location 3. Test: 20 questions	

UNIT 2

ANALYSIS AND PATHOLOGIES OF CONCRETE BUILDINGS (DISORDERS, INCLUDING HUMIDITY AND MATERIALS)

Unit 2	**Title:** Analysis and pathologies of concrete (masonry) buildings (disorders, included humidity and materials)
Learning outcomes correspond to EQF level	**4 & 5***

Learning outcome

The course requires that the learner has an overview of the construction processes and structural and non-structural disorders in order to propose a renovation plan.

Prerequisites

The student has an overview of the buildings, structures and technical systems necessary for the functioning, use or operational safety of buildings, including energy efficiency and environmental requirements when their use is necessary for future work.
Ability to build a succinct review report.
Training or experience in the field of real estate sector, construction field.
Personality Traits: Accuracy, Analytical Thinking. Communication skills, resilience and writing skills, courtesy, rigor, autonomy, efficiency, interpersonal skills. Argumentation skills, persistence and decision-making are useful in performing tasks.

Knowledge	**Skills**	**Competences**

The learner knows and understands:

● The overall functioning of the structure (lowering loads)

● The superstructure construction processes (masonry, reinforced concrete, wood, metal structures, mixed structures (wood-concrete, etc.)

● Infrastructure construction processes: foundation methods (shallow and semi-deep)

● Identification and classification of the different materials (structural and non-structural).

● structural disorders (example: visual-cracking) and non-structural (example: visual and olfactory-humidity)

● Masonry pathologies

● Concrete pathologies

● Wood pathologies

● Metal structure pathologies

● Insulating pathologies

● Sources of heating and natural ventilation

● the different thermal insulators

The learner is capable of:

● Identify disorders according to the level of risk for each supporting element*

Risk level		Description	Intervention
R1		Poor state of conservation: Risk for the people and the objects	12 months
R2		Disorder on the evolving load-bearing elements	1 to 2 years
R3		Average state of conservation: Risk for the objects	5 years
R4		Non-impacting defect, other than aesthetic	10 years

● Analyze disorders and classification in R1 / R2 / R3 or R4 (This device (application and / or course) will only treat R3 and R4, R1 and R2 will be dealt with by specialized structural design offices)*
● Identify and locate the thermal insulation.
● Recognize masonry pathology
● Recognize concrete pathology
● Recognize wood pathology
● Recognize pathology of metal structures
● Recognize isolating pathology
● Recognize, test and sample in order to classify the pathology.
● Predict the evolution-stabilization of the pathology with the goal to make a decision.
● Use - install electronic hygrometer, crack gauge, electronic thermometer.
● Analyze the results (humidity - hygrometry - cracking evolution - heating efficiency - ventilation efficiency)*

The learner shows the ability to:

● express him/herself and adapt his/her speech to the person he/she is talking to.
● establish a positive professional relationship with the various interlocutors
● gather information from customers and various contacts.
● organize work according to the priorities and complexity of the requested study - assess the building according to the condition, age and location of the building
● assess the condition of the building by assessing the structure, technical systems, roof condition and interior condition
● analyze and systematize the information collected and issue conclusions in order to define a renovation plan
● evaluate the feasibility or viability of works / presence and the evolution of risks for goods and people
● evaluate the conformity of the works taking into account the legislation.

	● Recognize repair processes: ○ steel repair, reinforced concrete and surface coating ○ repair of masonry joints. Filling of stabilized cracks. ○ rust passivation metal structure ○ wood structure graft repair ○ Change of insulation according to the situation (interior or exterior) ○ Create high and low ventilation-aeration (mechanical or natural)	

Teaching method: Lecture, case study, individual work, learning video, app, Guide for Professionals (case studies)

Performance criteria for the evaluation

The learner is able to:	**Expected outcomes:**
● Assess the condition of the building by assessing the structure, technical systems, roof condition and indoors condition ● Analyze and systematize the information collected and issue conclusions in order to define a renovation plan ● Evaluate the feasibility or viability of works / presence and the evolution of risks for goods and people according to the legislation.	Renovation plan taking into consideration the condition of the building and the viability of works in regards to the risks for goods and people and the priorities of the customers.

Number of hours : 40 hours

Evaluation Methods

Study case: Assess the condition of the different elements of a building: the structure, the technical systems, the roof condition and indoors condition. Define a renovation plan.

UNIT 3

TECHNIQUES FOR RENOVATION AND ENERGY REGENERATION OF CONCRETE BUILDINGS

<table>
<tr><td>Unit 3</td><td colspan="2">Title: Techniques for renovation and energy regeneration of concrete buildings</td></tr>
<tr><td>Learning outcomes correspond to EQF level</td><td colspan="2">4 & 5*</td></tr>
<tr><td colspan="3">Learning outcome
The course requires that the student has the knowledge of the renovation techniques of reinforced concrete structures directly connected to the energy retrofit of the building and its soundproofing</td></tr>
<tr><td colspan="3">Prerequisites: experience in construction sites for the renovation of concrete structures and knowledge of building statics
experience in site organization; ability in group management, and problem solving, autonomy in decisions;
technical diploma or degree in the construction sector (level 3)</td></tr>
<tr><td>Knowledge</td><td>Skills</td><td>Competences</td></tr>
<tr><td>The learner knows and understands:
● organization and operation of the construction site
● the process of building a reinforced concrete structure, phases, processes, roles and tools
● architectural, structural, plant engineering drawing and the calculation of reinforced concrete structures*
● Technical drawing through BIM modeling
● wooden or iron formwork for the construction of building works, including the assembly and finishing of building elements in reinforced concrete
● survey techniques including diagnostic construction technology for the renovation of reinforced concrete elements*
● characteristics and behaviors of materials for the recovery of reinforced concrete works and the production process, including mechanical ones, of cement mixtures *
● techniques for the execution of structural carpentry works, manufacture of iron reinforcements, assembly of formwork, laying of concrete, load-bearing framework of roofs, floors and structures *
● construction site equipment and machinery
● legislative references on waste management and civil and production discharges</td><td>The learner is capable of:
● designing the layout of the construction site in its organizational phases and directing the construction site
● to supervise the correct execution of the assembly and finishing of reinforced concrete elements*
● make corrections to work in progress projects
● identify the recovery techniques for reinforced concrete buildings:*

● resin injections
● reinforced concrete liners with thermal insulation materials
● partial bandage with Fiber Reinforced Polymers
● reinforcement of the knots with Fiber Reinforced Polymers
● reinforced concrete walls
● steel braces
● insertion of wall panels
● external buttresses

● Select techniques for insulation:</td><td>The learner shows the ability to:
● express him/herself and adapting his/her talk to construction teams
● establish a positive professional relationship with the various interlocutors
● Gather information with construction teams (on site)
● organize his/her work according to the priorities and the complexity of the requested analysis
● organize and supervise the construction site*
● assess the condition of a building by assessing the structure, technical systems, roof condition and interior condition
● analyse and systematising the information collected and issue conclusions in order to establish a renovation plan*
● according to his / her disciplinary competence (architectural, structural, plant engineering or infrastructural) uses Building Information Modeling tools relating to the life cycle of the building, specifying its functionality and performance *</td></tr>
</table>

● safety at work: rules and methods of behavior, ● safety on construction sites specific safety plans for accident prevention	● insulating panels inserted directly into the reinforcement or glued later, in order to reduce thermal bridges ● insufflations ● cavity with insulated masonry ● thermal coat with different materials ● carrying out an energy diagnosis applied to materials ● using remote virtual interactions (repository, common data environment) to allow interoperability between different models (BIM) * ● Appling techniques for extracting measurements and quantities from the BIM model to define the metric calculation for the purpose of carrying out the work	

Teaching method: Lecture, case study, individual work, learning video, app, Guide for Professionals (case studies)

Performance criteria for the evaluation

The learner is able to:	**Expected outcomes:**
through the knowledge of the building's energy diagnosis, the technician is able to choose the most suitable technologies for energy recovery and the elimination of pathologies of reinforced concrete	high skills in the recovery of reinforced concrete with the use of techniques for energy recovery of buildings

Number of hours: 40 hours

Evaluation Methods

practice for the use of BIM libraries
simulations of interventions aimed at restoring concrete and its energy revolving

UNIT 4

ENERGY REGENERATION: DIFFERENT HEATING SYSTEMS AND VENTILATION

Unit 4	**Title:** Energy regeneration: different heating systems and ventilation	
Learning outcomes correspond to EQF level	**4 & 5***	
Learning outcome The student has the knowledge regarding the construction and working principles required to necessitate a functional and safe interior climate of a building.		
Prerequisites: Training or experience in real-estate, construction, law or in the heritage field. Personality traits: accuracy, correctness, specificity and analytical thinking. Communication skills, resilience and the ability to resolve conflict situations peacefully. Writing skills, politeness, rigour, autonomy, efficiency, interpersonal skills. Negotiation and argumentation skills, perseverance and decision-making skills are useful in performing the tasks.		
Knowledge	**Skills**	**Competences**
The learner knows and understands ● **the following aspects of the technical systems of the building:** - Construction materials, principles of operation and assembly, the construction technologies of the systems, installation design principles* - Heating, water heating, cooling and ventilation systems - Water supply and sewage systems - Ensuring the safe usage of the building*, level 4 needs to ensure the safe usage of the building only within his work section ● **Construction legislation**: - Terms, subsections. Requirements for buildings and technical systems* (level 4 does not need to know more than what comes from the work order) ● **How to ensure the indoor climate and energy efficiency in the building (level 4 knows the following to the extent necessary for daily work):*** - Interior climate*	The learner is capable of: ● reading heating and ventilation projects from the working drawing (work order) ● reading heating and ventilation projects and describing their design (planning) principles* ● distinguishing the types of heating and ventilation systems, the materials used in them, the system components, the principles / functions of their operation; ● read water supply and sewerage projects and apply the basics of design in work* ● checking and taking into account the complexity of the system, ie the part of water supply and sewerage, to describe and justify the choice of materials used in the water supply and sewerage, system parts and equipment; ● performing high-quality work in accordance with the working drawing, without compromising, taking into account the conditions written to ensure the indoor climate and energy efficiency	Level 4 learner shows the ability to perform the necessary work according to the given work drawing and work order, level 5 learner has the ability to map, analyze and find practical solutions to the following: - to thermally insulate technical installations and/or parts for higher energy efficiency; - to improve the building's heating, ventilation, cooling and residual heating systems co-efficiency; - if necessary, propose the replacement of heating systems with systems based on new technologies to ensure greater energy efficiency; - if necessary, involve a heating and ventilation engineer (level 6) to coordinate the necessary changes in the technical systems and bring the need for justified technical changes to the client; - to perform high-quality work in accordance with the working drawing and the manufacturer's installation instructions, take into account the appropriate conditions and material information to ensure the indoor climate and energy efficiency, select materials (important knowledge and understanding of thermal conductivity);

- Heat spread* - Heat penetration through heat barriers*: superconductivity, homogenous external walls, non-homogenous external walls, flooring, windows. - Heat properties of barriers*: heat capacity, temperature regime, cold bridging and temperature index - Airtightness and thermography* - Moisture technical performance of building exterior walls, calculation methodology* - Solutions for energy and resource saving installations ● **Energy efficiency of buildings (Level 4 only considers energy efficiency within its work section):** - Calculating heat loss of a building* - Free heat load of buildings* - Energy classes for buildings and the calculations*	and the properties of the materials, eg knows and takes into account the specific thermal conductivity of the materials (lambda number, λ); ● performing competent supervision for the customer *; ● calculating specific heat loss, free heat load of buildings, degree days and energy label of a building and using an energy calculator *	- map problems and carry out the supervision for the customer, correct the errors / if necessary, introduce corrections in the work process, based on the parameters given in the working drawing, also offer different solutions*.
Teaching method: Lecture, case study, individual practical work, learning video, app, Guide for Professionals (case studies)		
Performance criteria for the evaluation		
The learner is able to:	**Expected outcomes:**	

● Level 4 learner is able to read the work order and perform practically the corresponding work in the correct technological order, taking into account the general requirements of occupational health and safety (topics are the same as level 5) ● Level 5* learner is able to analyze and make the necessary calculations, taking into account the requirements of occupational health and safety and the environment	Level 4: carries out work on the renovation plan of the building on its working section Level 5*: ● assesses the current condition of the building by looking at the condition and operation of the technical systems ● analyzes and organizes the information gathered and draws conclusions from it in order to draw up a renovation plan which: - is in accordance with the law - improves the energy efficiency of the building, improves air quality and increases the comfort of living. ● analyzes the building, taking into account the real estate market and the scope of the renovation work, in order to draw up an opinion (involving heating and ventilation engineers if necessary) / advice on the feasibility and durability of the renovation work.
Number of hours: 26 hours	
Evaluation Methods	
Level 4 practical tasks solving the technical unit (incl. heating unit, etc.) according to the given working drawing (*a design document which, by means of images (views, sections, cross-sections) and text drawn to a certain scale, provides the information necessary for the manufacture and inspection, use or repair of the product*). Level 5*: Situation tasks based on the structure and operating principles of different technical systems and analysis of their interaction on the indoor climate of the building.	