

Course dossier

Course title: European Training Programme on Energy Efficient Renovation of Old Buildings

For ETEROB Project

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1. Course dossier

COURSE DESCRIPTION

'European Training Programme on Energy Efficient Renovation of Old Buildings" provides basic knowledge about renovation of existing or historic buildings in a way that improves energy performance and effectiveness of various type of buildings while preserving architectural elements (facades, for instance) with historical value and cultural importance. It is designed to give students/learners a managerial and practical knowledge about standards for passive buildings, approach to conservation of historic buildings, assessment and evaluation procedures, energy audit process, modern technologies and materials used for improving energy efficiency and saving as well as application of renewable energy systems and devices in building retrofitting. Emphasis is placed on the integration of appropriate materials, heat and cooling systems (HVAC, for instance) and energy generation from renewable sources.

COURSE OBJECTIVES

To develop an understanding the importance of existing buildings refurbishment for better energy performance and less energy consumption.

To understand interrelationship between chosen materials / systems and preserving of architectural elements with historical value.

To understand interconnections between core renovation processes.

To strength design, processes planning and problem solving skills.

To develop skills for choosing appropriate solutions - materials, systems and installations depending on building physical characteristics.

To apply modern systems for renewable energy harvesting or energy generation from renewable sources (microCHP, for instance).

To learn how to manage construction process.

To learn how to manage costs and their control and optimization in buildings renovation projects.

MODULE	M1	BUILDING REFURBISHMENT. AN INTRODUCTION	
Learning Unit	LU1	Fundamentals and market overview	
Learning Outcomes			
Knowledge	Skills	Competence	
Learners are able to describe energy consumption in construction sector	Learners are able to find and gather information about current status of buildings renovation market	Learners are able to apply gathered information and data	
Learners are able to explain relationships between weatherization and energy efficiency in buildings	Learners are able to collect data on weather factors important for improving the energy efficiency	Learners are able to use and evaluate data on regional weather condition	
Learners are able to list	Learners are able to search for information and data necessary for planning refurbishment process	Learners are able to transfer of acquired knowledge	
		Learners are able to stimulate interest in completing the	

benefits of refurbishment of existing buildings	Learners are able to differentiate between old and historic buildings	knowledge and skills Learners are able to ask appropriate questions and set problems
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self-paced learning	
Learning Unit	LU2	Standards for passive buildings. An overview
Learning Outcomes		
Knowledge	Skills	Competence
Learners are able to list various standards for energy efficient buildings Learners are able to discuss about new standards briefly Learners are able to compare various standards principles and rules	Learners are able to locate and gather information and data on modern standards Learners are able to use the basic principles of given standard	Learners are able to use gathered information and data Learners are able to use given standard for planning refurbishment process Learners are able to transfer of acquired knowledge Learners are able to stimulate interest in completing the knowledge and skills Learners are able to ask appropriate questions and set problems
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self paced learning	
Learning Unit	LU3	Conservation of historic buildings
Learning Outcomes		
Knowledge	Skills	Competence
Learners are able to discuss role and importance of architectural conservation Learners are able to discuss structural aspects of historic buildings Learners are able to list building elements which may be upgraded	Learners are able to indicate buildings elements which can be upgraded Learners are able to use knowledge on energy efficiency in practice Learners are able to make detailed assessment of building before starting upgrading work Learners are able to use IT tools for planning and management	Learners are able to use gathered information and data in practice Learners are able to choose buildings elements for upgrading Learners are able to delegate some work to others Learners are able to transfer of acquired knowledge Learners are able to stimulate interest in completing the

Learners are able to discuss important aspects of energy efficiency in historic buildings	Learners are able to search for additional information and data efficiently	knowledge and skills Learners are able to ask appropriate questions and set problems
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding;	
Duration	10h self-paced learning	
MODULE	M2	ASSESSMENT AND EVALUATION
Learning Unit	LU1	Comparison of standard assessment methods
Learning Outcomes		
Knowledge	Skills	Competence
Learners are able to list of calculation methods used for building assessment Learners are able to discuss climate characteristics related to boundary condition Learners are able to discuss ISO 13790 Learners are able to discuss buildings refurbishment processes	Learners are able to gather additional necessary information on assessment methods Learners are able to use knowledge on calculation methods in practice Learners are able to calculate thermal bridges Learners are able to search for information and data efficiently as well as making appropriate analysis	Learners are able to use gathered information and data in practice Learners are able to plan refurbishment process Learners are able to choose right calculation method Learners are able to delegate some work to others Learners are able to transfer of acquired knowledge Learners are able to stimulate interest in completing the knowledge and skills Learners are able to ask appropriate questions and set problems
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self-paced learning	
Learning Unit	LU2	Life-cycle energy performance evaluation
Learning Outcomes		
Knowledge	Skills	Competence
Learners are able to discuss evaluation of energy performance Learners are able to list of principles of life cycle assessment of energy performance	Learners are able to gather necessary additional information and data Learners are able to use simplified methodology for refurbishment projects	Learners are able to use gathered information and data in practice Learners are able to choose appropriate calculation method Learners are able to make a plan for life cycle energy optimization

<p>Learners are able to describe the importance of refurbishment processes for energy savings</p>	<p>Learners are able to make calculation of life cycle energy performance</p> <p>Learners are able to calculate annual energy savings</p> <p>Learners are able to search for information and data efficiently as well as making analysis</p>	<p>Learners are able to make simplified refurbishment plan</p> <p>Learners are able to assess annual energy savings</p> <p>Learners are able to delegate some work to others</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>
<p>Assessment Procedure</p>	<p>Self-assessment online interactive test for acquired knowledge and understanding</p>	
<p>Duration</p>	<p>5h self-paced learning</p>	
<p>Learning Unit</p>	<p>LU3</p>	<p>Energy audit in buildings</p>
<p>Learning Outcomes</p>		
<p>Knowledge</p>	<p>Skills</p>	<p>Competence</p>
<p>Learners are able to discuss fundamentals of energy audit in buildings</p> <p>Learners are able to describe principles of energy audit</p> <p>Learners are able to list basic methods for calculations of energy loses</p> <p>Learners are able to discuss principles of energy audit</p>	<p>Learners are able to gather additional information on energy audit in buildings</p> <p>Learners are able to use knowledge in practice</p> <p>Learners are able to assess of energy use in buildings</p> <p>Learners are able to make basic calculations of energy loses in buildings</p> <p>Learners are able to search for information and data efficiently</p>	<p>Learners are able to use gathered information and data</p> <p>Learners are able to plan energy audit in buildings</p> <p>Learners are able to give practical advices</p> <p>Learners are able to use IT tools</p> <p>Learners are able to delegate some work to others</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>

Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self-paced learning	
MODULE	M3	MATERIALS SCIENCE
Learning Unit	LU1	Basics of building physics
Learning Outcomes		
Knowledge	Skills	Competence
<p>Learners are able to discuss thermal comfort of buildings</p> <p>Learners are able to describe hygrothermal behavior of buildings</p> <p>Learners are able to describe core issues on ventilation and air quality</p> <p>Learners are able to list environmental profiles of building materials</p>	<p>Learners are able to gather additional information on modern research on building physics</p> <p>Learners are able to use knowledge on building physics in practice</p> <p>Learners are able to choose appropriate system for heat storage and cooling</p> <p>Learners are able to choose materials with best environmental profile appropriate for given project</p> <p>Learners are able to evaluate heat and mass transport in buildings</p> <p>Learners are able to assess ventilation and air quality</p>	<p>Learners are able to use gathered information and data in practice</p> <p>Learners are able to assess thermal comfort in building</p> <p>Learners are able to plan evaluate energy efficiency in buildings</p> <p>Learners are able to delegate some work to others</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self-paced learning	
Learning Unit	LU2	Materials for improving energy efficiency
Learning Outcomes		
Knowledge	Skills	Competence
<p>Learners are able to list basic categories of building materials</p> <p>Learners are able to discuss characteristics of materials used for improving energy efficiency</p> <p>Learners are able to describe principles and rules of using building</p>	<p>Learners are able to gather additional necessary information and data</p> <p>Learners are able to choose appropriate materials</p> <p>Learners are able to cooperate with suppliers</p>	<p>Learners are able to use gathered information and data</p> <p>Learners are able to plan and schedule for materials supply/delivery on time</p> <p>Learners are able to analyze data and information about chosen materials</p> <p>Learners are able to implement modern materials for building</p>

materials in refurbishment projects		<p>refurbishment</p> <p>Learners are able to delegate some work to others</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding;	
Duration	20h self-paced learning;	
Learning Unit	LU3	Systems and devices
Learning Outcomes		
Knowledge	Skills	Competence
<p>Learners are able to describe modern systems and devices used for improving energy efficiency in building</p> <p>Learners are able to discuss important characteristics of building envelopes</p> <p>Learners are able to describe various type shading devices</p>	<p>Learners are able to gather necessary information and data</p> <p>Learners are able to use knowledge in practice</p> <p>Learners are able to choose appropriate system or devices</p>	<p>Learners are able to apply gathered information and data in practice</p> <p>Learners are able to choose and cooperate with suppliers</p> <p>Learners are able to plan process flow for building refurbishment</p> <p>Learners are able to use devices or systems effectively</p> <p>Learners are able to delegate some work to others</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding	
Duration	5h self-paced learning	

MODULE	M4	MODERN TECHNOLOGY	
Learning Unit	LU1	Systems and technology used	
Learning Outcomes			
Knowledge	Skills	Competence	
<p>Learners are able to discuss modern technologies used for improving energy efficiency in buildings</p> <p>Learners are able to list basic categories of systems and devices</p> <p>Learners are able to provide basic characteristics of various systems and devices</p>	<p>Learners are able to gather additional information and data necessary for making an assessment of usefulness of given system or device</p> <p>Learners are able to choose best solution for given project</p>	<p>Learners are able to use gathered information and data</p> <p>Learners are able to choose appropriate supplier or subcontractor and cooperate with them effectively</p> <p>Learners are able to design most effective lighting system</p> <p>Learners are able to choose most efficient HVAC system</p> <p>Learners are able to design appropriate workflow for installing chosen system or devices</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>	
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding; assessment of practical tasks		
Duration	25h self-paced learning; 10h practical workshop		
MODULE	M5	RENEWABLE ENERGY SYSTEMS	
Learning Unit	LU1	Application of RES in building retrofitting	
Learning Outcomes			
Knowledge	Skills	Competence	
<p>Learners are able to describe small scale RES system for energy generation used in buildings</p> <p>Learners are able to list various RE systems and describe them</p>	<p>Learners are able to gather additional information necessary for making an assessment of RES systems</p> <p>Learners are able to choose right solar system (thermal or photovoltaic)</p>	<p>Learners are able to use gathered information and data in practice</p> <p>Learners are able to choose most appropriate supplier or subcontractor and cooperate with them</p> <p>Learners are able to design RES</p>	

<p>Learners are able to describe core principles for design of RES installation</p>	<p>Learners are able to choose most effective CHP power generation system</p> <p>Learners are able to choose small wind mill for building</p> <p>Learners are able to choose most effective heating pumps</p>	<p>system as a best solution for given project</p> <p>Learners are able to plan workflow for chosen installation/system</p> <p>Learners are able to integrate various RES system</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p> <p>Learners are able to ask appropriate questions and set problems</p>
<p>Assessment Procedure</p>	<p>Self-assessment online interactive test for acquired knowledge and understanding; assessment of practical tasks</p>	
<p>Duration</p>	<p>45h self-paced learning; 10h practical workshop</p>	
<p>MODULE M6</p>	<p>COST CONTROL</p>	
<p>Learning Unit</p>	<p>LU1</p>	<p>Cost control of energy effective renovation project</p>
<p>Learning Outcomes</p>		
<p>Knowledge</p>	<p>Skills</p>	<p>Competence</p>
<p>Learners are able to discuss benefits of energy efficient refurbishment</p> <p>Learners are able to describe uncertainty in investment</p> <p>Learners are able to list categories of costs of green building</p>	<p>Learners are able to gather information necessary for making financial plan</p> <p>Learners are able to design costs structure</p> <p>Learners are able to indicate possible uncertainties of investment process</p>	<p>Learners are able to use gathered information and data in practice</p> <p>Learners are able to use economic and financial data and predict uncertainties</p> <p>Learners are able to make a preliminary financial plan</p> <p>Learners are able to make cost optimization</p> <p>Learners are able to cooperate with accounting department effectively</p> <p>Learners are able to transfer of acquired knowledge</p> <p>Learners are able to stimulate interest in completing the knowledge and skills</p>

		Learners are able to ask appropriate questions and set problems
Assessment Procedure	Self-assessment online interactive test for acquired knowledge and understanding; assessment of practical tasks	
Duration	20h self-paced learning; 10h practical workshop	

2. Supporting documentation

Document	Description

Website name	Description & link