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Erasmus+ Project ID: 2023-1-ES01-KA220-HED-000156652

BIM digital competencies to evaluate and improve the energy efficiency of European buildings.
A digital way towards positive energy districts

WP3 Basic concepts on energy efficiency of buildings. VSRC

IMPORTANCE OF AWARENESS OF ENERGY SAVING (WP3/A4)

Speaker: Violeta Lakštauskienė
Ivaras Giniotis

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Content	Responsible partner	Responsible person of the partner
WP3. Teaching Material about Building Energy Efficiency (BEE)	**VBTC & UTCN**	Ivaras, Inga & Maria
WP3/A1 List of tutorial to develope	UTCN	Maria
WP3/A2 Create BEE contents - Basics	Alba I M	Mari
WP3/A3 Create tutorials about use of BIM to analyze BEE	UPCT	José Manuel
WP3/A4 Contents about awareness of energy saving	VBTC	Ivaras, Inga
WP3/A5 Create contents about the building thermal envelope	UTCN	Maria
WP3/A6 Create contents about HVAC systems and energy vectors	Ceuti M	Isabel
WP3/A7 Create contents about BEE and Green Certifications	Alba I M	Mari
WP3/A8 Create contents about best improvement actions	UPCT	José Manuel
WP3/A9 Quality assesment of the tutorials. Revisions	VBTC	Ivaras
WP3/A10 Translation of tutorials	UTCN, VBTC & UPCT	Violeta VSRC José Manuel UPCT Maria UTCN

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Content	Start of work	The end of works
WP3. Teaching Material about Building Energy Efficiency (BEE)	**01 03 2024**	**31 01 2025**
WP3/A1 List of tutorial to develope	**01 03 2024**	**31 03 2024**
WP3/A2 Create BEE contents - Basics	**01 04 2024**	**30 06 2024**
WP3/A3 Create tutorials about use of BIM to analyze BEE	**01 09 2024**	**30 11 2024**
WP3/A4 Contents about awareness of energy saving	**01 04 2024**	**30 06 2024**
WP3/A5 Create contents about the building thermal envelope	**01 04 2024**	**30 06 2024**
WP3/A6 Create contents about HVAC systems and energy vectors	**01 05 2024**	**31 07 2024**
WP3/A7 Create contents about BEE and Green Certifications	**01 06 2024**	**31 08 2024**
WP3/A8 Create contents about best improvement actions	**01 07 2024**	**30 09 2024**
WP3/A9 Quality assesment of the tutorials. Revisions	**01 12 2024**	**31 01 2025**
WP3/A10 Translation of tutorials	**01 12 2024**	**31 01 2025**

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OBJECTIVES. There is **not enough awareness** about the problem of energy expenditure and the environmental impact of the inefficient buildings.

It essential to **have an awareness of energy saving**. It is important to take into account on one side about the huge amount of buildings that are energy inefficient, but also about our behaviour.

Sometimes energy efficiency has a "rebound effect", as p**eople tend to increase their energy consumption when they pay less**. Therefore, as Energy Management Systems establish it is also important to raise awareness in the end users, so that they do not waste energy with their behaviour.

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Many people may **not fully comprehend** the advantages of energy-efficient methods, including building owners, occupants, and even members of the construction sector.

People may not think about energy-efficient solutions when constructing, renovating, or operating buildings **if they are not aware of the technologies** that are available, their advantages, and their viability.

Reducing energy use, lowering greenhouse gas emissions, and reducing the effects of climate change all depend on buildings becoming more **energy efficient**.

However, a **number of obstacles** prevent the broad use of energy-saving techniques. These obstacles include issues with economics, behaviour, regulations, and information that prevent the implementation of energy savings and environmental advantages.

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TUTORIAL DEVELOPMENT

1. Why Energy Efficient Buildings Are Important

1.1. Issue

1.1.1. Global warming. Energy production and use promote some of the most long lasting and significant effect on environment.

Dependence of fossil fuels for energy generation is shows the **hazardous impact** on nature. Buildings are observed to be both, one of the biggest consumers of energy and producer of greenhouse gases.

Climate change resulting from atmosphere resulting in increasing CO2, even seemly slight temperature changes can cause change in weather patterns, climate, melting of polar ice caps and sea level rise, photochemical smog, high levels of atmospheric ozone, destruction of ecosystem.

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1.1.2. Energy inefficient buildings

1.1.3. Behaviour effecting BEE

It is important to **raise awareness** in the end users, so that they do not waste energy with their behaviour. Sometimes energy efficiency has a **"rebound effect"**, as people tend to increase their energy consumption when they pay less.

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1.2. Benefits of Energy Efficient Buildings

Energy efficiency is the utilization of less energy to provide the same service. In contrast to conventional buildings, energy efficient buildings seek to use land and energy efficiently, conserve water and other resources, and improve indoor and outdoor air quality.

Creates energy itself for regulating the structure, maximize the use of recycled renewable materials and renewable resources like sun, water, land and wind, and contributes toward healthy environment.

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1.2.1. Environment and health. In addition to reducing emissions, efficient buildings enhance energy security and reduce dependence on oil and coal imports. Well-planned efficient buildings result in higher profitability for occupants because of better indoor natural quality.

1.2.2. Cost effective. Energy Efficiency force in lower utility bills ad straight return on investment, making it an excellent financial thought. Annual cost saving often enlarges annual depreciation charges incurred. As a result, increasing attraction of building tenants, owners, and users.

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1.2.3. Energy conservation.

1.2.4. Water conservation. Utilizing ultra-low flow fixtures, dual plumbing systems and rainwater harvesting, EE buildings not only reduce their demand for water use but also look at on-site supply options to cater to its internal and external (landscape) water demands.

1.2.5. Waste reduction. Lesser waste by employing waste management strategies on site.

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TECHNICAL RESOURCES NEEDED TO FOLLOW THE TUTORIAL

LEARNING OUTCOMES

EVALUATION CRITERIA (it may be a report to be submitted by the student or a questionnaire to be answered).

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BASIC CONCEPTS ON ENERGY EFFICIENCY OF BUILDINGS(WP3/A2)

WP3. TEACHING MATERIAL ABOUT BUILDING ENERGY EFFICIENCY

Activity title WP3/A2 CREATE BUILDING ENERGY EFFICIENCY BASICS CONTENTS

Estimated start date 01/04/2024

Estimated end date 30/06/2024

Leading organisation VIESOJI ISTAIGA VILNIAUS STATYBININKU RENGIMO CENTRAS

Participating organisations Ayuntamiento de Ceutí, MUNICIPALITY OF ALBA IULIA, Rambøll Norge AS, UNIVERSITATEA TEHNICA CLUJ-NAPOCA.

Expected results Tutorial on Building Energy Efficiency basics

Participants: 5 teachers from VET education, at least 4 students from Computer Aided Design Operator, At least 4 students from Heating, ventilation and air-conditioning installer (Vilnius Builders Training Centre in Lithuania).

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Each tutorial will contain:

- ✓ objectives,
- ✓ tutorial development,
- ✓ technical resources needed to follow the tutorial,
- ✓ learning outcomes,
- ✓ evaluation criteria (it may be a report to be submitted by the student or a questionnaire to be answered).

gather information about practical examples of saving energy and equivalences in consumption, etc.

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BASIC CONCEPTS ON ENERGY EFFICIENCY OF BUILDINGS

OBJECTIVES. To learn what is basic concept of energy efficiency of buildings. To understand what are the main components of energy efficiency.

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TUTORIAL DEVELOPMENT

1. Location. Site selection.

2. Orientation. Proper orientation is important to serve with natural lighting, heat gains and proper wind blow. Heating costs can reduce through windows by transmission of sunshine.

Heat loss from the building can be reduced by selecting a location sheltered from the wind, trees nearby, adjacent buildings or surrounding hills are may be the part of shelters, if shelter not exists planting trees or shrubs are the option with time.

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3. Waste reduction. Energy efficient architecture also seeks to reduce waste of energy, water and materials during construction. Reuse of existing buildings, reduce the amount of waste generated by occupants, reduce matter going to the landfills.

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4. Insulation and building envelope.

Optimizing the building envelope is one of the primary strategies for optimizing energy efficiency in buildings.

The amount of heat transfer between the inside and outside of the building is reduced with the help of proper insulation and well-designed windows and doors.

As a result, there are **significant energy savings** because there is less need for excessive heating or cooling. The thermal performance of the structure can be greatly enhanced by using materials with high insulation values, such as fiber glass, cellulose, or spray foam.

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5. Openings.

A variety of blinds, shutters and windows are used for shading, heat preservation and heat insulation.

Three layer of hollow glass window are used of low emissivity and filled with inert gasses, thermal insulated materials are used outside the window to insulate the heat.

Ventilation should be provided fresh air, remove moisture, odors and pollutants.

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6. HVAC systems.

Reducing the heat load of the structure allows for the installation of a smaller heating and cooling system.

Cooling technique includes use of natural ventilations, ceiling fans, atria and stairwell towers, evaporative cooling systems for dry climates, dehumidification systems, and geothermal cooling and heat pump systems.

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7. Efficient lighting.

An important component of a building's energy use is lighting. Light-emitting diodes (LEDs) and compact fluorescent lamps (CFLs), energy-efficient lighting technologies, provide brighter illumination while using less energy than conventional incandescent bulbs.

By altering lighting levels in response to occupancy and available natural light, the use of smart lighting controls, such as daylight harvesting systems and occupancy sensors, further optimizes energy efficiency in buildings.

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8. Water savings.

Reusing water on toilets providing separate supply lines for reclaimed water, auto control valves, drip irrigation or sprinkler irrigation, rain water harvesting, shows great result towards resource and water savings.

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9. Use of materials.

Easy to recycle and reuse. Selected according to local availability, benefits, cost and durability. Environment friendly and approached towards waste utilization.

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10. Energy-Efficient Appliances and Equipment.

These appliances offer the same or better performance than their conventional counterparts while running more effectively.

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11. Renewable energy integration.

Energy efficiency in buildings can be considerably improved by incorporating renewable energy sources into building systems.

For example, onsite electricity generation from solar panels can lessen reliance on grid power.

Further reducing energy demand, solar water heating systems can also offer hot water for home usage or space heating.

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12. Smart building technologies.

Real-time monitoring and control of different building systems are made possible by building automation systems and energy management platforms.

Through the identification of inefficiencies and the optimization of energy usage in response to shifting conditions, proactive energy management is made possible.

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Thank you for your attention💻

We welcome questions!!!

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