



Energy performance assessment of the residential building stock

(Resource ID: 277)

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This teaching resource is allocated to following University:

U_POLIS - POLIS University

Institution:

Polis University

<http://www.sustainicum.at/en/modules/view/277.Energy-performance-assessment-of-the-residential-building-stock>



Group work



**Less than 5
students**



**up to 1 semester
more than 1
semester**



**Internet
connection
necessary**



English, Shqip

Please note: module with excess length - more than 7 lecture units required!



The objective of this teaching resource is to develop a library of energy-related data for the Albanian Residential Building Stock. The building types would be selected based on particular construction periods, sizes of buildings and used material. Also any regional variations would be highlighted. Furthermore we aspire to estimate the number of buildings in the national housing stock represented by each building type and their energy performance.

This will be achieved through interviews with the inhabitants, Problem Based Learning (students will be presented with the problems) and of course through class and field work. After doing all the field work and calculation of the energy performance of the chosen typologies, students should propose methods and instruments of how to improve the performance of the whole building or a single apartment. The knowledge proposing such measures will come from the collaboration with the private stakeholders dealing with energy efficiency material.

The teaching resource will require the following time:

work with the students: 1 day per week (2 lecture units) for 15 weeks. In total 30 hours.

work with stakeholders: 3 weeks (2 hour per week) per each stakeholder to explain the methodology of retrofitting of buildings.

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Using the typology for the assessment of the energy performance of residential buildings and to the evaluation of the impact of energy conservation measures (ECMs)

Use the typology concept to create a database for the estimation of the national energy performance of the Albanian residential building stock (through the help of National Statistic Institute INSTAT)

Investigate the possibility of extending the typology concept to non-residential buildings.

The work and outcome is addressed to:

Architects, engineers and consultants. Energy advisors can use it in counselling sessions to give their clients a quick overview of the energy performance of a building similar to their own and demonstrate the effect of possible measures. Energy consultants may use it as a set of example buildings for demonstrating and testing their software.

Building owners / building's technical and maintenance staff .House owners may use it on their own to assess the energy performance of their buildings as well as the cost effectiveness of measures to improve it.

National and international energy and policy experts On a national level, the building typology can be used as a model for the energy consumption of the residential building stock

This teaching resource aims to give students tools and instruments related to the energy performance of the Residential building stock. This teaching resource will help students learn how to calculate the thermal resistance coefficient for the building envelope and will learn about the volumetric loose coefficient, how to calculate the energy performance of a building, how to calculate the amount of money we spend every year on heating and cooling, how much it will cost to insulate a certain building typology, will learn about the building typology in Albania, the way of constructing, the indoor comfort and the passive techniques on how to reduce the energy consumption, etc.

After learning all that mentioned above and after collaborating with different businesses, students will learn how to develop a library of energy-related data for the Albanian Residential Building Stock. In the long run, the national building typology can be used and developed for forecasting and evaluating the energy savings and carbon dioxide reductions in Albania.

- the division of residential building stocks in size and age classes;
- data of exemplary buildings: visual appearance, commonly found

construction elements and corresponding U-values;

- typical values for the energy consumption by energy carriers;
- energy saving measures
- standard reference calculation procedure based on an agreed data format, user conditions and national climatic data;

After doing all the field work and data collection, myself and the students will work on software development, in order to help others to do a quick estimation of the energy performance of their own residential building / apartment.

The teaching methods used in this teaching resource is the "Case study" - in this case the study will focus in the existing residential building stock. As a case study we will take the main typologies of residential buildings in Albania that were built prior 1990

"PBL" related to the data we collected, students will estimate the energy performance of the case studies that they have and they will give solutions to the problems that they face during the study

"Interview" with the inhabitants of the chosen buildings in order for the students to better understand the living conditions of the inhabitants.

"Guest Speaker" during this class students will have the chance to meet at least 3 professionals from the energy calculation field and also from the companies who deal with the energy retrofit of the buildings.

Teaching Tools & Methods



Mini-project



Written material



Video



Computer program



Measurement device

Integration of Social Stakeholders

During this class, business, companies and institutions will have an active role in sharing their practical knowledge related to thermo insulated materials with students. On the other hand students will have direct contact with products and people dealing with them. During this class, the collaboration with stakeholders is crucial, because businesses need a general mapping of the energetic situation in Albania in order to invest in energy retrofit, also students will learn a lot from this collaboration. Collaboration with stakeholders for example: Izoterm, Knauf, Rehau Albania, INSAT, Ministry of Energy

Strength

- Active learning experience for students
- Strong trans-disciplinary approach
- Students learn to develop a library of energy-related data
- Stakeholders benefit from the data base created from students
- Students think about their own opportunities as architects in the context of global change
- Student learn about passive design
- Software development

Weakness

- Lack of laboratories for testing the materials and the building envelope
- Lack of devices for measuring the indoor and outdoor temperatures and humidity

Learning Outcomes

- The learning target of this teaching resource is to involve students and businesses in creating a database of Albanian Residential Building Stock, their conditions, the typologies, year of construction, and the most important their energy performance. Students should learn the way of calculating the energy performance of a building. The final goal of this teaching resource is to develop a software for calculating the energy performance of residential buildings.

Relevance for Sustainability

- Retrofitting an existing building can oftentimes be more cost-effective than building a new facility. Since buildings consume a significant amount of energy, particularly for heating and cooling, and because existing buildings comprise the largest segment of the built environment, it is important to

initiate energy conservation retrofits to reduce energy consumption and the cost of heating, cooling, and lighting buildings.

– Retrofitting Existing Buildings to Improve Sustainability and Energy Performance

Related Teaching Resources

– Basic knowledge of cataloguing

Preparation Efforts

Medium

Preparation Efforts Description

–Preparation for the lecturer: Identification of suitable companies that are seeking to collaborate in the energy performance field. Stakeholders should provide relevant information and must be open for cooperation with students. The site visits have to be scheduled for a)discussions b) interviews c) presentation of results and recommendations d)photo shooting

Access

Free

Assessment

Students will have to identify typical building stocks in Tirana. They will interview inhabitants about their indoor conditions. After doing that, they will start to calculate the energy performance of the building and to give recommendations of how to improve the living comfort. Also they will have to develop a software for calculating the energy performance of the buildings.

Credit/Certification Description

Students will take credits for following up this course/ module.

Sources and Links

www.building-typology.eu

<http://webtool.building-typology.eu/webtool/tabula.html?c=all>

www.iso.org/obp/ui/#iso:std:iso:13790:ed-2:v1:en

EN ISO 13790

www.episcope.eu

www.wbdg.org

www.gov.uk/government/policies/improving-the-energy-efficiency-of-buildings-and-using-planning-to-protect-the-environment/supporting-pages/energy-performance-of-buildings

www.ec.europa.eu/environment/eusssd/buildings.htm

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