



REACT

Summative assessment framework WebQuests

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WebQuest CU1

WebQuest title

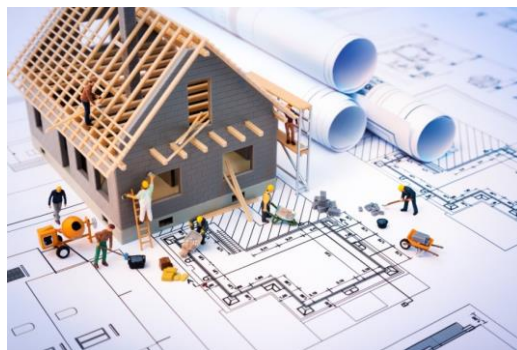
Ways to Boost Building Envelope Performance

Introduction

The degradation of buildings and the ageing of some of its elements that make up the building envelope, such as window frames, doors, thermal insulation, contribute to the increase in energy consumption.

To understand the thermal performance of buildings' envelope, particularly during energy audits and certification processes, the use of techniques that allow the measurement of the Thermal Transmittance (U) of construction solutions has become important.

In this context, you need to know how the different thermal behaviours of construction materials interfere with the energy efficiency of the building. In order to identify opportunities for improving an energy-efficient building envelope. You also can learn how to calculate the thermal transmittance coefficient and make your contribution to increasing the thermal comfort of your country's buildings.



Adobe Stock by Romolo Tavan

Task

A building envelope is commonly defined as the separation of the interior and exterior of a building. Overall, it is the entire exterior building system. It includes doors, windows, roof, foundation, floor, siding and all the components such as structural masonry and insulation.

Select a building and consider the external building envelope system. It includes exterior doors, windows, roof, foundation, floor, siding and all the components such as structural masonry and insulation.

Collect the data of Thermal transmittance (U) for each component of the external building envelope system, and base on that, present solutions for improvement of energy efficiency in the building, for example:



Characterization of the building envelope	Thermal transmittance (U)	Solution	Thermal transmittance (U) of the solution
Simple wall with 22 cm brickwork without cladding	1,70 [(m ² .°K)/W])	Single wall with 22cm brickwork, externally coated by 6 cm of expanded polystyrene	0,45 W/(m ² .K).

The Thermal Transmission Coefficient is obtained by dividing the thermal conductivity (k) by the thickness of the material (e)

In this WebQuest, you will produce a poster with these outcomes and present to your class.

Process

1. Form groups of three to work in a collaborative manner in this task. One person deals with the data collection; another person deals with the calculations/analysis and the third one deals with the recommendations.
2. Start by identifying and collecting data about the building envelope and its structure: doors, windows, roof, foundation, floor, cladding, walls (exterior wall,);
3. Collect the data on the construction materials of the structures you have identified (these data are usually found in the construction specifications);
4. For the construction materials used, investigate, or calculate the value of the thermal transmittance;
5. Create a table, with the results and propose additional insulation, renovation or replacement of the materials by others, which present a better performance for the thermal transmission coefficient and, consequently, lead to a better energy performance of the building
6. Develop a poster (in any tool you prefer) in which you will present the outcomes of the above exercise. Remember to share the criteria used for the selection of the chosen materials.
7. Present your poster to the class/audience and answer questions.

Resources

[Thermal transmittance U vs th. resistance R](#)

[Thermal insulation for buildings](#)

[U-Values](#)

[Thermal conductivity, R-Values and U-Values simplified!](#)

[Understanding U-values will help you create a comfortable home](#)

[How to Create a Research Poster](#)

[Create your best scientific poster easily](#)

[How to Give a Perfect Poster Presentation](#)

[Free Posters Templates](#)



Evaluation and LOs

After completing this WebQuest, the learner will be able to:

- Differentiate units of the international system of energy to interpret and supervise installation projects;
- Relate buildings envelope to thermal behaviour and uses to infer its energy efficiency level;
- Recognize the different thermal behaviours of construction materials and the way they interfere with the energy efficiency of the building
- Analyse and characterize constructive solutions that promote energy efficiency
- Prepare recommendations for reducing the energy consumption
- Research, gather and organize information
- Communicate an idea through a pitch in a public presentation

Trainees will be evaluated in pairs based on:

- Ability to collect data and calculation of Thermal transmittance (U);
- The relevance of the materials they have chosen, to increase energy efficiency according to its thermal characteristics;
- Ability to convey clear facts based on the findings/analysis;
- Ability to answer questions.

Conclusion

The whole point of this WebQuest is to try your skills regards with the identification and analysis of solutions, materials and construction methods that promote energy efficiency, reducing energy consumption in the construction and operation of buildings.

Once you know the structure of a building, you will be able to easily find efficiency measures that relate to other aspects to be addressed in the other chapters (technologies for energy efficiency, methodologies for the application of audit methods, monitoring of energy efficiency).