

Machine Learning Framework for the Sustainable Building Refurbishment

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Abstract

The use of renewable energy sources (RES) in the building sector has become increasingly important in recent years, aiming to reduce effects of greenhouse gas emissions. In the Republic of Serbia, the building sector accounts for over 50% of total energy consumption, which is almost three times higher than in the EU. The main reason is the relatively old household stock, with most buildings over 40 years old, requiring significant investment in refurbishment to enable efficient use of RES systems. Although interest in adopting certain RES technologies to transition to clean solutions has grown in recent years, the level of awareness among householders about the benefits and possibilities of renovation remains low. This often leads to poor investment decisions when refurbishing residential buildings.

In recent years, artificial intelligence (AI) has been increasingly used to improve decision-making and is already present in many sectors. The aim of this paper is to develop a machine learning model that can effectively serve as a decision-making tool in building refurbishment. The dataset for training the model was created from surveys conducted across the Republic of Serbia, covering nearly all types of buildings, and all energy consumers. Based on the developed model, users are assisted in making final decisions regarding building renovation, as well as in obtaining guidelines for further improvements in energy efficiency using renewable energy sources. The model and the methodology for building the database can also be effectively applied in other countries with similar patterns of energy consumption in their housing stock.

Keywords (5 words): Renewable energy, Household, Building Refurbishment, Machine Learning

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