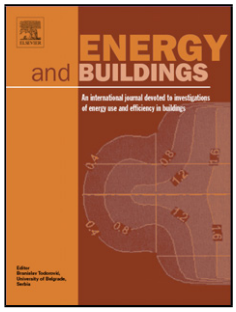

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Multi-criteria assessment for the effective decision management in residential energy retrofitting

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Highlights

- -Multi-criteria assessment to identify the effectiveness of energy retrofit solutions.
- -The assessment method includes environmental, economic and social variables.
- -The effectiveness of energy retrofit solutions in Mediterranean climate is evaluated.
- -Effectiveness of alternatives from the viewpoints of different stakeholders.
- -Results allow improving the decision-making process in residential energy retrofitting.

Abstract

Building sector is responsible for 40% of European energy consumption, of which heating and cooling account for around 70%. Moreover, 75% of buildings for 2050 are already built in Europe. On the road to a sustainable energy transition, this article develops a multi-criteria assessment methodology for the environmental, economic and social evaluation of different residential energy retrofit solutions, based on effectiveness indices. This methodology allows improving the decision management in residential energy retrofitting by identifying the most effective solutions according to the requirements and needs of each intervening agent (citizens, public administrations and private promoters). The methodology is based on the integrated analysis of environmental, economic and social variables. It is applied to a Mediterranean case study from Southern Spain built in 1955. As part of methodology, survey data from the different stakeholders were collected, identifying the keys that condition the viability of the measures. The results show that measures with few inconveniences to tenants, investment costs below 2,000 €/dwelling and payback periods below 15 years are the most viable by end-users' implementation in the Mediterranean area, but between them, only efficient heat pumps allow achieving more than 45% of CO_2 emissions reduction (with a payback period of 6 years).

Keywords: Assessment methodology; Energy efficiency; Energy retrofit; Energy Efficiency Measures; Residential buildings; Mediterranean climate.