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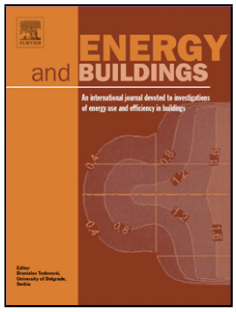


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# Multi-objective optimisation model: A housing block retrofit in Seville

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## HIGHLIGHTS

Thermal load indexes provide useful energy demand behaviour data in mild climates

Window type is the main determinant of the envelope energy and financial performance

Multi-objective models can evaluate the trade-off among building competing aspects

The presented performance-driven methodology does not require scripting skills

## Abstract

Performance-driven optimization has shown its potential to integrate design and energy performance, since building shape and envelope are determinant to the energy demand. Even though new buildings should be nearly zero energy buildings by 2020, according to European Directive 2010/31 recast, they only represent a minority of the building stock. Building retrofit has demonstrated a great potential to reduce energy consumption, and at the same time, $CO_2$ emissions.

The scope of this work is to present and test a design methodology to enable architects and decision makers to couple building shape and envelope with energy and financial performance in a multi-objective optimization method. Our multi-objective optimization model is adaptable for both conceptual design and building retrofit, and presents effective application to assist design decisions in a seamless workflow.

In this case study, we have applied the model to a housing block retrofit in Seville. We have designed indexes to optimise building envelope, considering mild climates issues. Then, we have simulated

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