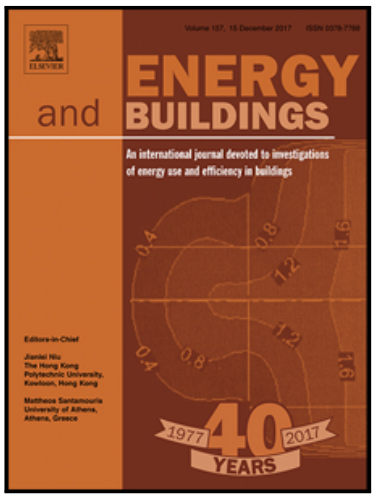

Parametric Analysis of Design Stage Building Energy Performance Simulation Models

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Abstract

For many years, the practice of implementing a design stage building energy performance simulation (BEPS) model has been overshadowed by a perceived lack of accurate results, when predicted model figures are compared with actual usage, post-occupancy. With the worldwide push for more efficient buildings, this perception of lack of accuracy is becoming an important issue. Research has primarily focussed on the examination of post-occupancy calibrated models. In the construction industry, most BEPS models are built to show compliance with national standards and/or regulations, such as ASHRAE or the UK's Part L, or a voluntary code such as LEED™. This is done at the design stage, before construction has commenced, as compliance usually must be shown as part of the regulatory planning and early design process.

Examining two very different buildings, a methodology has been devised to identify the groups of influential parameters within a design stage BEPS model and determine quantitatively, how influential these groups might be on the predicted energy usage.

The study finds that many similar issues exist in both building's design models, even though the buildings are in different countries, of different operational characteristics and had design models built at differing levels of complexity. The process of developing the most accurate design stage BEPS model is broken down into nine possible model stages and each of the nine is quantitatively assessed. The study gives pertinent guidance to an energy modeller as to the likely accuracy of their model, depending on what data has been used in the model's creation.

Keywords

Building energy simulation, Building energy design model, Building energy calibrated model, Energy model sensitivity analysis, Building energy model guidance