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Explore and Reduce the Performance Gap between Building Modelling Simulations and the Real World: Case Study

Authors : B. Salehi, D. Andrews, I. Chaer, A. Gillich, A. Chalk, D. Bush

Abstract : With the rapid increase of energy consumption in buildings in recent years, especially with the rise in population and growing economies, the importance of energy savings in buildings becomes more critical. One of the key factors in ensuring energy consumption is controlled and kept at a minimum is to utilise building energy modelling at the very early stages of the design. So, building modelling and simulation is a growing discipline. During the design phase of construction, modelling software can be used to estimate a building's projected energy consumption, as well as building performance. The growth in the use of building modelling software packages opens the door for improvements in the design and also in the modelling itself by introducing novel methods such as building information modelling-based software packages which promote conventional building energy modelling into the digital building design process. To understand the most effective implementation tools, research projects undertaken should include elements of real-world experiments and not just rely on theoretical and simulated approaches. Upon review of the related studies undertaken, it's evident that they are mostly based on modelling and simulation, which can be due to various reasons such as the more expensive and time-consuming nature of real-time data-based studies. Taking in to account the recent rise of building energy software modelling packages and the increasing number of studies utilising these methods in their projects and research, the accuracy and reliability of these modelling software packages has become even more crucial and critical. This Energy Performance Gap refers to the discrepancy between the predicted energy savings and the realised actual savings, especially after buildings implement energy-efficient technologies. There are many different software packages available which are either free or have commercial versions. In this study, IES VE (Integrated Environmental Solutions Virtual Environment) is used as it is a common Building Energy Modeling and Simulation software in the UK. This paper describes a study that compares real time results with those in a virtual model to illustrate this gap. The subject of the study is a north west facing north-west (345°) facing, naturally ventilated, conservatory within a domestic building in London is monitored during summer to capture real-time data. Then these results are compared to the virtual results of IES VE, which is a commonly used building energy modelling and simulation software in the UK. In this project, the effect of the wrong position of blinds on overheating is studied as well as providing new evidence of Performance Gap. Furthermore, the challenges of drawing the input of solar shading products in IES VE will be considered.

Keywords : building energy modelling and simulation, integrated environmental solutions virtual environment, IES VE, performance gap, real time data, solar shading products
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