BIM for energy efficiency

Decarbonising the built environment through informed decision-making using digital simulation and analysis

Ioan Petri and Yacine Rezgui

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Foreword

The construction industry, with its services and operations, is often portrayed as slow in adopting new technologies, relying on solutions and techniques which tend to be outdated and very traditional. In general, the performance of the construction industry has unforeseeable results, leaving a gap for a technological transformation. The digitalisation of the construction industry has been started around building information modelling (BIM) systems with substantial input from the industries, research institutes and local government across the world.

BIM for energy efficiency describes a pioneering study that contributes to the in-depth understanding of BIM engineering issues covering the complete environmental and building life cycle, including energy efficiency design, construction and operation stages. It provides a fully integrated theoretical and practical guide to BIM for energy efficiency, to better tackle the complex challenges in the construction domain with an emphasis on the orchestration of the whole built environment through informed interventions.

The contribution of this study is twofold:

- a fundamental change to a systematic BIM-based approach towards achieving a sustainable built and energy efficient environment
- a world-class unified open and informed vision for sustainable engineering supported by BIM.

The authors go beyond state-of-the-art BIM-based technologies by promoting a fundamental change in energy efficiency underpinned by knowledge-based systems engineered with research-oriented practices to addressing a complete life-cycle integration.

This book creates a forward-looking framework for BIM digitalisation and analysis for sustainable engineering, shaping sustainable environmental development (interdisciplinary, cross-sector and international) for BIM researchers and practitioners who are sensitive to climate change challenges.

This book paves the way towards the next generation of BIM-smart infrastructures.

Nick Tune

Digital Engineering Director
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Nick Tune is leading the digital transformation of the Atkins transportation business and the rollout of digital engineering within Atkins UK&E. He is the winner of six innovation awards 2016/17 by contributing to the development of new technologies and processes for the benefit of the built environment, while creating wealth-generating organisations. Nick is the UK BIM Alliance lead on information (data) requirements, promoting the use of openBIM and BIM Level 2 within the AEC industry.

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The recent climate conferences, including COP21 in Paris, have evidenced and raised awareness about the impact of our built environment on climate change. In this context, the digitalisation of our buildings presents a unique opportunity to collaboratively and iteratively optimise our design interventions and thus minimise their life-cycle impact. Building information modelling (BIM) provides a unique capability to transcend current limitations across the complex life cycle and supply chain of construction projects by:

- continuously informing on the optimal design options with the least negative environmental impacts during the early design stage
- promoting inter-disciplinary design decision-making through co-simulation, while ensuring full compliance with the regulatory landscape
- streamlining the procurement activities by facilitating access to supplier/manufacturer databases, informed by the life-cycle environmental impacts of selected products and components
- ensuring scrupulously full compliance of construction activities with design data
- informing on ways of optimising the building during its operation in line with design predictions
- ensuring sustainable decommissioning and recycling after demolition at the end of the building's life cycle.

This book is timely as it contributes to the ongoing debate in the UK on 'BIM Level 3' with a focus on energy efficiency, while informing the wider research community and practitioners on ways of further developing BIM to address wider challenges, such as that posed by climate change.

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