# BIM4BEMS

Building Information Modeling for Building Energy Management Systems

| | | | |
|---|---|---|---|
| **Programm / Ausschreibung** | ENERGIE DER ZUKUNFT, SdZ, SdZ 3. Ausschreibung 2015 | **Status** | abgeschlossen |
| **Projektstart** | 01.01.2017 | **Projektende** | 31.12.2019 |
| **Zeitraum** | 2017 - 2019 | **Projektlaufzeit** | 36 Monate |
| **Keywords** | Building Information Modeling, Energiemanagementsystem, Gebäudeleittechnik, Energieeffizienz | | |

## Projektbeschreibung

Das Projekt BIM4BEMS soll aufzeigen, dass eine Weiterverwendung der Informationen aus der Planung sowie As-Built-Dokumentation großen Nutzen für den effizienten Betrieb eines Gebäudes hat. Für den Betrieb wird das BIM-Datenmodell mit Planungsstand herangezogen und im Betrieb erweitert, indem Informationen hinzugefügt werden, sowie Änderungen des aktuellen Gebäudestatus nachgezogen werden. BIM4BEMS untersucht Anwendungsfälle, die den Nutzen eines BIM-Modells in Kombination mit Energiemanagementsystemen (BEMS) im Betrieb darstellen, die die Verbindung zwischen BIM und Gebäudeleittechnik (BMS) erlauben, und somit zu verbessertem Reporting und Erkennung von Ineffizienzen im bestehenden Gebäudebetrieb führen.

## Abstract

A facility passes through several life cycle phases: conceptual design, design development, construction, use, reuse, remodeling, and demolition. In each phase, documents are created by architects, engineers, technical planners, and contractors that reflect the facility's state at certain points in time. Information exchange is achieved with commercial or open data exchange standards. Powerful modeling software has made so-called Building Information Models (BIMs) feasible. These are three-dimensional and rich building models that facilitate planning and data exchange in project teams and through the whole life cycle. Such models have significant potential not only for design and construction, but also to improve building operation.

The project „Building Information Modeling for Building Energy Management Systems" (BIM4BEMS) investigates how BIM may be applied in order to improve operational efficiency in facilities. More specifically, the aim is to achieve improved reporting of energy and comfort related parameters by application of BIM in combination with BEMS. A dynamic BIM is developed in which facility data are combined with building management system data. Such a model may significantly improve the analysis and visualization of changes in the current state of a facility. The BIM is derived semi-automatically from available design, operational and maintenance data with semantic and geometric reasoning. BIM4BEMS investigates the following aspects that are relevant to create and use the dynamic BIM in building operation:

• Derivation of a semantic description of the operational range of building energy management systems from space data,

• Integration of building data with building management system (BMS) data, and

• Analysis and visualization of energy inefficiencies and comfort issues.

By combining space and BEMS data through geometric localization, enhanced information about the range of components as well as operational data from the building management system, it is feasible to semi-automatically generate and update the dynamic BIM. This improves the analysis and visualization of inefficiencies. The project considers a requirement of existing facilities where data from design, operation, and maintenance may be incomplete and have low information content. This means that current approaches for new construction that are based on reuse of BIMs from the design phase are not immediately applicable to existing facilities. Yet it is precisely existing facilities that often have a high potential for improved energy effectiveness and comfort. The requirement of incomplete and poorly structured base data affect the definition of the data model and workflows for partially automated generation of the dynamic BIM. The project aims for a prototypical implementation of the integration of BIM and operation, thereby validating the feasibility of developed methods. An existing office building is used as a test building. Findings from the project are shared with professional groups in BIM, Facility Management (FM), and heating, ventilation and air conditioning (HVAC) in order to extend BIM standards towards building operation.

## Projektkoordinator

- AIT Austrian Institute of Technology GmbH

## Projektpartner

- Caverion Österreich GmbH
- Technische Universität Wien