Plotting a path to reduce the energy performance gap

Improving energy efficiency performance in buildings is a major priority for the European Commission, with a target of achieving 20 percent energy savings by 2020. The EU promotes solutions which reduce energy consumption in the building sector to achieve this, an area which forms the primary research focus for the MOEEBIUS project.

The MOEEBIUS project is introducing a totally new approach to reducing energy consumption in the building sector, based on modelling the optimization of energy efficiency in buildings for urban sustainability. MOEEBIUS has been developing its work since the latter part of 2015, and the initial results are very promising.

The goal in the project was to elaborate products and services like the Integrated Energy Performance Optimization Framework, an Application for Consumers, or the multi-sensing NOD device that will enable the minimization of the aforementioned ‘performance gap’ and promote customer confidence in the effectiveness of Energy Performance Contracting (EPC). The project also looked at the ability ofESCOs (Energy Service Companies) to guarantee results and mutually agree with customers on savings targets, thus reducing the business risks that have hindered the growth of the ESCO market, especially at the EU level.

Technically, the system as a whole appears quite complicated. Standing on a white box modelling approach of buildings, systems and distributed energy resources, a diverse range of components have been developed that take advantage of the energy simulation of those models and the real time monitoring of key performance indicators in pilot sites. Those components are combined in different ways, depending on the business scenario, use case and end-users’ needs. Selected applications are: Building Energy Performance Simulation tool, Demand Flexibility Engine, Dynamic Assessment Engine, Occupants’ User Interface, Predictive Maintenance Advisor, Retrofitting Advisor Tool, Facility Manager & ESCO Management Tool, or Decision Support System.

External view of a residential building in Belgrade, Serbia.

MOEEBIUS-NOD, a wireless multi-sensor device.

From the data acquisition side, the project has introduced innovations in a multi-sensor wireless device, MOEEBIUS NOD, for indoor monitoring and distributed data acquisition and management middleware.

In the last stage of the project the partners focused on the validation of specific solution components at large-scale pilot sites, located in Portugal, the UK and Serbia, incorporating diverse building typologies, heterogeneous energy systems and spanning diverse climatic conditions. These components started from different Technology Readiness Levels (TRL) and have been developed by a diverse range of project partners, from universities to technological centres and large companies.

As Dr Pablo De Agustin, representing the MOEEBIUS project coordinator, mentions, the potential of these models, algorithms, tools, etc. is impressive. However, there is still work to be done to prove that they can work together. One of the biggest technical difficulties in the project is undoubtedly integrating all the components within the MOEEBIUS framework and adapting its architecture to the needs and constraints of each business scenario and use case.

Living Labs (LL) activities played a crucial role in elaborating solutions tailored to the needs of potential end-users, and were an element which differentiated MOEEBIUS from ostensibly similar EU projects on energy efficiency. This is an environment for experience sharing and exchange towards user-driven open innovation of products and services. The activities carried out within the MOEEBIUS Living Labs were oriented towards widely disseminating the project outcomes, creating opportunities for exploitation and replication of the project results.

Most importantly, the Living Labs served as a channel for gathering feedback from the end-users and interested stakeholders throughout the whole project. This provided a basis to optimize all project developments, so as to directly address the critical needs of end-users, building occupants and relevant stakeholders involved in the operation of the MOEEBIUS optimization framework.

The pilot sites included a diverse range of building types and uses, where the contact people included professionals (ESCOs, Aggregators, Building Managers), with a solid knowledge of energy and technology aspects. Occupants of residential buildings also acted as contact points, as Dr De Agustin explains:

“These interactions with end-users convinced us that, in order to ensure that MOEEBIUS framework answered to stakeholders’ needs in each pilot site, the solution had to be flexible and adaptable, and their requirements should be understood.”

Indeed, the Living Lab community included both end-users of the pilot sites and external experts from academia and energy business sectors, who provided feedback during the project.
MOEEBIUS

Modeling Optimization of Energy Efficiency in Buildings for Urban Sustainability

Project Objectives

MOEEBIUS introduces a Holistic Energy Performance Optimisation framework that delivers innovative tools which deeply grasp and describe real-life building operation complexities in accurate simulation predictions. The system reduce „performance gap” and enhance optimisation of building energy performance.

Project Funding

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 680517.

Project Partners

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External view (left) and Building Energy Model (right) of a primary school and sport hall complex in Mafra, Portugal.

External view (left) and Building Energy Model (right) of a primary school and sport hall complex in Mafra, Portugal.

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