EBC

Energy in Buildings and Communities Programme

Factsheet

New Generation Computational Tools for Building and Community Energy Systems

ANNEX 60

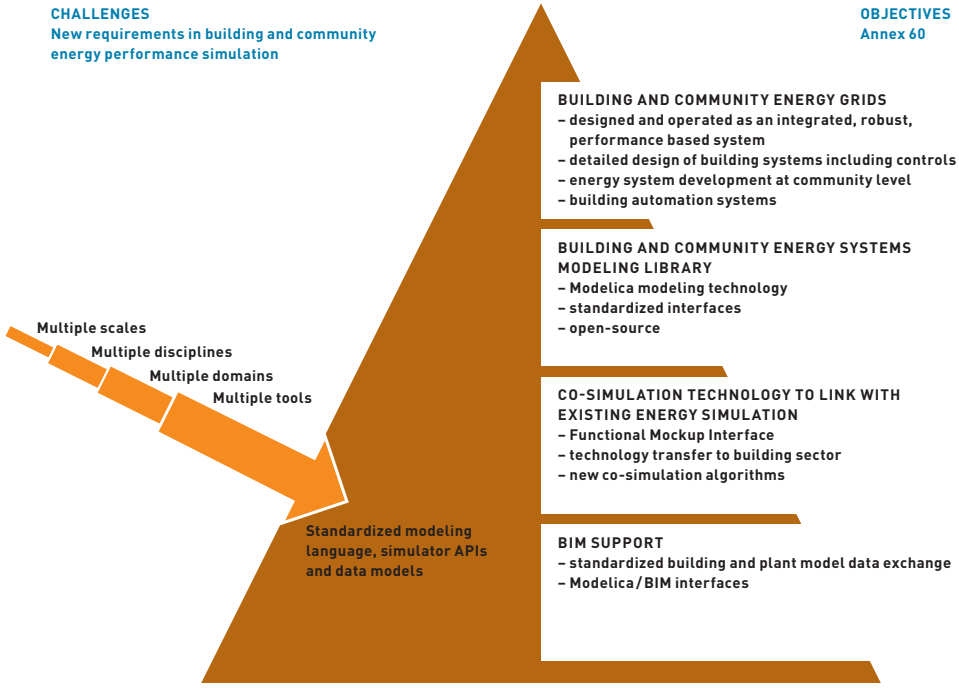
Connections from individual buildings and district energy systems will become increasingly integrated within smart grids to reduce energy and peak power and to increase occupant health and productivity. This poses new challenges for building simulation programs to support decision making during product development, building design, commissioning and operation. This situation leads to new functional requirements on computational tools for buildings that are not addressed by existing building simulation programs.

PROJECT OBJECTIVES

develop, demonstrate and deploy next-generation computational tools that allow buildings and energy grids to be designed and operated as integrated, robust, and performance based systems.

The aim of the project was to transfer approaches already commonly used in other sectors (for example aerospace and automotive) to the buildings industry. For buildings and community energy systems it has co-ordinated previously fragmented developments on next generation computing tools based on two open, non-proprietary standards:

- the Modelica modelling language, and
- the Functional Mockup Interface.



Interrelationships between technical challenges and planned project outcomes. These challenges are being addressed through the use of a standardized modelling language, standardized Application Programming Interfaces and standardized data models.

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INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA) was established as an autonomous body within the Organisation for Economic Co-operation and Development (OECD) in 1974, with the purpose of strengthening co-operation in the vital area of energy policy. As one element of this programme, member countries take part in various energy research, development and demonstration activities. The Energy in Buildings and Communities Programme has co-ordinated various research projects associated with energy prediction, monitoring and energy efficiency measures in both new and existing buildings. The results have provided much valuable information about the state of the art of building analysis and have led to further IEA co-ordinated research.

EBC VISION

By 2030, near-zero primary energy use and carbon dioxide emissions solutions have been adopted in new buildings and communities, and a wide range of reliable technical solutions have been made available for the existing building stock.

EBC MISSION

To accelerate the transformation of the built environment towards more energy efficient and sustainable buildings and communities, by the development and dissemination of knowledge and technologies through international collaborative research and innovation.

ACHIEVEMENTS

The outcomes from this project are:

- validated and documented models that can be used with multiple open source and commercial Modelica simulation environments;
- case studies that demonstrate to designers the co-design of building energy and control systems taking into account system dynamics (energy storage and controls), uncertainty and variability;
- a guidebook that explains how these technologies can be used in applications that are beyond the capabilities of traditional building simulation programs. Applications include rapid virtual prototyping, design of local and supervisory control algorithms, and deployment of models in support of commissioning and operation.

Project duration

Completed (2012–2017)

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