

Reliable Building Energy Performance Characterisation Based on Full Scale Dynamic Measurements

ANNEX 58

It is clear that quantifying the actual performance of buildings, verifying calculation models and integrating new advanced energy solutions for nearly zero or positive energy buildings can only be effectively realised by in situ testing and dynamic data analysis. But, practical experience has shown that the outcome of many on site activities can be questioned in terms of accuracy and reliability. Full scale testing requires high quality during all stages of research, starting with the test environment, such as test cells or real buildings, accuracy of sensors and correct installation, data acquisition software, and so on. It is crucial that the experimental setup (for example test layout or imposed boundary conditions for testing) is correctly designed, and produces reliable data. These outputs can then be used in dynamic data analysis based on advanced statistical methods to provide a characteristic with reliable accuracy intervals and final use of the results. If the required quality is not achieved at any of the stages, the results become inconclusive or useless. This project has therefore developed the necessary knowledge, tools and networks to achieve reliable in situ

PROJECT OBJECTIVES

- 1 develop common quality procedures for dynamic full scale testing to realise better performance analysis, and
- 2 develop models to characterize and predict the effective thermal performance of building components and whole buildings.

dynamic testing and data analysis methods that can be used to characterise the actual energy performance of building components and whole buildings.

ACHIEVEMENTS

- The state-of-the-art on full scale testing and dynamic data analysis, including a survey of existing full scale test facilities for the benefit of the building industry, engineers and consultants.



VLIET test building at KU Leuven, University of Leuven, Belgium.
 Source: KU Leuven



Test site at University of Innsbruck, Austria.
 Source: University of Innsbruck (UIBK)

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.

- Guidance on how to perform reliable full scale dynamic testing, intended for the building Industry and building research community.
- A description of the methodology to perform dynamic data analysis and performance characterisation, intended for the building research community and associates.
- A summary report (white paper) on full scale dynamic testing and data analysis to characterise building energy performance, intended for the building research community and associates.
- A few, well-documented dynamic data sets that can be used for developing dynamic data analysis procedures and for validation purpose, aimed at software developers and building research community.
- A summary report, demonstrating the applications of the developed framework, intended for building designers and industry, government and authorities.

Project duration

Completed (2011 - 2016)

Operating Agent

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Observer: Finland

Further information

www.iea-ebc.org