

# Integration of Micro-Generation and Related Energy Technologies in Buildings

## ANNEX 54

Microgeneration consists of technologies for providing energy for single buildings. Small scale systems of up to around ten kilowatts are used. The combined production of heat and power (CHP) in a single small scale process is called micro-cogeneration ( $\mu$ CHP). This can be extended to a micro-trigeneration system, if cooling power is also produced. Microgeneration also consists of technologies for small scale electricity generation, such as photovoltaic or micro-wind turbines.

Activities within this project have encompassed complete building integrated systems, also including thermal and electrical energy storage, chillers, balance of plant components such as pumps and heat exchangers and advanced control strategies. The effects of microgeneration on power distribution systems have been analysed with a focus on the building level for single

and multiple residences, along with small commercial premises.

### RESEARCH AREA

The following areas of research have been investigated:

- Field tests and laboratory measurements of microgeneration systems to derive performance parameters and input data for simulation models.
- Development of technical models for different microgeneration technologies, such as cogenerators with combustion engines, fuel cells or Stirling engines, photovoltaic systems, thermal and electrical storage and balance of plant components. The models have been validated using data from laboratory and field measurements.



A microgeneration unit in a field test. Source: TUM

## 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.

- Simulations have been used to develop an extensive library of performance assessment studies covering different combinations of technology types, performance in different countries and with different end users. Simulation work initially concentrated on improving and optimising the performance of basic, but realistic micro-generation systems. Subsequent work featured a wider range of system components, system functions and end users.
- Dissemination strategies for the mass deployment of microgeneration-related technologies have been investigated. This activity was informed by a regulatory and market review, along with data emerging from technical analyses and performance assessment studies.

## Project duration

Completed (2009 - 2014)

## Operating Agent

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## Participating countries

Belgium, Canada, P. R. China, Denmark, Finland, Germany, Italy,  
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## Further information

[www.iea-ebc.org](http://www.iea-ebc.org)