

# Design and Operational Strategies for High IAQ in Low Energy Buildings

## EBC ANNEX 68

To achieve nearly net zero energy use, all buildings in future will need to be more efficient and optimized. As new buildings are already well insulated in certain industrialised countries, the focus is shifting to limiting space heating energy consumption by reducing ventilation demand. Low energy buildings need to be airtight and energy demand for ventilation is often reduced by lowering the ventilation rate to the minimum necessary. Each of these can have adverse impacts on indoor air quality (IAQ). This project investigated how to ensure that future low energy buildings are able both to improve their energy performance and to provide comfortable and healthy indoor environments.

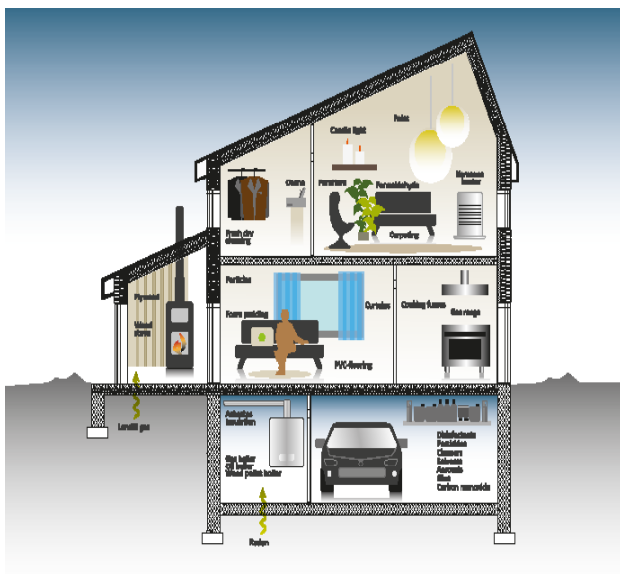
### PROJECT OBJECTIVES

1

providing a scientific basis for the design and operational strategies of buildings that have minimal energy consumption, and at the same time maintain very high standards regarding indoor environmental quality based on the control of sources, sinks and flows of heat, air, moisture, and pollutants under in-use conditions

2

collecting and providing data about properties for transport, retention and emission of chemical substances in new and recycled materials under the influence of heat and moisture transfer



An example of indoor air pollution in a typical dwelling  
Source: Technical University of Denmark

Reducing the amount of fresh air supplied to a building would save energy, but however may increase the risk of poor indoor air quality. Therefore, it is very important to find the ideal balance between energy efficiency and the need for ventilation. The aim of this project involved using existing data and tools, which in combination gives an integrated picture of the air flow, hygrothermal and air quality conditions in whole buildings with a focus on optimisation of their use and operation. This should achieve energy efficiency alongside providing healthy and comfortable indoor environments.

## 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

This project provided a scientific basis for the design and operational strategies of buildings that have minimal energy use, and at the same time maintain very high standards regarding indoor environmental quality based on the control of sources, sinks and flows of heat, air, moisture, and pollutants under in-use conditions. It also collected and provided data about properties for transport, retention and emission of chemical substances in new and recycled materials under the influence of heat and moisture transfer.

The following reports have been published as the official project deliverables:

- Defining the Metrics
- Pollutant Loads in Residential Buildings
- Modelling of Energy Efficiency and IAQ - Review, Gap analysis and Categorization
- Current Challenges, Selected Case Studies and Innovative Solutions Covering Indoor Air Quality, Ventilation Design and Control in Residences
- Field Measurements and Case Studies

### Project duration

Completed (2014 - 2020)

### Operating Agent

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### Participating countries

Austria, Belgium, Canada, P.R. China, Czech Republic, Denmark, France, Germany, Japan, R. Korea, the Netherlands, New Zealand, Norway, UK, USA  
Observers: Estonia.

### Further information

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