

# Optimized Performance of Community Energy Supply Systems with Exergy Principles

## ANNEX 64

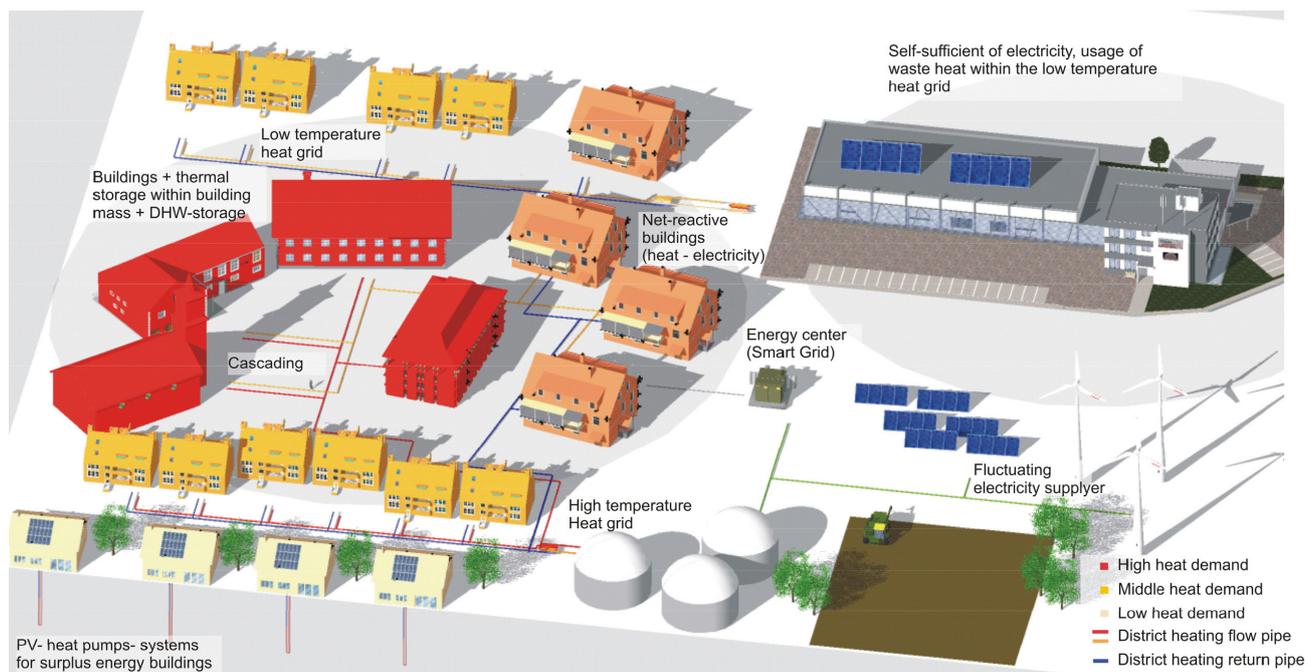
The method of exergy analysis has been found to provide the most accurate and insightful assessment of the thermodynamic features for any process, as well as offering a clear and quantitative indication of both the irreversibilities and the degree of correspondence between the resources used and the end-use energy flows. The scope of this project covered the improvement of energy conversion chains on a community scale, using an exergy basis as the primary indicator.

The project focused on both theoretical and methodological tools, as well as on modelling and on practical implementation aspects. The scope was clearly not to produce another sophisticated modelling

tool, rather to evaluate the practical application of low-exergy approaches on a community scale. Thereby, the project has contributed to technological development, the understanding of system synergies and overcoming existing implementation barriers.

### ACHIEVEMENTS

The main outcome of the project research is the 'Design Guidebook for Low Exergy Communities', which has been prepared for designers and key decision makers in the field of community energy systems. This explains holistic balancing methods and tools to display various stages of planning and design of buildings, groups of buildings and community energy supply systems.



Exergy flows in community systems - consideration of building interaction caused by different energy demands.

## 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.

## PROJECT OBJECTIVES

- 1 increasing the overall energy and exergy efficiency of community systems,
- 2 identification and application of promising technical LowEx solutions and practical implementation of future network management,
- 3 identification of business models for distribution and operation,
- 4 development of assessment methods and tools for various stages of planning, and
- 5 knowledge transfer to community actors.

### Project duration

Completed (2013–2018)

### Operating Agent

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### Participating countries

Austria, Denmark, Germany, Italy, the Netherlands, Sweden,  
USA

Observer: Turkey

### Further information

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