

# IEA Solar Heating and Cooling Programme

## Task 47: Renovation of Non-Residential Buildings Towards Sustainable Standards

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

<http://task47.iea-shc.org/>

**Context:** Task 47 started by analyzing highly successful renovation projects and innovative concepts for the most important market segments. Local authorities, companies and planners need the knowledge how to achieve market penetration of sustainable renovation solutions. Success stories and planning knowledge are communicated to target audiences to accelerate a market break-through of highly effective renovations in non-residential buildings.

**Objectives:** both technical and market oriented:

- Develop a solid knowledge base on how to renovate non-residential buildings towards the NZEB standards in a sustainable and cost efficient way.
- Identify the most important market and policy issues as well as marketing strategies.

**Scope:** The task deals with several types of non-residential buildings, including protected and historic buildings; office buildings, educational buildings and kindergartens, cultural buildings.

**Structure:** The project started January 1<sup>st</sup>, 2011 and ended June 30<sup>th</sup>, 2014. Reports and brochures are available for free download from the task 47 web-site. The task was divided into 4 subtasks:

### Subtask A: Advanced Exemplary Projects – Information Collection & Analysis

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19 exemplary renovation projects are available from the website. The projects are described in 8-page brochures presenting the key renovation actions as well as energy performance numbers, decision-making process and costs. The projects show a 50-90% reduction in heat consumption and a 50-70% reduction in overall energy demand. The example of Powerhouse Kjørbo in Norway shows that it is possible to achieve a plus energy standard combined with the highest possible BREEAM score: Outstanding.

### Subtask B: Market and Policy issues and Marketing Strategies

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To identify barriers and opportunities in the renovation process, a number of interviews of key persons involved in renovation projects have been accomplished.

Building stock analyses show that the biggest potential is in office buildings, schools and retail/shopping centers. Unfortunately, no retail buildings is represented in task 47. Across the different building types, experts see a large potential in historic buildings.

### Subtask C: Assessment of Technical Solutions and Operational Management

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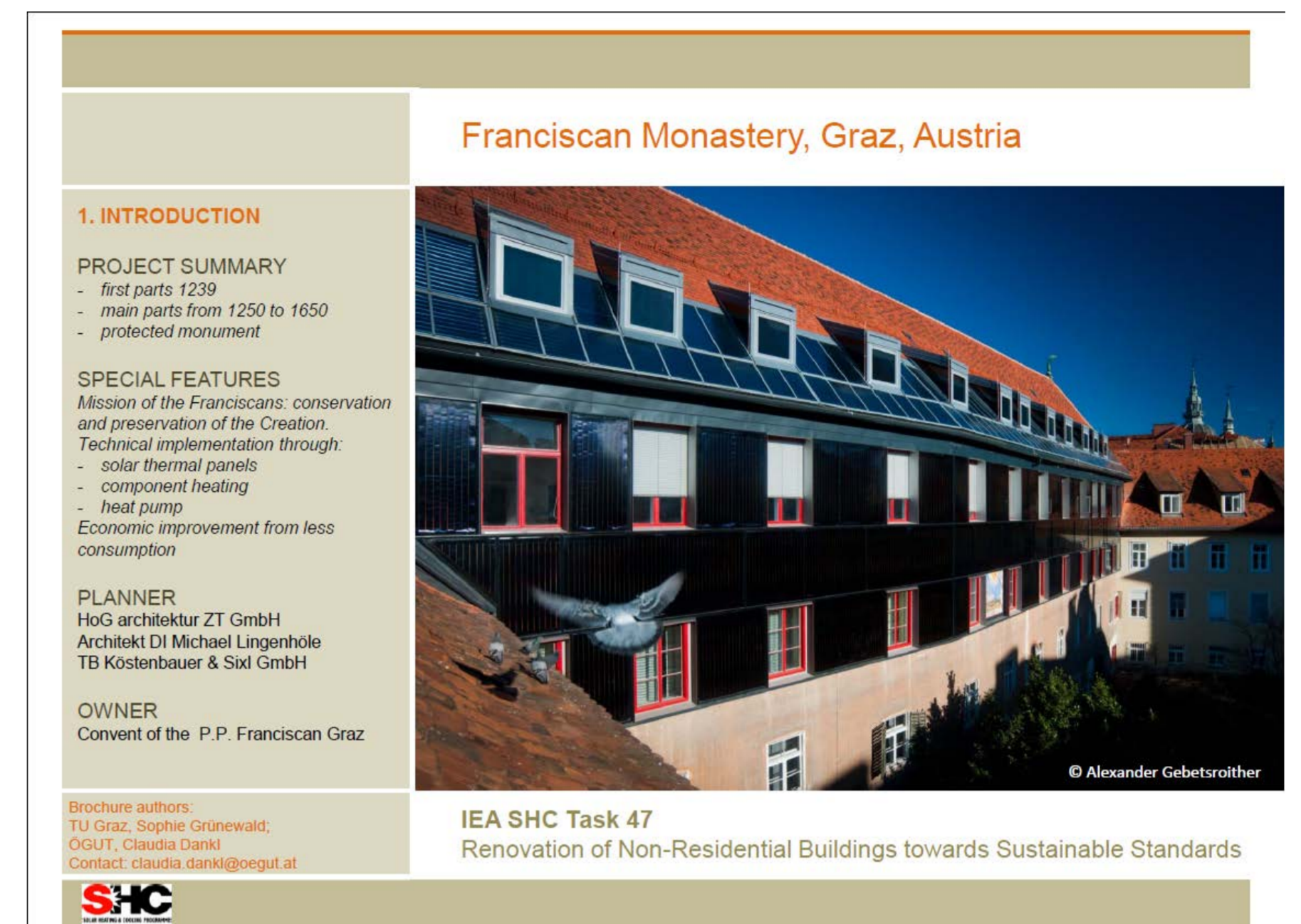
An individual technical database for the demonstration projects and their energy concepts has been established. The database includes performance numbers for monitored buildings as well as technical descriptions. The performance of eight buildings has been analyzed in terms of energy consumption and thermal comfort achieved using long-term monitoring data in high time resolution. In particular, a comparison is made between the performance before and after retrofit. It can be seen, that the buildings studied achieve the ambitious target values set during the design stage of the building.

### Subtask D: Environmental and Health Impact Assessment

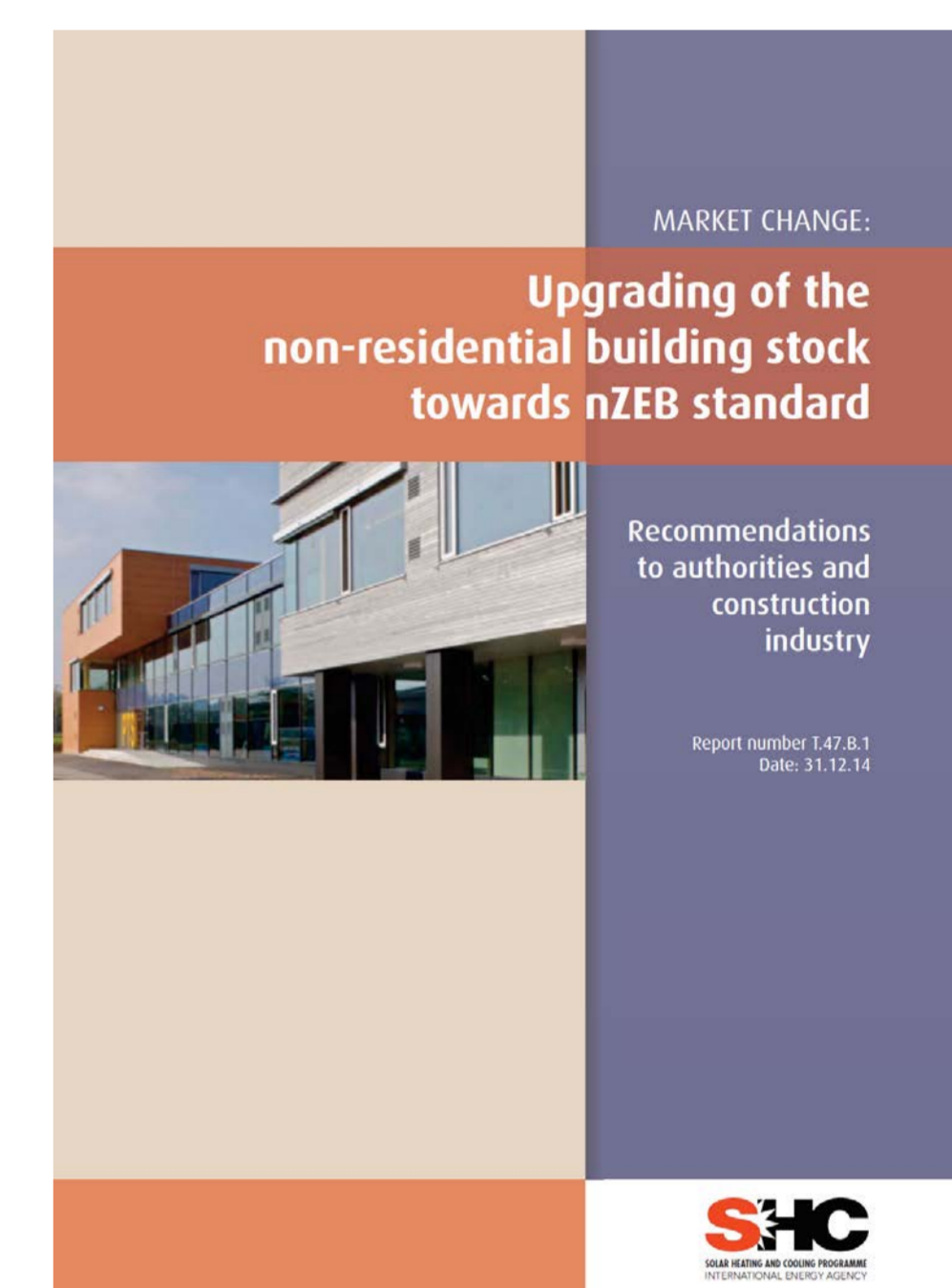
**Leader:** Sophie Trachte, University of Louvain La Neuve, Belgium [sophie.trachte@uclouvain.be](mailto:sophie.trachte@uclouvain.be)

The subtask work addressed indoor comfort and quality of life, with a special focus on school building refurbishment. The outcome is a guideline for designers and developers to be followed during renovation projects to improve significantly the energy performance of schools but also the comfort of children and teachers and the quality of life and use of school buildings. The publication is illustrated with innovative concepts of exemplary projects, some links with BREEAM Assessment methodology have been made.

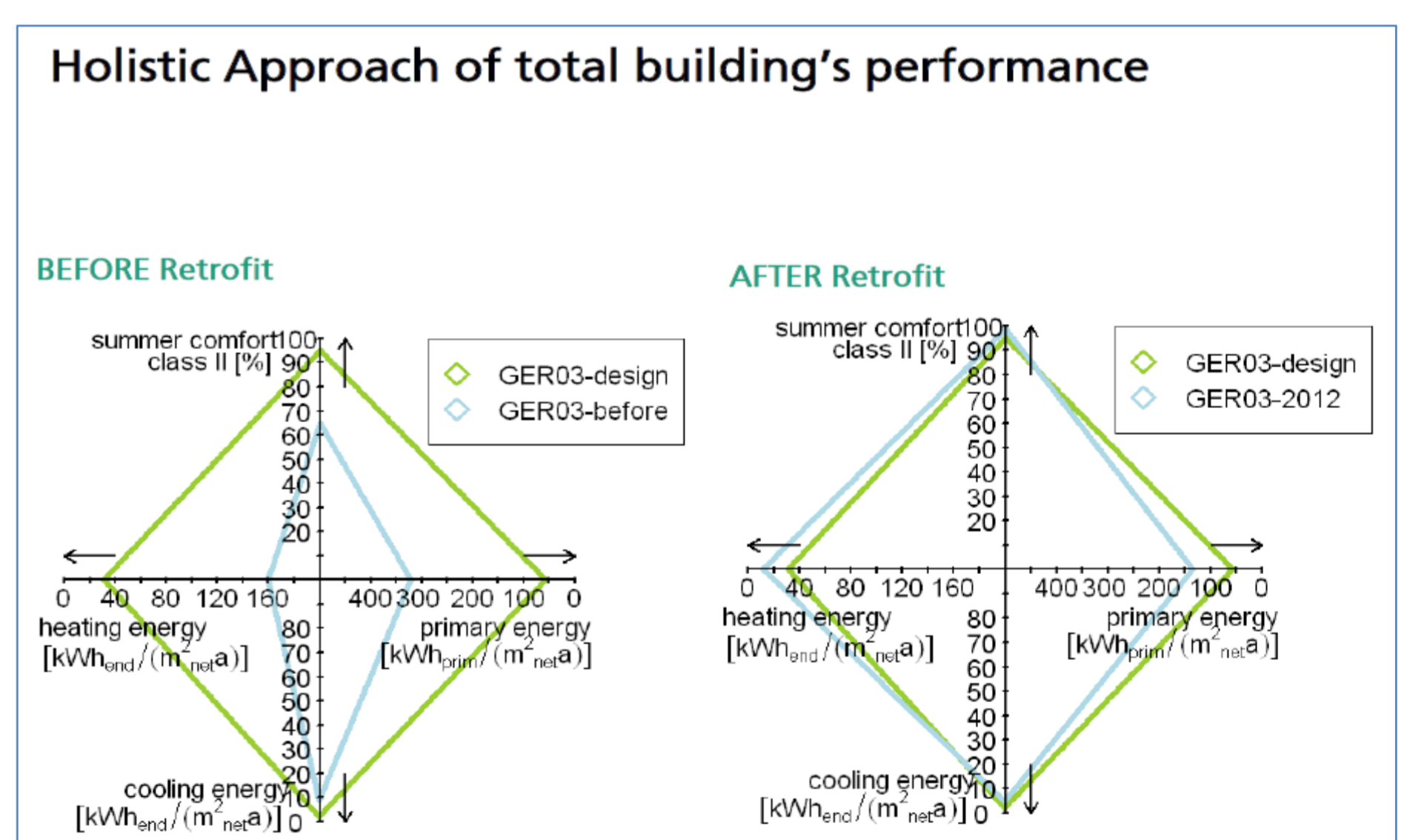
**Operating Agent:** Fritjof Salvesen, Asplan Viak, Norway



Subtask A: Front Page Exemplary Building Brochure



Subtask B Brochure – Recommendations to authorities and construction industry



Subtask C Energy Analysis

### From Design Guideline for Schools

Not all designers and planners are aware that children are not “small adults”; their metabolism, nervous system and respiratory system are not mature:

- Compared to their weight children drink and eat more, they also absorb a larger proportion of pollutants in their food.
- Children inhale twice as much air as adults compared to their weight. They breathe mainly through the mouth.
- Their metabolic elimination of toxic substances is weak.
- They spend more time near the floor and put their fingers in their mouths, increasing their exposure to toxic agents in dust and soil.

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