

Case Study:

Headquarters of the District Authority of Weiz, Austria



Summary

The headquarters of the District Authority of Weiz is located in an office building constructed in 1964. Due to new requirements concerning function, fire protection and energy demand, a comprehensive renovation has been carried out. Renovation measures include a new innovative façade system, mechanical night cooling with the existing air condition system and a circulating heat exchanger based on air. Following renovation the building is planned to achieve a very high energy standard (which is A+ in the Austrian energy certificate) – the reduction of the energy demand for heating and annual CO₂- eq. emissions per m² is about 80%. After the renovation (end of June 2011) detailed energy monitoring will be carried out to evaluate planned renovation measures.

Organisations Involved

Client: LIG Styria - Real Estate Company - Province of Styria, www.lig-stmk.at

Architect renovation: Arch. DI Erwin Kaltenecker, Passail, www.dike.at

Consultant HVAC: Technisches Büro Bierbauer, Passail, www.bierbauer-tb.at

Date

Procurement, planning: 2009 - 2010

Renovation: April 2010 – June 2011

SCI-Network Context

Working group 2: Innovative Technical Solutions.

This case study examines the practical application of two of the innovative solutions studied by this working group:

- Multifunctional facade systems
- Mechanical ventilation systems

For further information on this Working Group, or to get involved:

www.sci-network.eu

The

Process

Before procurement took place a comprehensive study of the building was conducted to develop a detailed and ambitious energy concept¹. This provided the basis for the whole procurement process. This showed that the high energy consumption for heating was mainly caused by the poor thermal quality of the building shell (u-values) and inefficient HVAC-systems. The renovation concept of the Headquarter of the District Authority of Weiz therefore took these two aspects into account.

The procurement covered planning services, construction work and building services, and was carried out in two steps. The first step was the procurement of planning services (architect, specialist consultants). The restricted procedure was used, where selected architects and specialist consultants had to show their experience in the field of energy efficient renovation through reference projects.

The second step involved tendering for construction work and building services (HVAC, electrical services, etc.). As required by Austrian procurement law, this was done through an open procurement procedure. At this stage the architect and the specialist consultants employed in the first step were responsible for the technical (environmental) specifications of the tendering documents and also for the checking the compliance of the bids. They developed detailed technical specifications for the construction work (materials, u-values, specifications for an innovative facade solution, etc.) and the building services (e.g. output power and performance of the HVAC system). Because of these detailed technical specification sustainability and innovation were not evaluated in the award stage. For the innovative façade element tender a detailed, technologically neutral specification was developed (u-value, fire protection requirements, etc.). This was developed with a specific technology in mind (GAP Solution Façade), but it was left up to bidders to offer the most appropriate solution.

Environmental Impact

- 80% projected reduction in annual heating energy demand per m² gross floor area.
- 80% projected reduction in CO₂ – eq. emissions per m² gross floor area

Results

The improvement of the thermal building shell (nearly passive house standard) and the implementation of mechanical ventilation with heat recovery should result in an 80% reduction in the annual heating energy demand per m² gross floor area.

A more energy efficient HVAC system is also being installed. The existing air conditioning system will be used for heat distribution, with mechanical night ventilation in the summer reducing the cooling energy demand. The circulating heat exchanger has an efficiency factor for heat recovery of 75% – 85%.

The annual reduction of CO₂- eq. per m² gross floor area for these measures, based on the final energy demand for heating (district heating, no change in the energy source), is about 80%.

¹ This was carried out within the Austrian “Ökosan” research project

Table 1: Energy performance before and after renovation

Energy performance		
in kWh/m ² /year (Calculation results from the Austrian energy certificate)		
	Existing building	Renovated building
Useful energy demand for heating	144	20
Final energy demand	199	66
CO ₂ - equivalents in kg/m ² /year		
CO ₂ -equ. District heating	48	9

Budget and Finances

Currently no operation cost details are available, but based on the projected heat demand reductions, an 80% reduction in district heating costs is also estimated.

Detailed information on costs will be available after the first few years of operation, as a comprehensive monitoring system for energy consumption for heating, cooling and electrical energy will be installed.

Lessons Learned

One of the most important key success factors was the comprehensive programming stage, where a detailed study of different renovation measures and their potential for energy saving was carried out. The clear setting of targets concerning energy and environment closely linked with construction and building service costs enabled successful implementation.

Furthermore the involvement of planners (architect, HVAC planner) with substantial experience and knowledge in the sector of energy efficient buildings was a significant success factor. Comprehensive and detailed tendering documents with clear technical specifications concerning energy aspects are further success factors in this ambitious renovation project.

Potential for replication can be found both on the technical and organisational level. For buildings with mechanical ventilation the additional use of mechanical night cooling in most European countries (middle and northern European climate) might be an interesting alternative to energy-intensive vapour compression machines. At the organisation level higher investments in the programming stage and a detailed, comprehensive tendering are important strategies to enable energy efficient renovation projects.

Innovative solutions

- Mechanical night cooling with existing air condition system
- Thermal insulation with multifunctional façade system
- Circulating heat exchanger based on air
- Comprehensive evaluation measures (energy monitoring)

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