

MountEE - Energy efficient and sustainable building
in European municipalities in mountain regions
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QUESTIONNAIRE GOOD PRACTICE

SUSTAINABLE BUILDINGS

**SUSTAINABLE TOTAL REFURBISHMENT OF THE HIGH SCHOOL IN SON-
THOFEN IN PASSIVE HOUSE STANDARD WITH A REDUCTION OF CO₂ OF
OVER 80 %.**

CATEGORY: MODEL PROJECTS BUILDINGS

Region / local area considered: City of Sonthofen, Germany, Alps	Good practice submitted by CIPRA
<p>1) Short description of the project</p> <p>„Nachhaltige Generalsanierung des Gymnasiums Sonthofen in Passivhausbauweise mit einer Einsparung von über 80 % CO₂ im Vergleich zum Bestand“</p> <p>Total refurbishment with high energy and spatial standards of the high school in Sonthofen at running school business. Integrated planning taking into consideration ecological and economic criteria such as energy saving, life cycle costs and the use of regional and sustainable construction materials. Reduction of follow-up costs and maintenance of the building value in the long term. Reduction of the use of fossil energies and of CO₂ emissions of over 80%.</p>	
<p>2) Background/targets</p> <p>The School was built in the 70s in precast concrete structure, and had a very high demand of energy. The city decided to refurbish the building.</p> <p>Targets: correct deficiencies in terms of safety, fire protection, construction physics, construction, lighting, room air, functional and spatial deficiencies and pollution with cold-mix foundation fibers. Carry out at running school business A factor 10 total refurbishment with high energy and spatial standards. Integrated planning taking into consideration ecological and economic criteria such as energy saving, life cycle costs and the use of regional and sustainable construction materials. Reduction of follow-up costs and maintenance of the building value in the long term. Reduction of the use of fossil energies and of CO₂ emissions of over 80%. Carry out an integrated planning involving the architect, all specialist planners and the school. Improvement of the learning environment for pupils. Transferability of the experiences to other school buildings of the same construction type.</p> <p>The refurbishment of the high school is one of the projects of the long term/holistic strategy of the city of Sonthofen, which aims to reduce the energy consumption of its buildings.</p>	
<p>3) Detailed project/program description</p> <p>The project was inspired by the best-practice-example Schwanstadt/AT. The driving force behind the first steps of planning was the Department of Facility Management of the city of Sonthofen (contact: see below). In contrast to other schools in Bavaria, where it's a topic for the district-administration, the city of Sonthofen bears the responsibility for the school.</p> <p>Planning steps:</p> <ul style="list-style-type: none"> - Inspiration by good practice-example, local need and responsibility for a similar building - Search for expert-planners together with local institutions (Energie-&Umweltzentrum Allgäu) - Acquisition of Funding from Deutschen Bundesstiftung Umwelt (DBU) for building-analysis 	

A detailed analysis of the old construction materials was the basis of the integrated planning of the refurbishment. The specialist planners worked together within a consortium, this is an advantage, as there is only one speaker/contact person of the planners. Responsibilities are assigned explicitly; involvement of e.g. the school is easier. Life cycle costs of single construction parts were analyzed in detail and special attention was paid to the use of regional and sustainable construction materials. In order to create an optimum learning environment sophisticated simulations of the ventilation and lighting technologies were carried out. The use of prefabricated components shortened the duration of the construction work. A continuous control of the refurbishment works in course ensured that the objectives could be met. After the finalization of the refurbishment works a two years monitoring is set up to control and regulate the installation technologies.

- The analysis proposed two options, of which the city council accepted the more energy-efficient one.
- The realization was done by the same specialist planners, who did the analysis. They employed experts for details (lighting, ventilation etc.) and a local architect to be available more quickly.

There occurred no specific complications, even though there was a third party liability insurance and responsibilities were assigned clearly. Several partners and experts gained experience, as it was the first project of that kind for many.

4) Funding/financing/costs

Total costs: 17 Mio. Euro

How is the strategy/building project/instrument financed? Who is involved (public, private bodies, users, etc.)?

Funding from Deutsche Bundesstiftung Umwelt (DBU): 125.000,00 €, for the analysis of the building structure and planning

Involvement on part of the city stayed low. The school-representatives could address their ideas directly to the planners, the Department of Facility Management engaged in Public relation-activities, the City Council was needed for only the most important decisions

Public Relations include information material by the funding "Deutsche Bundesstiftung für Umwelt" and demand-oriented activities by the Department of Facility Management, e.g. three public days at the construction site, presentations at various events.

The costs of operation are carried by the City of Sonthofen, the expenditures for energy were lowered by 80%.

5) Main results

CO₂ emissions of the high school are reduced by more than 80% compared to the old building. This corresponds to a reduction of CO₂ emissions of about 440 tons per year. An analysis of life cycle costs allows to reduce follow-up costs for single construction parts and a longer life time for certain parts. Through a longer life time material and energy can be

saved. The re-use of the existing reinforced concrete structure also saved CO₂, raw materials and energy which would have been emitted for the construction of a new building. A further reduction of CO₂ and energy was reached by short transport distances for regional construction materials.

6) Analysis – lessons learnt and success factors

If such a refurbishment is considered and planned in an integrated way it becomes obvious that refurbishments of existing buildings for more energy efficiency are worth the costs in the long term due to lower running costs. An important reduction of CO₂ emissions could be reached through an effective refurbishment of the building envelope and the use of efficient environmental technologies at running school business. Attractive learning environments with a standard corresponding to a new building and with a high spatial quality for optimum learning conditions could be created. The re-use of existing construction material saved energy and costs compared to a new construction.

The experiences can be transferred to other school buildings of the same construction type. One of the initial objectives of the refurbishment was to document the transferability of the experiences to other projects and to pass on the gained knowledge. The high school has been built from 1972 to 1974 in precast concrete structure according to the "Kasseler Modell". At the same time many schools of the same model have been constructed throughout Germany due to highly increasing pupil numbers. The experiences should become part of a guideline for refurbishments of these buildings.

7) Time frame

Start date: Start of planning in August 2008,
Start of first construction phase in August 2009
Duration: 2,5 years for the construction works

8) Contact project owner

Organisation: City of Sonthofen/DE, Stadt Sonthofen Abteilung Gebäudemanagement

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More information: www.dbu.de/OPAC/ab/DBU-Abschlussbericht-AZ-25812_01.pdf;
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More picture sand diagrams in the pdf-links above.



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