SUSTAINABLE CONSTRUCTION AND RENOVATION

Background: Worldwide, the construction, use and renovation of houses accounts for about half the energy consumption. In Europe, heating rooms and water accounts for most of the energy used in housing. Fuel and gas are the most frequently used energy sources. Therefore construction and renovation have a large energy reduction potential. But for many municipalities the transition to a new sustainable and energy-efficient way of building is a major challenge. With the MountEE project – sustainable public buildings, three European mountain areas show how it works.

Photo © Tengbom

ÄLVDALEN SCHOOL, ÄLVDALEN MUNICIPALITY

WHAT

Älvdalen Municipality set themselves a high target when their new school was being procured. Requirements were very high as regards energy and materials. The new building had to be possible to use for different groups, all day and all year. Ventilation and heating systems were planned on this basis. The facilities had to be flexible and easy to adapt to different activities. The town library will be moving in and there will be facilities for a cinema, for sports and for lectures. To be able to spread knowledge about renewable energy, a small solar energy unit will be constructed at the school.

FACTS

Type of building (use) // School, library and café
Year // 2015
Size // 7 438 m^2
Investment // Approx 200 000 000 SEK
Energy demand // Requirement: 69 kWh/(m^2/Atemp)
Renewable Energy // District heating based on forest biofuels (woodchips)
Ventilation System // Heat recovery by exchanger
Air tightness // Requirement: 0,15 l/(sec, m^2)
Building material // Local materials such as wood and stone (Älvdal quartzite)

Photo © Tengbom

HOW

The project is sponsored by a local forest company, making it possible to use a timber construction. The wooden façade will be treated with an environmentally compatible preservative lasting at least 40 years. All construction materials have been selected according to Sunda Hus criteria, focusing local products. Energy requirements meet Minienergihus standards, and the project managers would like to try out new methods in order to reduce running costs. Training courses will be held for those using the new facilities so they can contribute to energy savings, waste fractioning and other environmental targets.

LESSONS LEARNED

1. Small municipalities find it difficult to manage procurement of major construction projects. There has previously been a lack of support in this area.
2. Architects' drawings and aesthetically pleasing solutions do not always support energy requirements. It's essential that the architects understand the requirements from the outset.
3. There should be much emphasis on future running and maintenance costs right from the planning stage.
4. Important to discuss procedures for monitoring the project and the requirements made.
5. By locating ventilation equipment in the attic instead of the cellar, cellar area could be reduced by 800 m^2.

More information on the municipal website

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SERVICE

Read more about the MountEE project and other pilot buildings at: www.mountee.eu

Funding Programme

Co-funded by the Intelligent Energy Europe Programme of the European Union

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Photo © Falu Kommun

ASPEBODA SCHOOL, FALUN MUNICIPALITY

WHAT

Falun Municipality remains at the forefront of energy-efficient construction. When a new school was to be built in the village of Aspeboda, the authority wanted to challenge current energy criteria. For example, the energy demand was set at 40 kwh/m^2, less than half of the level required by construction regulations. The school is now in use and the new requirements have been more than fulfilled, not least because the building is so well sealed. In an external evaluation it was found to be up to international standards, the only comments concerned certain materials (e.g. PVC flooring). The villagers appreciate their new school, which blends well with the setting. It is seen as bright and airy, despite its compact room.

FACTS

Type of building (use) // Primary School
Year // 2014
Size // 1252 m^2
Investment // 25 million SEK, no kitchen in building
Energy demand // 36 kWh/(m^2/Atemp)
Renewable Energy // Biomass district heating from municipal heating company
Ventilation System // Heat recovery by exchanger (84%)
Air tightness // 0,16 l/(sec, m^2)
Building material // Wood, in line with municipal timber building strategy

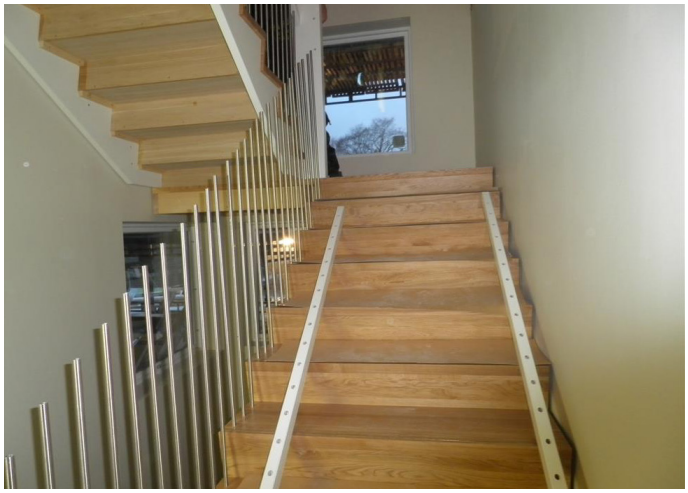

Photo © Falu Kommun

HOW

One of the success factors was close and frequent communications, not least with school staff. Uniquely, both the purchasing and technical managers took part in all planning meetings. Energy balance was calculated both before and after the planning process. All parties involved knew from the start what performance levels were required. These targets were then monitored throughout the entire process. The entire school is built of wood, including the joists. For fire prevention, all wooden surfaces indoors had to be covered with plasterboard. All lighting is LED-based with automatic switch-off.

LESSONS LEARNED

1. Energy-efficient building need not entail increased costs. Slightly thicker walls, careful sealing and planning from energy efficiency right from the drawing-board can prove sufficient.
2. Connectivity for mobile phones may be a problem as low energy windows have a metal layer.
3. The municipality can improve its use of totally emission-free materials. The 2014 Wooden Buildings strategy is already being implemented and use of materials databases such as Basta or Sunda Hus is being planned for the future.
4. The municipality could use this unique building more in its communications work.
5. The sub-contractor maintained that a concrete joist system would have been cheaper and simpler.

More information on the municipal website

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Photo © Vansbro Kommun

MYRBACKA SCHOOL, VANSBRO MUNICIPALITY

WHAT

For years, Myrbacka school has comprised two buildings. When one of them was condemned for fire safety reasons, new facilities were acutely needed. The municipality decided to retain the more modern building, connecting it with a new building by way of a corridor. The buildings have the same heating system but different systems for ventilation. When the municipality joined the MountEE project at a late stage in the planning process, requirements were accordingly increased for energy efficiency and building materials in the new building. The target was to meet the Minienergihus criteria. Despite a late entry into the project, both budget and environmental targets have been met.

FACTS

Type of building (use) // Junior school
Year // 2014
Size // 1050 m^2
Investment // 20 million SEK, not including outdoor work
Energy demand // 69 kWh/(m^2/Atemp)
Renewable Energy // Woodchips for heating and hot water, Dalakraft for operating power
Ventilation System // FTX heat exchanger, CO2 sensor for regulation
Air tightness // 0,22 l/(sec, m^2)
Building material // Brick and fibre cement. Otherwise in accordance with BASTA database

Photo © Vansbro Kommun

HOW

As part of the Mount EE project we had a fruitful meeting with Dalarna University, the construction company and others – to discuss weatherization. This led to us being able to exceed even these high requirements. Every single pinhole is sealed is weather. The project management has monitored energy standards systematically throughout the course of the entire project. Keeping materials dry at all times has been important and they were therefore ordered in plastic casings and stored under shelter. Plasterboard, acoustic blocks and linoleum are examples of materials used indoors. Plastic flooring was used in wet rooms.

LESSONS LEARNED

1. Most difficult to weatherize in corners and supporting walls.
2. Important for all stakeholders to have a say at an early stage. Create a joint strategy including needs, wishes and requirements.
3. No stress in the planning stage. Redrawing is easier than rebuilding.
4. Structures such as LCC, BASTA, FEBY and similar must be applied systematically. Which of them are to be used and how, should be stated in municipal strategies.
5. For evaluation and new energy balance calculations, the procuring party must create procedures and resources for follow-up.

More information on the municipal website

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Photo © Säters Kommun

ÄVENTYRET PRE-SCHOOL, SÄTER MUNICIPALITY

WHAT

Councillors in Säter were planning to build a highly energy-efficient pre-school building. When the — project became part of MountEE, requirements were increased even more, to the level of "Minienergihus". Säter will be building several more new pre-schools in the future, using Äventyret as a reference point and built to this standard or better. They chose to build an efficient climate envelope, so as not to be dependent on advanced technology. The two buildings were linked by a highly-appreciated glass-covered play area. Otherwise the construction if fairly traditional, but with thicker walls, lower air infiltration and better doors and windows.

FACTS

Type of building (use) // Pre-school
Year // 2014
Size // Atemp, 171 m^2 unheated area, 161 m^2 outdoor room (+2°C)
Investment // Approx 23 million SEK
Energy demand // 69 kWh/(m^2/Atemp)
Renewable Energy // District heating and solar panels.
Ventilation System // Heat exchager, boreholes to heat/cool incoming air
Air tightness // 0,3 l/(sec, m^2)
Building material //Mixed materials, mainly wood. Target to meet Basta criteria

Photo © Anna Vickholm, Säters Kommun

HOW

Study-visits to other pre-schools and regular staff meetings to discuss what the rooms should look like. Both children and parents were involved. Architects, facilities manager and pre-school staff had fruitful meetings at an early stage. They had to identify acceptable solutions even though the building had to be a V-shape and on a slope. The project was careful to integrate experience from the maintenance of other buildings. For example, it was important to be able to adjust the temperature of incoming air according to whether the rooms in question needed heating or cooling.

LESSONS LEARNED

1. The glass-covered area gets too hot during the summer and attracts a lot of flies. The idea of a protected outdoor area was nevertheless much appreciated.
2. The doors are heavy and the children have difficulty opening them.
3. Indoor air is considered dry.
4. System design worked well, thanks to close collaboration between headteacher, purchasing manager and architects.
5. Structures such as LCC, Basta and Feby can be utilised more systematically. Feby will be used as a monitoring tool in future projects.
6. A lot of knowledge rests with individuals. There is a need to document decisions and guidelines so that new co-workers can easily access the knowledge.

More information on the municipal website

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