

Cultural Centre Proevhallen, Copenhagen, Denmark

The Proevhallen demonstration project proves that introducing the right concept of energy conservation measures and renewable energy integration into a renovation project can bring the resulting building up to an energy standard that is considerable better than current building regulations at reasonable costs and payback time.

Context

The site is located in an urban area called Valby located in Copenhagen. The building, Proevhallen ("The test hall") was part of an industrial complex - a porcelain fabric.



Before renovation

Ventilation

The building is ventilated by a combination of natural ventilation – of the upper floor – and mechanical ventilation of the lower floors which includes bathroom and toilets. The upper parts of the high windows are used for natural ventilation of the upper floor. As the openings are placed high above the ceiling the incoming air will be mixed with the indoor air – thus reducing the risks for cold draughts.

Solar PV & Solar PV/Thermal (PV/T)

Two kinds of PV plants are installed at Proevhallen; One at the gable (19 kWp) which is made with an artistic expression and one innovative PV-T plant (6kWp) which also delivers heat by coo-ling by a heatpump. The cooling raises the efficiency of the PVs. The produced electricity are used in the building or sold to the electricity grid.

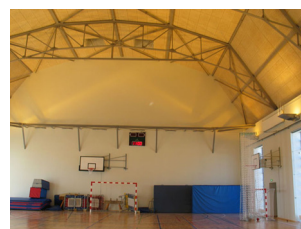
Savings and costs

He table below shows the estimated savings (which has been verified). The overall payback time is 14 years

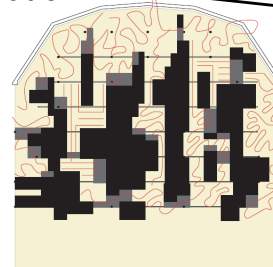
Energy saving measures, heating, cooling, ventilation	[kWh/m ² a]	Total [kWh/a]
High efficient ventilation	47,2	118000
Improved insulation of the façade	6,0	15000
Low-e windows	8,0	20000
Heat savings (lower water use)	9,2	23000
BEMS	12,0	30000
Combined PV and Thermal heating system	6,6	16500
Total heating energy savings	89,0	222500

Building construction

Proevhallen had not been used for a number of years. It was an empty hall with only a ground floor in spite of a height of 18 m. Because of its original purpose it had been built as a minimal construction with no insulation in walls and windows and simple single glass metal frame windows. In the renovation process 2 new floors had to be fitted in, and insulation and new windows had to be installed. The building had been unheated and ventilated solely by the port opening and the windows, so also complete heating and ventilation systems had to be designed and installed. As there was not energy consumption before retrofit to compare to the energy saving design had to compare to the existing requirements in the Danish building regulations and estimate the savings compared to a building renovated to these requirements. Complying with the requirements in the building regulations was not a requirement for the renovation as it was valid only for new buildings



After renovation



Lessons learned

The main impression is that by pushing and trying hard enough you can move "what is possible" quite a bit further than what is first indicated by building designers and contractors.

The examples of this experience are:

- * The competition between the window manufactures made it possible to come up with quite low U-values for the whole window even considering the rather small individual glazing areas.
- * As always the first reaction from the contractors is that "this is too expensive". In the actual situation it was the BEMS system. But by negotiations it finally got through the process.

Germany: Stuttgart



Nursing Home Filderhof

Great Britain: Plymouth



City College Plymouth

Norway: Asker



Borgen Community Centre

Norway: Hagafoss



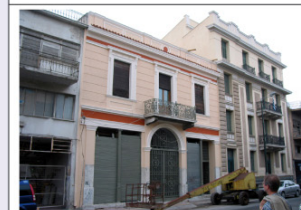
Church Hol Commune

Denmark: Copenhagen



Cultural Centre Proevhallen

Greece: Athens



Evonymos Ecological Library

Czech Republic: Brno



Social Centre "Brewery"

Lithuania: Vilnius



Main Building Vilnius Gediminas University