

EXTENSIVE ENERGY RENOVATION OF OFFICE BUILDING ROCKWOOL INTERNATIONAL

September 2013



The existing building

The office building "Centre 2" was built in 1979 and has an area of 3,626 m². The work places were outdated and the energy performance and indoor climate far below the current standard of an office building.

The aim of the renovation has been to upgrade the energy performance to meet the future Danish low energy class for new buildings for 2015 and to make first class work places. An alternative to the extensive renovation was to demolish the old office building and construct a new one. However, this solution turned out to be more expensive and to have a higher environmental impact primarily due to the heavy concrete structure of the existing building.

The existing building was heated by electrical heating and with standard 2 layer windows. The ventilation system was without heat recovery. There is a parking cellar under the building which is causing a big heat loss through the floor.

85% reduction in energy consumption

The existing office building consumed 264 kWh/m² per year. After the extensive energy renovation the consumption will be reduced to 38,5 kWh/m² per year which equals a reduction of 85%.

The renovation has included the following works: new facades including new windows, insulation of floors and ceilings, toilettes, bathrooms, heating (heat pumps with ground heat) and cooling system, water based solar



Foto: Office area facing one of the patios

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collectors, photovoltage and mechanical ventilation with heat recovery. The work places will be made for different functions by using movable glass walls. Two out of four green gardens will be covered by a roof to create two atriums.

To reduce the energy consumption in the office building the following measures have been installed:

- New facades with 395 mm Rockwool-FlexSystem (U-value: 0,08 W/m²K)
- Extra 180 mm Hardrock insulation and granulate in the parking deck (total 300-750 mm Rockwool insulation; U-value: 0,06 W/m²K)
- New 3 layer windows (Outrup windows with high density Rockwool frames U-value 0,75 W/m²K)
- LED electrical light
- Mechanical ventilation with heat recovery (84 %) and cooling – indoor climate Class A
- Natural ventilation in the top of the building
- Heat pumps (2x75 kW) with 15 vertical 150 m deep wells
- 86 m² heat collector for hot water (production 3 kWh/m² year)
- 170 m² PV (production 17 kWh/m² year)
- The renovated building will be EEC-ECO-Life certificated. (<http://www.ecolife-project.eu/>)

Cost of the renovation project

The total cost of the renovation project is 16,700 dkr/m² (~2255 €/m²). The part of the total cost which is directly related to the improvement in energy performance is approx. 9,700 dkr/m² (~1300 €/m²) – this cost covers all the works related to the energy performance and does not only represent the additional cost for going further than the current minimum requirements when renovating a building – this additional cost will be significant lower. The total cost related to the energy renovation makes up 58 % of the total project cost.

During the renovation work it was discovered that the existing building had a severe attack of rot, mould and fungus in the existing floor. The additional cost for the mould and fungus repair has been equally split between energy related cost and the cost of the renovation work.

Demolishing and building a new office building would have increased the cost with € 4 mill. compared to the extensive energy renovation project.



Foto: Renovation of Centre 2 - office area facing one of open gardens. The old wooden structure and the new ventilation system will be part of the visual architecture in the new building.