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Energy efficiency measures – a lifecycle perspective

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Purpose of the study

- The purpose of this study was to analyse various measures and opportunities to improve energy efficiency for future refurbishment of a building in Sege Park, Malmö.
- The building is a former hospital and psychiatric ward built in the 1930's
- In cooperation with Malmö Stadsfastigheter and Serviceförvaltningen



Analysis of energy efficiency measures

- Demand controlled ventilation
- ESX-ventilation with plate heat exchanger
- Recirculation of heat from ventilated air and heat pump
- Supplementary insulation the attic
- Supplementary insulation of external walls
- Energi efficient windows
- Radiators shut off automatically when opening windows
- Solar collectors for pre-heating radiators and varm water
- Individuell measuring of hot water



Method

- The energy performance has been simulated with VIP-energy
- General climate data for Malmö has been used
- Prerequisites such as wind, sun and shadowing has been assessed from observations on site



Life cycle analysis based on net present value

- Prerequisites for the assessment:
- All measures is assumed to have a life span of 50 years
- No remaining value after 50 years
- Energy savings is the only factor affecting future revenues
- The price of energy is for 2012 assessed to be 0,75 SEKkWh.
- The annual price change is assessed to 2%
- The calculated rate of return is set to 6%.
- The calculation is made to assess the maximum investment possible based to achieve a profit level of 6% (calculated rate of return)



Ventilation

- Energy savings 43 500 kWh a year
- Maximum investment 696 000 SEK.



Supplementary insulation

Attic

- Energy savings 3 600 kWh a year
- Maximum investment 58 000 SEK.

External walls

- Energy savings 46 000 kWh a year
- Maximum investment 736 000 SEK.



Windows

U-value 1,4

- Energy savings 32 200 kWh a year
- Maximum investment 532 000 SEK

U-value 0,9

- Energy savings 43 600 kWh a year
- Maximum investment 698 000 SEK.



Solar collectors

If the added energy is assumed to 300-400 kWh per squaremeter the energy savings will amount to 24 000 – 32 000 Kwh a year. This will allow for a maximum investment in range from 384 000 SEK to 512 000 SEK



Individual measuring of hot water

- Based on a reduced usage of hot water from 58 to 42 litres per person and day and 1,2 person inhabiting each apartment the energy saving will amount 12 750 kWh a year
- This allows for a maximum investment of 204 000 SEK



Further Studies

The forthcoming evaluation of the Sege Park refurbishment will focus on the following:

- How is a calculated rate of return to be assessed with respect to climate change and sustainability as well as profit demands on invested capital?
- How can various criteria relevant for assessing energy efficient measures be evaluated in the decision process of the real estate owner?
- How is the feasibility of energy efficient measures evaluated with respect to function, technology, financing, quality and sustainability?





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