ROW - Albertslund, DK

Bjørnens Kvarter 15C og 15D

PROJECT SUMMARY
Renovation and additional insulation of roof, facades and floor. New bay windows, bathrooms, kitchens and interior surfaces. Designed per Danish low energy class 2 (63,3 kWh/m² a for a 120 m² house).

SPECIAL FEATURES
Solar panels for domestic hot water and mechanical ventilation with heat recovery

ARCHITECT
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ENERGY CONSULTANT
Niras Consulting Engineers, DK

OWNER
BoVest Housing Company, DK

Photo: NOVA5

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation
BACKGROUND

The houses in the residential area of Albertslund South were built in 1963-65. Among other types there are 550 terrace houses. These suffered from difficult to solve construction problems. Therefore, the owner, BoVest Housing Co. decided for a comprehensive renovation.

Due to a fire in two of the houses (Bjørnens Kvartaer 15C og 15D), these were selected as exhibition units to demonstrate how the renovated houses would look.

It is the aim that the houses are renovated to comply with the Danish standards for low energy class 2 (63.3 kWh/m² a for a house of 120m²). To meet this goal solar panels and mechanical ventilation with heat recovery were installed.

SUMMARY OF THE RENOVATION

• New roof construction (prefabricated roof elements)
• Additional insulation of lightweight facades
• New windows and doors with triple glazing
• New kitchens and new bathrooms
• Mechanical ventilation with heat recovery
• Solar panels for domestic hot water and floor heating
• Mounting of prefabricated bay windows

Photos: NOVA5

Drawings: NOVA5
SOLAR HEATING

One of the houses has solar panels mounted on the roof. It contributes 11.4 kWh/m² a.

The panels are 5 m² and hot-water tank is 255 litre.

VENTILATION

The mechanical balanced ventilation system provides a constant airflow of 240 m³/h. It is located in a kitchen cupboard and includes an efficient counter-flow heat exchanger with 85-90% heat recovery.

Air is exhausted from the kitchen, bathroom and hallway. Fresh air is supplied to all bed rooms and the living room. Ducts are partially visible, partially above suspended ceilings and partly in the insulation layer in the ground deck.

The specific fan power (SFP) for the entire ventilation system is 1.2 kJ/m³.
BAY WINDOWS

As part of the renovation bay windows were added to the row houses. This enlarges the indoor area and to creates better daylighting of the space.

Photos: BoVest

Drawings: NOVA5
Large glazing areas improve daylighting

**CONSTRUCTION**

**Floor**  
*U-value: 0.15 W/(m²·K)*  
(interior to exterior)  
White oiled parquet (on joists)  22 mm  
Joists  50 mm  
Vapour barrier  
In-situ casted ground deck floor heating  150 mm  
Rigid insulation  300 mm  
Capillary break layer  150 mm  
Total  672 mm

**Wall**  
*U-value: 0.18 W/(m²·K)*  
(interior to exterior)  
2 layer of plaster  24 mm  
Vapour barrier  
Lightweight element  200 mm  
Insulation  200 mm  
Plastering  
Total  424 mm

**Roof**  
*U-value: 0.12 W/(m²·K)*  
(top down)  
Lightweight prefab. element:  
Asphalt roofing + air gap  45 mm  
Insulated ridge construction  400 mm  
Vapour barrier  
Suspended ceiling  200 mm  
2 layers of plaster on steel section  24 mm  
Total  669 mm

Photos: BoVest  
Drawings: NOVA5
Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Roof</td>
<td>0.19</td>
<td>0.12</td>
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<tr>
<td>Walls (lightweight)</td>
<td>0.36</td>
<td>0.18</td>
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<tr>
<td></td>
<td>-0.45</td>
<td></td>
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<tr>
<td>Floor</td>
<td>0.60</td>
<td>0.15</td>
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<tr>
<td>Windows*</td>
<td>2.8</td>
<td>1.42</td>
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* the U-values vary from 1.02 to 1.85; the most commonly used windows have U-values of 1.42 W/m²K.

** ENERGY PERFORMANCE **

Space + water heating (primary energy)*

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<tbody>
<tr>
<td></td>
<td>163.5 kWh/m² a</td>
<td>40.4 kWh/m² a</td>
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<td>38.5 kWh/m² a</td>
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<tr>
<td>Reduction</td>
<td>75% (C) and 76% (D)</td>
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The area used in the calculation is the total heated floor area (net m²).

*Conversion factor used for district heating: 0.77 (70% coal and 30% oil)

** Solar heating supplies the house with 11.4 kWh/m²/year

BUILDING SERVICES

The houses are situated in an area with district heating from the Albertslund Municipality: Its goal is to supply the residential neighbourhood with low temperature district heating. The houses will be equipped with radiators for low temperature heating. In house 15C solar panels will be used for heating of the hot water. In house 15D a decentral water heater will be used.

INFORMATION SOURCES

Housing Company BoVest - www.bo-vest.dk
Nova5 architects – www.nova5.dk
Niras Consulting Engineers - www.niras.dk

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Photos: BoVest and NOVA5