Apartment building in Albertslund, DK

PROJECT SUMMARY
14 apartment houses, in total 631 flats, were renovated in the period from 2007-2009. The renovation of the facade respects the original architecture and uses environmentally benign materials.

SPECIAL FEATURES
Renovation of the building envelope incl. mounting of balconies and merging of small apartments into larger family flats.

ARCHITECT
Nova5 Architects, DK

ENERGY CONSULTANT
Niras Consulting Engineers, DK

OWNER
Bo-Vest, DK on behalf of Albertslund Housing Company and Vridsløselille Housing Co-operative.

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

The 14 buildings with 631 apartments were built in 1966-69. Since then they have had technical problems primarily with the building envelope. Also the units were depreciated due to the large number of small apartments, occupied for short periods and resulting in a frequent transit of people. Therefore, it was decided to make a comprehensive renovation.

AIMS

Renovate the facade respecting the architecture by using dark Spanish slate. To give the units identity and variety new balconies were added. Residents were involved during the planning.

SUMMARY OF THE RENOVATION

- Merging of flats, making flats suitable for families, elderly and physically disabled people.
- Focusing on daylight and functionality in the new design of the apartment.
- Renovation and adding insulation of facades
- Mounting balconies and gardens
- Common room for social purposes
- Exchange of water pipes and installation of water meters
- New entrances
- New doors and windows in wood/aluminium
IMPROVED PLANS

As part of the renovation small flats were merged into larger flats to improve the living quality and better meet demand.

New flats were designed for elderly people (plans to the right).

Each flat was supplied with a separate kitchen, large bathroom and sliding double doors to admit more light into the room.

The flats benefit from new balconies, in contrast to the former French windows.

See the next page for photos.
DOORS AND DOOR OPENINGS – allowing the light to flow across the rooms
Spanish nature slate is used in the renovation in order to respect the original architecture.

CONSTRUCTION

Floor

\[ U\text{-value: } 0.14 \text{ W/(m}^2\text{K) } \]

\begin{itemize}
  \item White oiled parquet (on joists) \hspace{1cm} 22 mm
  \item Vapour barrier with felt
  \item Concrete (with floor heating) \hspace{1cm} 100 mm
  \item Rigid insulation (mineral wool) \hspace{1cm} 200 mm
  \item Capillary break layer \hspace{1cm} 250 mm
\end{itemize}

Total \hspace{1cm} 572 mm

Wall

\[ U\text{-value: } 0.19 \text{ W/(m}^2\text{K) } \]

\begin{itemize}
  \item Existing concrete wall \hspace{1cm} 60 mm
  \item Tolerance \hspace{1cm} 12 mm
  \item Concrete chipboard, \hspace{1cm} 8 mm
  \item Insulation/ridge \hspace{1cm} 220 mm
  \item Distance list \hspace{1cm} 16 mm
  \item Horizontal laths \hspace{1cm} 38 mm
  \item Nature slate \hspace{1cm} 14 mm
\end{itemize}

Total \hspace{1cm} 368 mm

Roof

\[ U\text{-value: } 0.19 \text{ W/(m}^2\text{K) } \]

\begin{itemize}
  \item Concrete slab \hspace{1cm} 215 mm
  \item Insulation \hspace{1cm} 75 mm
  \item Plywood \hspace{1cm} 15 mm
  \item Roofing felt \hspace{1cm} 36 mm
  \item Insulation \hspace{1cm} 100 mm
\end{itemize}

Total \hspace{1cm} 441 mm

+ attic and asphalt roofing
**Summary of U-values W/(m²·K)**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
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</thead>
<tbody>
<tr>
<td>Roof*</td>
<td>0.19</td>
<td>0.19</td>
</tr>
<tr>
<td>Walls</td>
<td>0.36</td>
<td>0.19</td>
</tr>
<tr>
<td>Floor</td>
<td>0.52</td>
<td>0.14</td>
</tr>
<tr>
<td>Windows**</td>
<td>3.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*Because the roof was renovated earlier it was not part of this renovation so U-values before and after are the same.

**The U-value is an average for both windows, glass doors and balcony doors**

**ENERGY PERFORMANCE**

Total transmission loss (primary energy)*

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<tbody>
<tr>
<td>Before</td>
<td>115.6</td>
<td>kWh/m²</td>
</tr>
<tr>
<td>After</td>
<td>99</td>
<td>kWh/m²</td>
</tr>
<tr>
<td>Reduction</td>
<td>14% (40%)</td>
<td></td>
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Because of a previous renovation of the roof the energy performance “before” was relatively good and therefore the reduction is not as significant as expected. It was not cost effective to insulate the roof construction further and therefore the U-value is not as low as could be expected. However, if the “before” is calculated based on original construction, 50 mm roof insulation and a new roof were insulated to 0.08 W/m²K the reduction would have increased to approximately 40%.

*Conversion factor used for district heating: 0.77 based on 70% CHP-coal and 30% oil.

**BUILDING SERVICES**

District heating as heating supply. Mechanical ventilation in kitchen and bathroom according to Danish building regulations. Manually operated natural ventilation.

The common rooms have mechanical ventilation with rotating heat exchanger and heating surface.

**RENEWABLE ENERGY USE**

No use of renewable energy

**INFORMATION SOURCES**

Building Association BoVest - [www.bo-vest.dk](http://www.bo-vest.dk)
Nova5 architects - [www.nova5.dk](http://www.nova5.dk)
Niras Consulting Engineers - [www.niras.dk](http://www.niras.dk)

**Photos**

All photos by NOVA5

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