Row house with new annex in Oslo NO

PROJECT SUMMARY
Housing renovation and new annex with Passive House components
Private owner

SPECIAL FEATURES
Ground to water heat pump
Nearly doubled living space

ARCHITECT
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OWNER
Karin Anton and Sven Støvne

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

Typical row house in the end of a three unit row, constructed in 1962, with poor insulation and thermal bridges. Two storeys and cellar, about 100 m² heated by electricity and wood stove. The owner family wants to enlarge the living space and on this occasion improve the energy efficiency of the existing building.

SUMMARY OF THE RENOVATION

- Establish an air tight layer
- Additional insulation of the hole building envelope (walls: external on porous concrete north wall and cellar walls; internal on strut frame south wall and neighbouring wall)
- Passive House windows and doors
- New entrance
- New annex in prefabricated wooden elements
- Compact unit for ventilation, heating and DHW with integrated ground to water heat pump
- Heated net floor area included annex: 179 m²
Existing south-facing facade with wooden panels; same type for the new annex (south-facing)

CONSTRUCTION

**Attic construction**  \( U\)-value: 0.10 W/(m²·K)
- Existing roof + vapour permeable membrane
- Mineral wool insulation  330 mm
- Wooden beams (exist.)/min. wool (repl.)  150 mm
- Wooden panels (existing)  10 mm
- Airtight sheet
- Lathing  20 mm
- Fibrous plaster sheet  18 mm
- Total  528 mm

**Wall construction north**  \( U\)-value: 0.10 W/(m²·K)
- Wooden panels (replaced)  12 mm
- Lathing (replaced)/wood fibre or flax  50 mm
- Airtight sheet
- Porous concrete brick (existing)  250 mm
- Plaster (existing)  15 mm
- Mineral wool  200 mm
- External plaster  15 mm
- Total  542 mm

**Basement ceiling**  \( U\)-value: 0.10 W/(m²·K)
- Parquet (existing)  24 mm
- Lathing (existing)  40 mm
- Wooden beams (existing)/cellulose fibre  200 mm
- “Living board” (OSB without adhesive)  18 mm
- Lathing/cellulose fibre  200 mm
- Fibrous plaster sheet  18 mm
- Total  500 mm

Existing east-facing gable with plaster; similar solution for the new annex (east- and north-facing)
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>Attic floor</td>
<td>0.34</td>
<td>0.10</td>
</tr>
<tr>
<td>Wall north*</td>
<td>0.66</td>
<td>0.10</td>
</tr>
<tr>
<td>Wall south*</td>
<td>0.57</td>
<td>0.10</td>
</tr>
<tr>
<td>Basement ceiling</td>
<td>0.33</td>
<td>0.10</td>
</tr>
<tr>
<td>Windows</td>
<td>2.6</td>
<td>0.80</td>
</tr>
</tbody>
</table>

The south-facing facade must keep the original appearance. Therefore, the owners decided to use vacuum insulation panels on the inside of the existing stud-frame wall. Additional internal vacuum insulation will also be used on the new ground story north wall in order to save space.

BUILDING SERVICES

A compact unit for ventilation with 85 % heat recovery provides heating and domestic hot water. The remaining heat demand will be covered by a ground to water heat pump supplying a low temperature wall heating system.

RENEWABLE ENERGY USE

Integrated ground to water heat pump. The heat will be collected by a brine heat exchanger with an 80 m deep vertical pipe.

ENERGY PERFORMANCE

Before: measured total delivered energy
150 kWh/m² + wood stove

After: calculated demand for space heating*
20 kWh/m²

Reduction: Roughly 80 % (space heating)

*PHPP

INFORMATION SOURCES

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