PROJECT SUMMARY
Housing renovation in several stages comprising:
• the building envelope
• a new ventilation system

SPECIAL FEATURES
New facade insulation system

PLANNING AND DESIGN
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OWNER
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IEA – SHC Task 37
Renovation project approaching low energy standard

SFH Log home outside Kongsberg NO
BACKGROUND
This holiday cottage was built in 1942 using 6" logs. It was converted into a permanent residence in 1997. 200 mm insulation were added in the roof construction and 100 mm in the floor construction and the electrical and sanitary systems were upgraded.

The total floor area is just under 60 m². The heating system consists of electrical floor heating in the hall and bathroom and a fireplace used extensively in the winter.

SUMMARY OF THE RENOVATION
• New roofing with more insulation (100-300mm)
• Balanced mechanical ventilation with high efficiency heat recovery
• All windows replaced with triple glazed units, near Passive House Standard (U ~0.8-1.0 W/m²K)
• New façade system with 200 mm exterior insulation
• Major efforts to improve air tightness
• Additional insulation and improved tightening the crawl space
A layer of studs / OSB panels outside the old log walls were needed to achieve an even surface for the facade insulation, which was anchored to the OSB with long screws.

The floor of the crawl space is covered with a 0.2 mm moisture barrier, then 150 mm insulation. Foundation walls are insulated with 100 mm mineral wool and 70 mm edge insulation. The crawl space is sealed to keep the temperature above the condensation point (temperature and humidity will be monitored).

Under the roofing are a 50mm air layer and 100 mm mineral wool. 60% of the ceiling faces an unheated attic room. The floor is insulated with 200mm mineral wool. The remaining 40% has an extra layer of mineral wool with variable thickness (100-400mm).
Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>0.2</td>
<td>0.10</td>
</tr>
<tr>
<td>Walls</td>
<td>0.8</td>
<td>0.11</td>
</tr>
<tr>
<td>Floor</td>
<td>0.2</td>
<td>0.15</td>
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<tr>
<td>Windows</td>
<td>2.8</td>
<td>0.9</td>
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</tbody>
</table>

ENERGY PERFORMANCE
Calculated demand for total delivered energy*
Before: 230 kWh/m²
After: 120 kWh/m²
Reduction: ~66 %
* Based on methodology from NS3031:2007

VENTILATION
A balanced ventilation system with ~80 %
temperature efficiency is planned. Air is supplied
to the office, living room and the bedroom.
Air is extracted from the bath room and the kitchen.

INfiltration
The infiltration before was very dependent of the
temperature and wind condition, but an average
estimate would be about 2 ach in the heating
season. Pressure tests will be conducted when
the project is finished but expectations is in the
area of 0.1 ach.

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