Rowhouse, Henz-Noirfalise in Eupen, Belgium

PROJECT SUMMARY
Transforming a 19th century row house into a state of the art passive house

SPECIAL FEATURES
Passive house standard

ARCHITECT
Fhw, architectes scprl
www.fhw.be

OWNER
Family Henz - Noirfalise

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

This 150 year old house needed a thorough renovation of the following elements:

- bad hygienic conditions demanded a mechanical ventilation system and insulation
- worn out roof structure needed replacement
- single paned glazing and small glazed surfaces had to be replaced by bigger, triple glazing
- enlarging the small historical house from 130m² to 180m²

Renovation was preferred because of a substantially lower VAT, and reaching passive house standard only asked for some minor extra measures, so it was only a logical next step for the owner.

SUMMARY OF THE RENOVATION

- Insulation of the walls, floors and roofs with cellulose
- The single pane glazing is replaced by triple glazing with passive house frames
- New ventilation system (HRC 85-90%)
- Solar thermal panels
- Pellet heating

The inside insulation allows an almost continuous layer of insulation. The darker red layers represent the extra measures needed to reach passive house standard.
CONSTRUCTION

Roof construction  \( U\text{-value: 0,14 W/(m}^2\text{·K)} \)
(top down)
- Bituminised soft fibreboard  22 mm
- Cellulose insulation + rafter  360 mm
- Battens  48 mm
- Interior plaster  9 mm
Total  439 mm

Wall construction  \( U\text{-value: 0,135 W/(m}^2\text{·K)} \)
(interior to exterior)
- Clay  20 mm
- Wood fibre insulation panel  60 mm
- Variable internal air barrier  - mm
- Cellulose insulation + wood construction  280 mm
- Quarry (existing)  500 mm
- Exterior stucco (existing)  15 mm
Total  875 mm

Basement ceiling  \( U\text{-value: 0,165 W/(m}^2\text{·K)} \)
(top down)
- Floor  20 mm
- Wood fibres insulation  40 mm
- Wood boards  22 mm
- Cellulose insulation + beams  260 mm
- Wood fibre panel  18 mm
Total  360 mm
**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>-</td>
<td>0,14</td>
</tr>
<tr>
<td>Walls</td>
<td>3,14</td>
<td>0,135</td>
</tr>
<tr>
<td>Basement ceiling</td>
<td>2,2</td>
<td>0,165</td>
</tr>
<tr>
<td>Windows*</td>
<td>4,65</td>
<td>0,72</td>
</tr>
</tbody>
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**RENEWABLE ENERGY USE**

Pellets and solar thermal installation for space and water heating.

**ENERGY PERFORMANCE**

Space heating:
- Before: 300 kWh/m²
- After: 15 kWh/m²
- Reduction: 95% (PHPP 2004)

**INFORMATION SOURCES**

Plans, sections, calculations:
Fhw, architectes scprl ([www.fhw.be](http://www.fhw.be))

Photos: Fhw, PHP

Brochure authors
Wouter Hilderson, Passiefhuis Platform vzw
Olivier Henz, Fhw, architectes scprl

Wouter.hilderson@passiefhuisplatform.be

**BUILDING SERVICES**

Air ventilation with heat recovery and ground-air heat exchanger. Solar heating covers a portion of the hot water supply. A pellet stove covers the remaining heat demand (15%) and hot water demand (85%).

To guarantee a good summer comfort level, the thermal mass of the old building is used as well as external shading on the upper floor by the installation of the solar heating panels, and on the ground and first floor by natural vegetation.