

8647 Lo, Sub-Urban detached house

1. OVERVIEW

PROJECT SUMMARY

- Year of construction: /
- Year of renovation: **2008**
- Building typology:
“**Suburban detached house**”

CERTIFIED PASSIVE HOUSE

- Space heating demand: **13 kWh/m².a**

SPECIAL FEATURES

- *Partially protected house transformed into a vacation house: re-use of the roof shingles and protection of exterior walls*
- *Installation of an ground-coupled heat exchanger.*
- *Box-in-box timber construction for interior insulation*
- *New passive joinery*

ARCHITECT

De witte kamer



One Stop Shop Demonstration Project

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2. ENERGY PERFORMANCES

Energy performance – before and after, space/water

USE	kWh/m ² year	kWh/year
Energy demand before renovation Calculated with the Flemish EPB software	/*	/*
Energy demand after renovation Calculated with PHPP software	13	1828

* Since the dwelling was not occupied for a long time, there is no data of energy demand before renovation.

Thermal and electric consumption and costs

Since the project has only just opened; it is too soon to compare.



Ventilation system D – with heat recovery

3. CONTEXT AND BACKGROUND

BACKGROUND

- Ownership status: **private**
- Net surface area: **475,49 m²**
- Occupation: **single family**

SUMMARY OF THE RENOVATION

- Passive renovation of a partially protected brewery into a vacation house
- Challenge: Keep the most quantity of exterior wall and re-use the roof shingles, to keep the style. This was a condition of Urban Planning, because it is a "Protected Building"
- Window placement and orientation
- Box-in box construction: a new timber frame construction with mineral wool insulation
- Thermal insulated walls
- Airtightness and reduction of thermal bridges
- Thermally insulated timber window and door frames with triple glazing
- Ventilation system with heat recovery and ground-coupled heat exchanger

Pictures

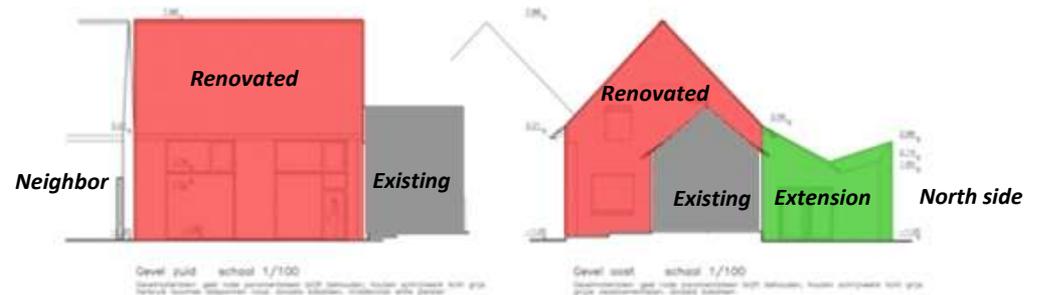


Picture of the surrounding . Remains of the old brewery

Main building of the fully protected old brewery.

Project location

Plan



South façade. The renovated area is between the neighbor and a remaining part of the old brewery

4. DECISION MAKING PROCESSES

OBJECTIVES AND DETAILS

Why was the building selected for renovation?

“There is an interesting motivation to do this renovation according to the passive house standard: To show people that it is possible”

But it was not simple. 4 Years ago, when the architect, owner as well, started with the first sketches, the concept of a passive renovation was still not well known, but he knew that it was possible.

In the summer of 2012, it will become not just a successful renovation, but also a place where other people will be able to feel the comfort of a passive house. The house will be a vacation house, a place where the people that are still doubting, can be convinced.



Pictures during renovation



5. THERMAL ENVELOPE

Exterior brick wall

U-value: 0,11 W/m².K

Materials. (exterior to interior) / (existing – new):

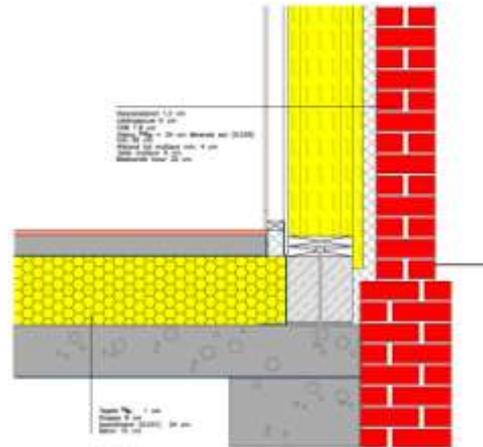
Mineral wool insulation	5 cm
Mineral wool insulation	4 cm
Mineral wool+ timber frame	4,5 cm
Mineral wool+ timber frame	15 cm
Mineral wool+ timber frame	4,5 cm
OSB	1,8 cm
Pipes cavity	
Gypsum fiber board	1,2 cm
U = 0,11 W/m²K	36 cm

Overlap joinery

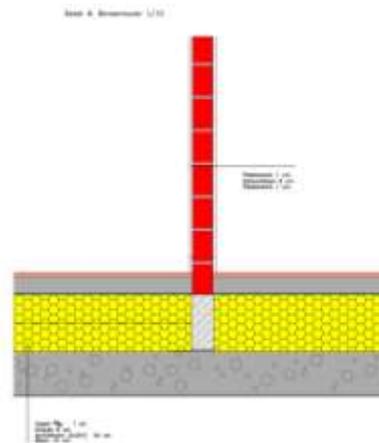
U-value: 0,68 W/m².K

Materials. (exterior to interior) / (existing – new):

PUR insulation	3 cm
U = 0,68 W/m²K	3 cm



Connection between new timber construction and new foundation



Connection between new interior wall and new foundation

Exterior shingle Wall

U-value: 0,11 W/m².K

Materials. (exterior to interior) / (existing – new):

Wood fibre panel	12 cm
Mineral wool+ timber frame	4,5 cm
Mineral wool+ timber frame	21 cm
Mineral wool+ timber frame	4,5 cm
OSB	1,8 cm
Plasterboard	1 cm
U = 0,11 W/m²K	35,2 cm

Floor

U-value: 0,13 W/m².K

Materials. (exterior to interior) / (existing – new):

Floor	1 cm
Chape	8 cm
EPS insulation	24 cm
U = 0,13 W/m²K	33 cm

Roof with tiles

U-value: 0,09 W/m².K

Materials. (exterior to interior) / (existing new):

Wood fibre panel	12 cm
Mineral wool+ timber frame	4,5 cm
Mineral wool+ timber frame	21 cm
Mineral wool+ timber frame	4,5 cm
OSB	1,8 cm
Plasterboard	1 cm
U = 0,09 W/m²K	44,8 cm

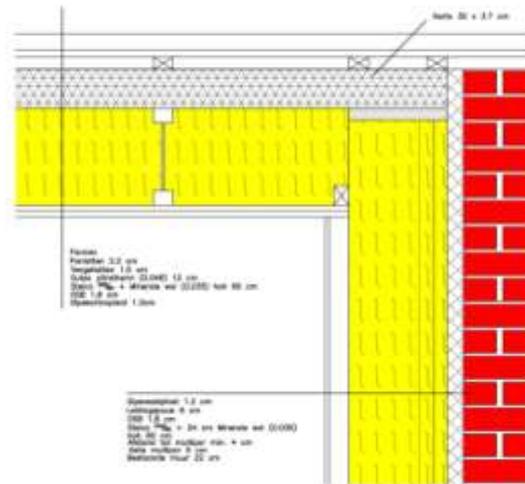
Roof with shingles

U-value: 0,10 W/m².K

Materials. (exterior to interior) / (existing new):

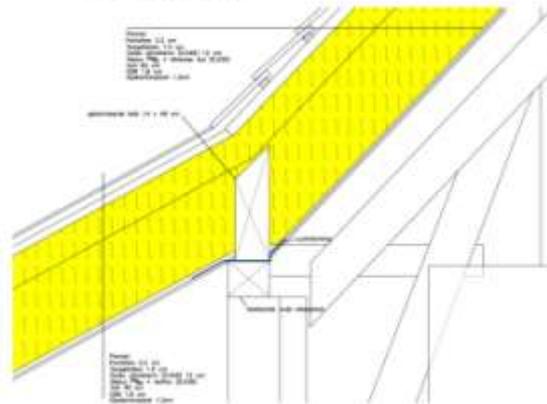
Wood fibre panel	12 cm
Mineral wool+ timber frame	4,5 cm
Mineral wool+ timber frame	21 cm
Mineral wool+ timber frame	4,5 cm
OSB	1,8 cm
Plasterboard	1 cm
U = 0,10 W/m²K	44,8 cm

Detail 11: Vertikale stromende raumabgrenzung 1/10



Connection between existing and new timber structure

Detail 8: Stromecke mit einseitiger Abdichtung 1/10



New roof with existent tiles

Thermal bridge avoidance:

Windows

Thermally insulated window frame with triple glazing.

Average window U-value:

$U_w = 0,96 \text{ W/m}^2\text{K}$

Airtightness

A blower door test indicated an n_{50} -value of $0,46 \text{ h}^{-1}$. This value was reached in the first blowerdoor test.



6. BUILDING SERVICES

HEATING SYSTEM

The fresh air comes into the house through the ground-coupled heat exchanger. The main heating is provided by an electrical decentralized heating system air-to-air, in the ground floor. A traditional radiator has been installed in the bathroom. The first floor has any additional heating system.

VENTILATION

A balanced ventilation system with heat recovery was installed (type D).

HOT WATER PRODUCTION

The domestic hot water is produced by a pellet boiler.

Winter strategies

- *Passive solar gains by the large glazed façade on the south side.*
- *Pre-heating of the fresh air by the ground-coupled heat exchanger*
- *Decentralized electrical air-to-air heating in ground floor*
- *Traditional radiator in bathroom*

Summer strategies

- *Solar shading will be placed on the south façade of the house.*
- *In the day ventilation will be through the ventilation system. The air will be fresher due to the ground-coupled heat exchanger.*
- *Night cooling by natural ventilation.*



Installation of the ground-coupled heat exchanger



Large windows for passive gains on the south facade



7. ENVIRONMENTAL PERFORMANCE

RECYCLING/ RE-USE

One of the requirements of Urban planning was the protection of the exterior walls and the reuse of roof shingles. Also some interior walls were kept, but the base of the walls were insulated with cellular blocks.

The wood of the old roof was reused in the building the new walls and in the floor of the first floor.

ECOLOGICAL MATERIALS

They used cellulose as insulation in the new roof construction and mineral wool as insulation in the walls.

The wood is FSC labeled. The cellular blocks used in the interruption of the thermal bridges area recyclable.

USER TESTIMONIAL

It is a challenge, professional and personal, to show the people that it is possible to renovate a building towards a passive house.

The respons has been so nice, that the "Bed & Breakfast" is full booked the next 2 months.

We have given a new and pleasanter life to this place and better quality of interior air, structure and finishing. This factors combined with the magnificent surrounding and the charmed of the rest of the complex, is the perfect combination to let the people on their way, with a "Bed and Breakfast". It is not just a visit to a passive building, here you can live in it.



Interior insulation of the walls. As protected building it was impossible to exterior insulation. This means more thermal bridges to treat.



Air tightness layer

