

SFH in Lanterswil CH

PROJECT SUMMARY

Modernisation of a single family house with a solar facade

SPECIAL FEATURES

Passive solar façade reducing heat loss by 80%, mech. ventil. with h.r. and earth register, 4.9 kWp PV

ARCHITECT

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IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation



Before



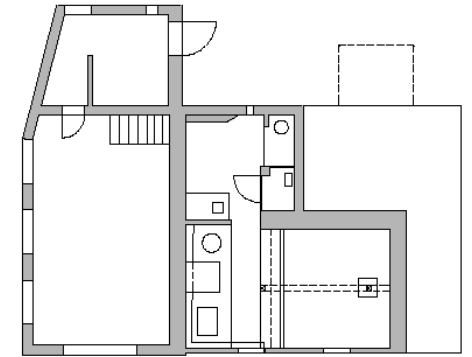
After

BACKGROUND

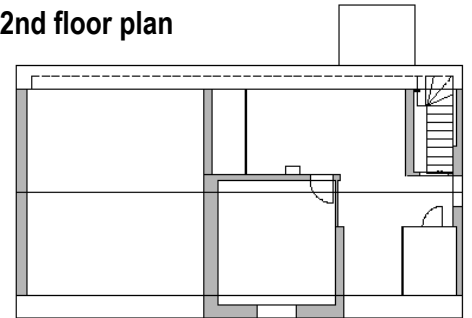
The home owner wished to have more living space and at the same time reduce energy consumption. The solution was to add on a bathroom and wc, and convert the attic to living space, increasing the area from 95 to 256 m². The energy consumption was reduced with a solar façade, mechanical ventilation with heat recovery and additional pv panels were added. The total cost of the renovation was €200,000.

SUMMARY OF THE RENOVATION

- Addition of a bathroom + wc and attic converted to living space
- Solar façade (Lucido System)
- Roof insulation with 320 mm (wood + cellulose fiber)
- Ventilation hr + - ground to air heat exchanger
- PV added bringing total power to 4.9 kWp

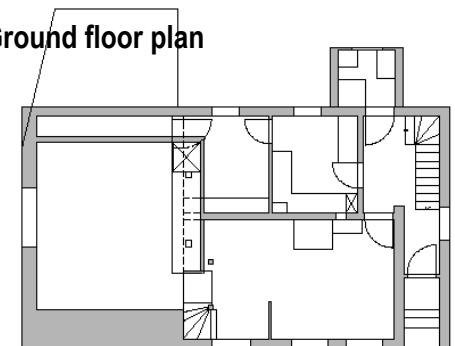


2nd floor plan



1st floor plan

Ground floor plan



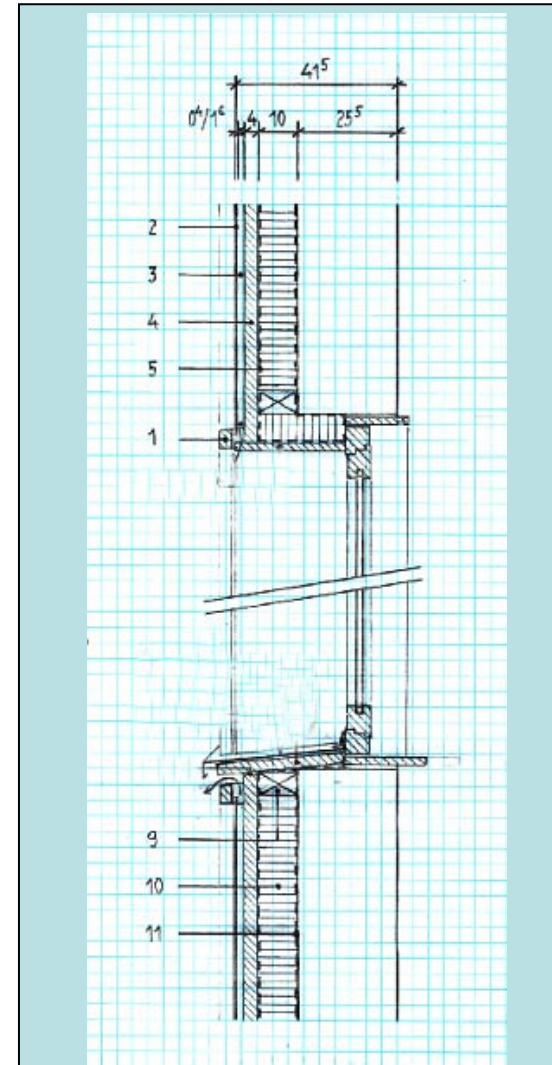


ADDED EXTERIOR WALL CONSTRUCTION

U-value: 0.08 W/(m²·K)

(dynamic U-value over heating season)

2	Solar glass	4 mm
3	Air gap	16 mm
4	Slotted wooden solar absorber,	40 mm
5	Wind barrier paper	
9	Wooden lathing with cellulose-wood fiber insul between	100mm
11	Wind barrier paper and existing wall behind	
Total added wall thickness		160 mm



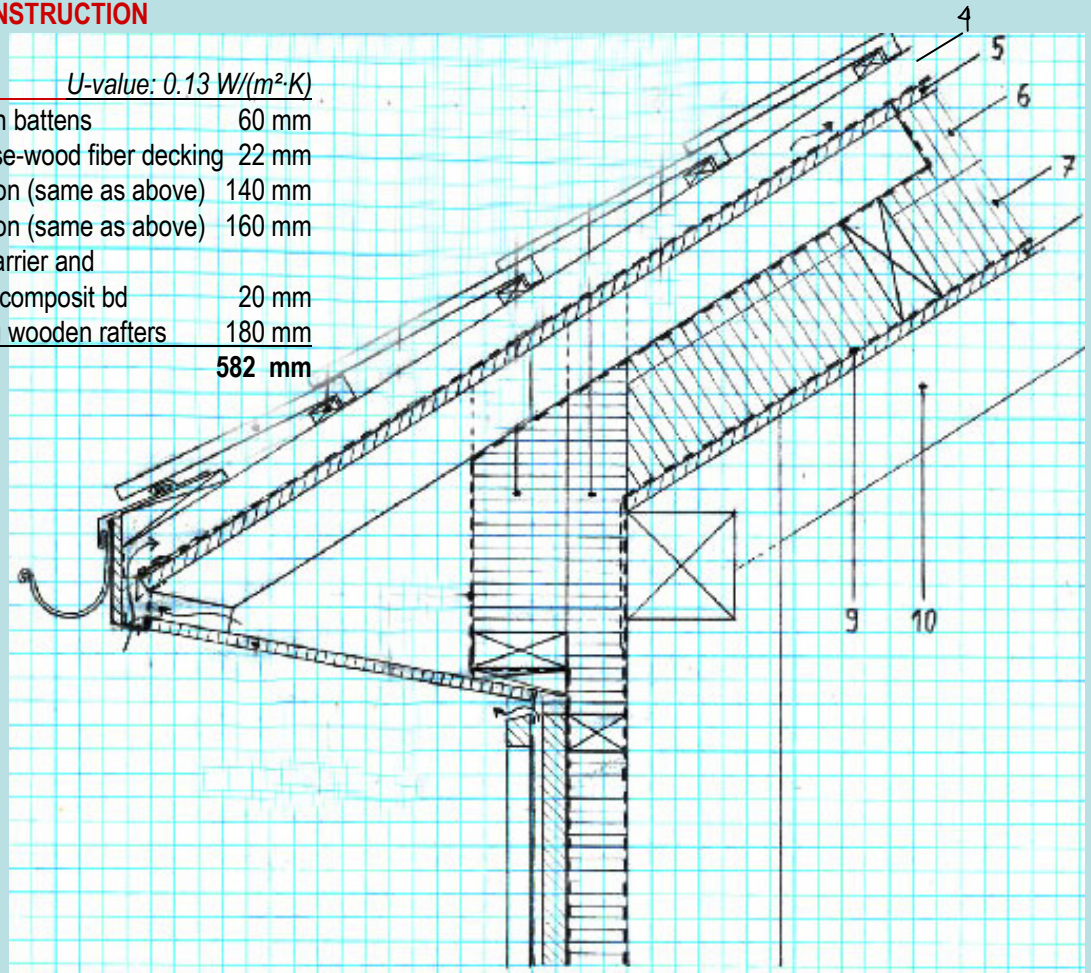
Wall and window section

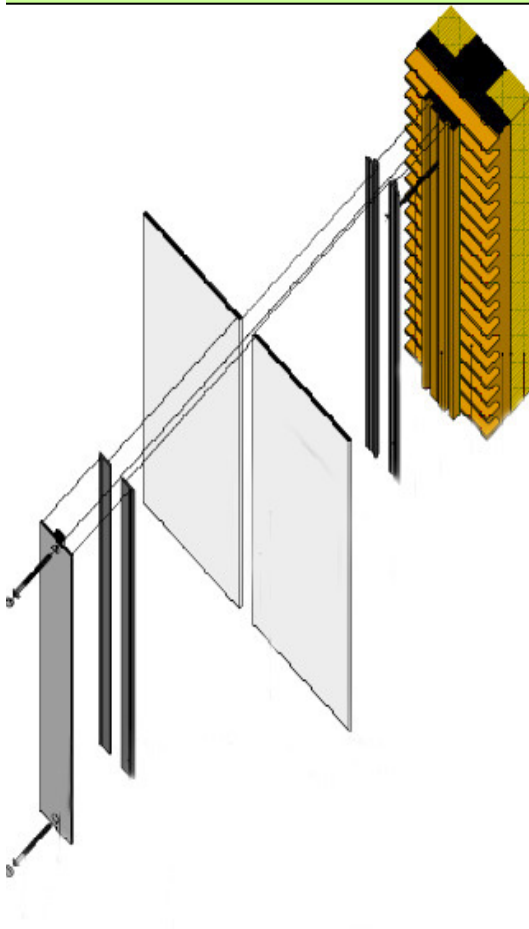


ROOF CONSTRUCTION

U-value: 0.13 W/(m²·K)

4	Wooden battens	60 mm
5	Cellulose-wood fiber decking	22 mm
6	Insulation (same as above)	140 mm
7	Insulation (same as above)	160 mm
9	Wind barrier and ceiling composi bd	20 mm
10	Existing wooden rafters	180 mm
Total		582 mm



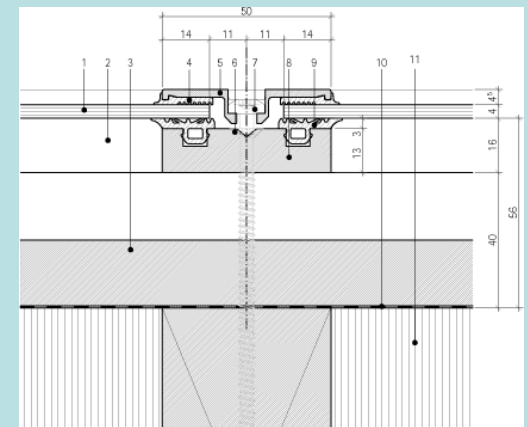


Isometric of solar facade

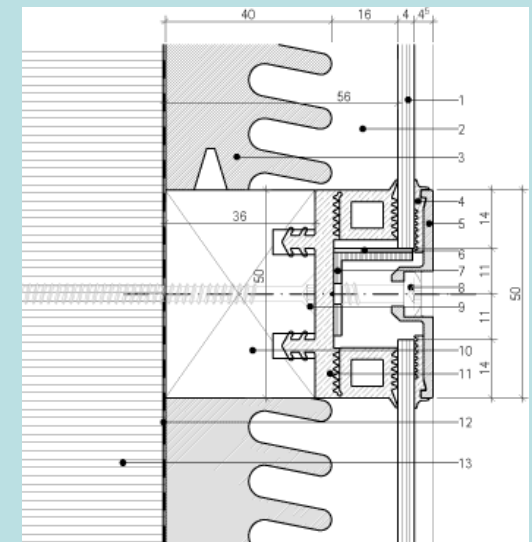
The solar facade, Lucido®, absorbs and stores solar energy to create a warm buffer between the house and the ambient, reducing wall heat losses.

- 1) **Solar glass:** (4 mm typical). This traps the heat in the buffer space behind the glass and protects the wooden absorber from weather.
- 2) **Air gap:** (16 mm typical) Openings at the top and bottom allow the construction to "breathe" and dissipate any condensation.
- 3) **Absorber | heat storage:** The 40 mm absorber is massive wood. Slits are routed out of the wood to create horizontal louvers sloping inward and upward. Certified quality fir or larch wood is used.

The facade appearance can, if desired, be left in natural wood. It will not turn gray like exposed facades, because it is protected behind glass.



Plan of solar facade



Section of solar facade



Summary of U-values $W/(m^2 \cdot K)$

	Before	After
Attic floor	0.60	0.13
Walls	0.40	0.08
Basement ceiling	1.20	0.18
Windows*	2,20	0.80

BUILDING SERVICES

A mechanical ventilation system with a stainless steel earth heat exchanger and 85% heat recovery.

Space and domestic water heating by an ground coupled heat pump.

Electricity use and production in 2006:

- 2 467 kWh PV Production
- 2 662 kWh HP consumption

RENEWABLE ENERGY USE

A PV system was mounted on the roof totalling 4.9 kWp (20m² in 2005, 15m² in 2008).

ENERGY PERFORMANCE

Space + water heating (primary energy)*

Before: 107 kWh/m²

After: 24 kWh/m²

Reduction: 77%

INFORMATION SOURCE

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