Engaging Owners in Energy Renovations: a case study of farmhouse refurbishment in Alsace, France

ENERGY EFFICIENCY SEMINAR

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A case study available online

• In the Task 59 website:

• Or in the French website CREBA « knowledge centre for responsible retrofitting of traditional buildings » (in French)
Case study: Half timbered house from 1783 in Schnersheim, Alsace

- Very typical Alsatian vineyard residence
- Not listed but with strong heritage interest
Heritage preservation of half-timbered building in Alsace

• Around 300 Half timbered houses are destroyed each years
The challenge

• Saving the landscape for future generations

• To ensure that people wants to live in these buildings, not only tourists!

• Bring energy performance, comfort and light in the building
Context of the retrofitting project

• 20 km from Strasbourg, in a small village, not concerned by heritage conservation measures

• The surrounding of the building is homegenous with other typical farms from the same period

• New owner for the house with a global retrofitting project and the idea of showing the new generation that it is possible to be comfortable in a traditional house

• The owner wants to applied for a grant for exterior works related to heritage and a grant related to energy performance (from the region)
Heritage and cultural consideration

- A mark in the basement and dendochonology analysis confirm the date of construction: 1717 for a first house and 1783 for the timber frame and cob (taken from another house from 1730)
- Very typical U-shape farm with a yard, main bulding and technical barns,…
- 3 storeys attic, traditionaly used to dry tobacco in the area
Half timbered house from 1783 in Schnersheim, Alsace

- 2010 beginning of the retrofitting project
- 3000L oil tank removal
- Before intervention, the house was in poor condition.
Problems of the initial house

- Basement very humid due to a concrete floor from 1970 and cement coating on the walls.
- Differential settlement (12 cm) below a large stone load bearing wall « brandwand »
- The horizontal main fir timbers « sablières » of the first floor needed to be replaced
Overview of the project

• In first place, double glazing not allowed by heritage architect in 2012
• In 2013 after demonstrating the heritage benefits of the whole project → Agreement
• Oak mullioned windows, design 18th century
• $U_w = 2.14$ (4-8-4)
• $U_w = 1.3$
The project

• Concrete footing below the stone walls and lime injection in the basement walls.
• Retrofitting of the old basement
• Roof retrofitting with « beaver tail » tile and insulation of the attic floor
  • U=0,16
Attic insulation
The project: Insulation

- Floor of the house: Hemp concrete
  - U = 0.4
  - Double flux pipes in the floor
- Walls: Hemp concrete
  - U = 0.39

Double-flux ventilation duct
The project: Air permeability

- ACH n50:
  - Before: 5
  - After: 2.04

Special focus on wood beam end
The project: Heating and hot water

- New 25 kW pellet boiler of an efficiency of 95 %
- Domestic hot water thanks to two storage tank (300 and 800 L respectively)
- The pellet silo is equipped is an aspiration system (no worm screw because of fire risk in a timber framed house)

- A traditionnal stove: called "Kachelofe«, air inlet directly outside.
The project: ventilation system

• Simple flux system for winter in the basement
• Double flux with heat exchanger in the house
• Hidden pipes in the floor or in the walls
• Hidden air inlet on the façade
• Air outlet on the roof
Light on the garden at the back of the house

• Loggia
Economic point of view

• 150 000 € H.T. , 440 € /m²
  « Energy measures »
  • Without the windows, specifically made.

• A contribution to the work by the owner

• Heritage grant was 1% of the bills for the outdoor works but it allows a tax refunding of 25 %

• Energy grant was 10 k€ plus an assistance plus the air permeability measurements

Energy measures:
- Walls insulation: 17%
- Ventilation: 15%
- Ground Floor insulation: 4%
- Other Floors insulation: 8%
- Attics insulation: 8%
- Heating and hot water system: 49%
Energy consumption and comfort

• 25 °C maximum inside the house in summer
• 19°C in all 350 m² and 20°C in bathrooms

• 352 kWh/m².years before the project (all except domestic electricity)
• 94 kWh/m².years in dynamic simulation in conception

• 102 kWh/m².years for heating and hot waters (wood pellets) in real in 2017. (that is 2500 €)
• 280 €/year (pre-tax prices) maintenance contract for the balanced ventilation and a 216 €/year maintenance contract for the heating system.
Visit our knowledge center! (only in French for now...): http://www.rehabilitation-bati-ancien.fr/fr

www.iea-shc.org

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