



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

ENERGY EFFICIENCY SEMINAR



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TASK 59
RENOVATING HISTORIC BUILDINGS
TOWARDS ZERO ENERGY

2018 
ANNO EUROPEO
DEL PATRIMONIO
CULTURALE
#EuropeForCulture

A case study available online

- In the Task 59 website :
 - <https://www.hiberatlas.com/en/timber-framed-house-in-alsace-france--2-45.html>
- Or in the French website CREBA « knowledge centre for responsible retrofitting of traditional buildings » (in French)
 - <https://www.rehabilitation-bati-ancien.fr/fr/retours-d-experiences/une-rehabilitation-energetique-et-une-restauration-patrimoniale-exemplaire-0>

The screenshot displays a user interface for a building information system. On the left, a vertical navigation menu lists four categories: GENERAL INFORMATION, RENOVATION PROCESS, RETROFIT SOLUTIONS, and EVALUATION. The main content area is divided into a top section for 'GENERAL INFORMATION' and a bottom section for 'RENOVATION PROCESS'. The 'GENERAL INFORMATION' section contains six data points: Energy performance (94 kWh/m2.y with a green-to-red gradient bar), Protection level (Not listed), Building age (1700-1800), Building use (Residential (rural)), Building area (Net floor area [m²]: 350,0), and Construction type (Timber frame). A '+ MORE' button is located on the right side of this section. The 'RENOVATION PROCESS' section features two images: a ground-level view of a two-story timber-framed house with a balcony, and an aerial view of a village with similar traditional buildings.



Case study : Half timbered house from 1783 in Schnersheim, Alsace

- Very typical Alsatian vineyard residence
- Not listed but with strong heritage interest



1900



1964

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



Objectif : label Fondation du Patrimoine



- A mark in the basement and dendochronology 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 building and technical barns,...
- 3 storeys attic, traditionally 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



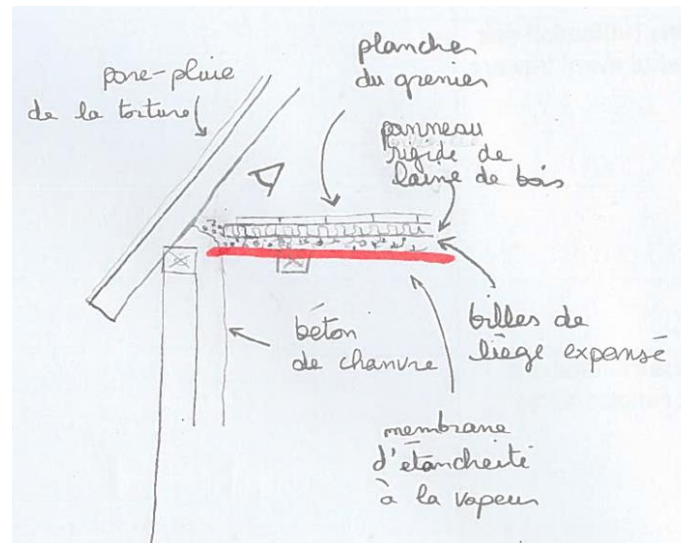
Overview of the project

- 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
 - $U = 0,39$



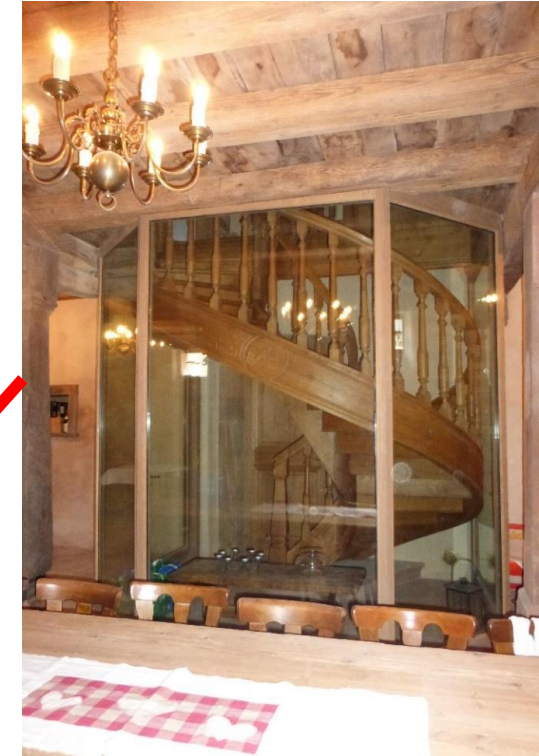
Double-flux ventilation duct

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



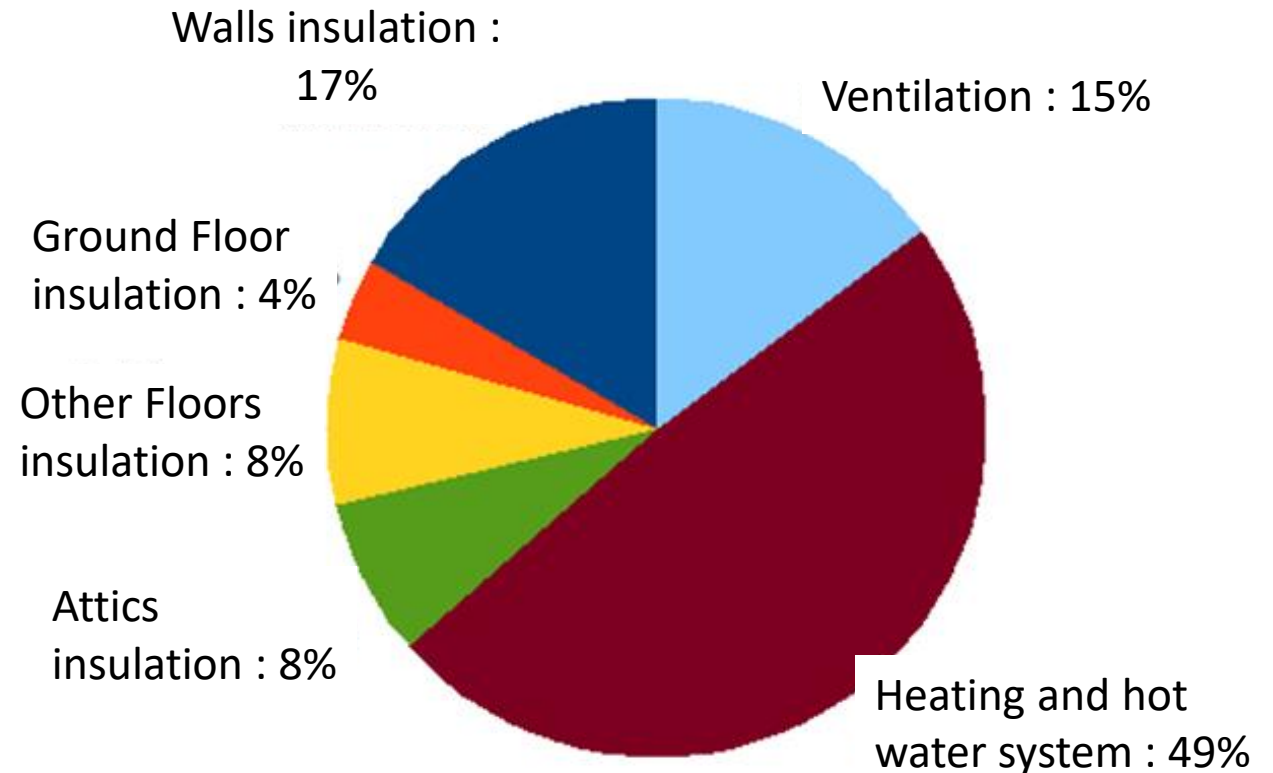
Light on the garden at the back of the house

- 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 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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