

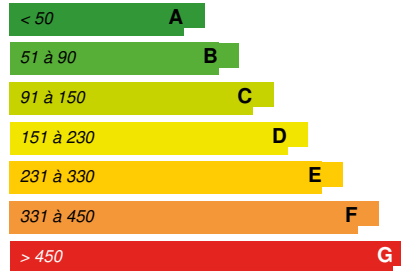
# Rehabilitation of a stone house in Saint-Cast

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Extension + refurbishment

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**Building Type** : Isolated or semi-detached house  
**Construction Year** : 1920  
**Delivery year** : 2014  
**Address 1 - street** : Rue du clos cotillon 22380 SAINT-CAST-LE-GUILDOT, France  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 188 m<sup>2</sup>  
**Construction/refurbishment cost** : 500 000 €  
**Number of Dwelling** : 1 Dwelling  
**Cost/m2** : 2659.57 €/m<sup>2</sup>

## General information

This small stone house in Saint-Cast, built in 1920 by the grandparents of the Owner had never been renovated. The Owner wanted to offer his mother to return to this holidays place in comfort.

Originally, only a renovation of the existing building was talked about and the request extended to creating a veranda opening onto the garden.

The build quality of the original house and its ideal orientation (south) pushed us to propose a real investment for a sustainable home, largely bio-based and economical.

Today he even use the house for his own vacations.

### Sustainable development approach of the project owner

Environmental considerations were not part of the requests of the client, but most of our proposals have found a listening ear. Thus it has been approved to build wood, isolating wool and wood fiber, to recover rainwater for watering and spreading to those were not recoverable, revegetated the inaccessible part of the terrace, installing a geothermal system, etc.

The extension was originally designed as a separate space heating was passively provided by its south facing windows that are protected from the summer sun by the cap created by the roof deck.

The project owner has chosen that this space is the extension without threshold of the original house. If necessary, this space can be heated or cooled the same floor heating system to geothermal was chosen for the rehabilitation of the original house. For the sake of efficiency and simplification, this house is a second home, the idea of a solar hot water system was abandoned, whereas the roof pitch was not ideal and unoccupied periods were likely to cause overheating.

For the same reasons, the humidity sensitive ventilation is but natural. We relied on a clever use of the premises, the windows are open allowing

natural flow of air bearing sea impairment of natural ventilation in hot weather.

## Architectural description

The original request of the owner was, besides the renovation of the house, adding a porch to the kitchen to enjoy the garden level ...

The idea of veranda, we kept the essence: the wide opening to the garden, as in the living room created on the ground floor on the terrace accessible from the great room on the 1st floor which offers the look now turn to the sea.

Based on a golden rectangle, which also determines the position of the doors, the space doubles the surface of the ground floor and offers a place of receipt, while the original house only conceded small narrow rooms.

View of the exterior, the general line of the extension is a reflection of environmental choices.

## Building users opinion

Very good feedback of occupants who asked us for another realization.

## If you had to do it again?

Because it was initially decided to keep the original walls and the staircase, the plan of the house was not upset. The construction system partitions finally allowed their removal and the client ultimately chose to replace the stairs.

If it again, we certainly agencerions spaces differently in the original house.

## See more details about this project

[http://www.carabox.com/architecture/rehab\\_stCast.php](http://www.carabox.com/architecture/rehab_stCast.php)



## Stakeholders

### Stakeholders

Function : Contractor representative

Michel Levenok

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Function : Designer

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Function : Company

Chassé

Daniel Chassé

<http://www.maisons-bois-chasse.com/>  
frame / walls / insulation / flooring

Function : Company

FORPAC ETAO

Yoann Taraud

<http://www.forpac.fr/>  
drilling / geothermal

Function : Company

Toutain

Monsieur Toutain Yvon à Pléboulle

Masonry / stone mason / stone facing

Function : Company

Lemarchand

Jean-Michel Brignon

slab / structure

Function : Manufacturer

Acthys

Stephan Lerner

<http://www.acthys-ventilation.fr/>  
natural humidity controlled ventilation

## Contracting method

General Contractor

## Type of market

Table 'c21\_luxembourg.rex\_market\_type' doesn't exist

## Energy

### Energy consumption

Primary energy need : 11,46 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 48,30 kWh/m<sup>2</sup>.an

Calculation method :

CEEB : 0.0001

Initial consumption : 505,00 kWh/m<sup>2</sup>.an

### Envelope performance

Envelope U-Value : 0,33 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

In the rehabilitated part, there was no question of losing the cachet of the stone of Saint Cast, wall insulation has been carried out from the inside. The repair of the cover is provided, the roof insulation was performed sarking, resulting from the fact raiser flues. In extension, the structure is wood and insulation level low consumption building partly wedge between the structural elements. Coverage is largely a terrace available, the small inaccessible part is vegetated. Laundry and unheated equipment room were isolated from the outside.

Building Compactness Coefficient : 0,62

### More information

Because it is a second home, the real consumption is not representative. For example, in 2015: the occupancy rate is 2 months of summer.

## Renewables & systems

### Systems

Heating system :

- Geothermal heat pump
- Low temperature floor heating
- Wood boiler

Hot water system :

- Heat pump

Cooling system :

- Geothermal heat pump

Ventilation system :

- Natural ventilation

Renewable systems :

- Wood boiler
- Heat Pump on geothermal probes

Other information on HVAC :

Heating, cooling and hot water are generated by a geothermal system on heated floors. The idea of a solar hot water system was discussed but abandoned, whereas the roof pitch was not ideal and that, in respect of a secondary residence, vacancy periods were likely to 'cause overheating problems.

Natural ventilation and humidity controlled (see document attached) with air fed through walls and extractions through the attic. To overcome a possible power failure summer ventilation, power lines were drawn at each air outlet.

Geothermal heat pump Power = 8640W  
COP = 4.59

Solutions enhancing nature free gains :

Orientation sud de l'extension et des pièces principales avec une casquette pour le confort d'été.

## Smart Building

BMS :  
Power switch for each main room.

## Environment

### Urban environment

Land plot area : 1 010,00 m<sup>2</sup>  
Built-up area : 10,00 %  
Green space : 900,00  
Residential District away downtown Saint-Cast.  
Individual houses with garden and / or vegetable garden on a dirt driveway.

## Products

### Product

Geothermal heat pump

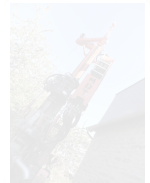
FORPAC ETAO

Yoann Taraud

<http://www.forpac.fr/>

Product category : Génie climatique, électricité / Chauffage, eau chaude

heat pump collect calories in depth in an area where the soil temperature varies little and returning warmth or coolness by underfloor heating (or cooling).



The choice of a geothermal system was actually an environmental commitment by the project owner because the return on investment for housing in Brittany mainly inhabited was not granted. The idea does not suffer from tariff increases for gas and those little electricity was to seduce the client.

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Natural ventilation hygroadjustable

Acthys

Stephan Lerner

<http://www.acthys-ventilation.fr/>

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

By a membrane system sensitive to ambient humidity, ventilation opens or closes. The draw is then made by depression, naturally. The system operates less in summer (especially if the outside temperature exceeds the indoor temperature), an electrical assistance may be added later.



This system would avoid the installation of a complex system of Mechanical ventilation and needs no electricity.

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Wood wool insulation

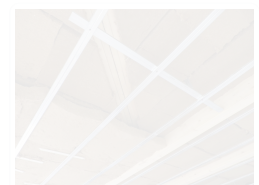
Actis

<http://www.actis-isolation.com/contacts.php?p=1&l=1&rub=6&vert=1>

<http://www.actis-isolation.com>

Product category : Second œuvre / Cloisons, isolation

Unlike rock wool, wood wool comes from renewable material and does not require as many energetic expenditure for the development of the material. This is an insulator which has advantages in summer comfort and management of hygrothermal comfort.



Actis certainly would not have been my choice (other companies are much more committed to the environment), but this choice was delegated to the carpentry business

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Wood structure

CHASSÉ

Chassé Daniel

<http://www.maisons-bois-chasse.com/>

Product category : Gros œuvre / Structure, maçonnerie, façade

Renewable materials, to limit the thickness of the walls, the structure involved in the insulation, a wood structure is naturally stable fire, did not require complicated apparatus for its implementation and will require little energy to its deconstruction.



The client had no a priori, it was easily conquered.

Sarking

STEICO

<http://www.steico.com/fr/service/demande-contact/>

<http://www.steico.com/fr/>

Product category : Second œuvre / Cloisons, isolation

The sarking or insulating a roof from outside for enjoying the re-roofing to isolate or improve insulation, while maintaining the internal volume. Here, we chose wood fiber for its stiffness and its simplicity of implementation.



The project owner has accepted without question all our insulation propositions ... but we were not able to convince him of the futility of a system refresh his memory warm her childhood summers spent in the uninsulated roof slate was more powerful than our demonstrations.

Facing imitation St-cast stone

ORSOL

Ricardo MACÉ

<http://www.orsol.fr/produits/parements/causse>

Product category : Gros œuvre / Structure, maçonnerie, façade

St Cast stone recovered during the expansion of the south windows or creating openings to the extension would have been sufficient to achieve the facing thickness was not as important in cutting and facing elements of a disproportionate blow to the expected effect. Our choice was therefore postponed on a concrete surface appearance stone that mimics the original stone.



Several aspects of the extension were proposed to owners who chose this reminder of the original house in its extension.

## Costs

Construction and exploitation costs

Renewable energy systems cost : 18 515,00 €

## Health and comfort

Water management

RECOVERY OF RAIN WATER

The sloping roof water recovery system used for watering the garden, rainwater from the terrace (not recoverable under the regulation) are rejected application.

Theoretical capacity: 27m3

WATER SUPPLY SYSTEM

The supply system was taken to its origin in roads and past Reticulated Polyethylene until meter and copper in housing.

Indoor Air quality

The house is located in a sparsely developed area, the quality of indoor air is acquired by natural ventilation and the use of non-toxic materials.

Comfort

Health & comfort : To limit the risks of solvents, paints and oils used were VOC and formaldehyde-free OSB, vitrified flooring in the workshop.

Acoustic comfort : The house is located in a very little urbanized area, acoustic comfort lies to hear outside sounds natural, so we intentionally selected windows without enhanced sound insulation.

## Carbon

Life Cycle Analysis

- Eco-design material : - wooden structure  
- wood wool  
- Wood fiber  
- Birch parquet / special oak floor heating  
- wooden window

## Contest

### Reasons for participating in the competition(s)

This refurbishment could compete in the "temperate climates and energy" category as well as in the "low carbon" because we paid as much attention to reducing energy requirements as choosing bio-sourced solutions.

Building candidate in the category



Energie & Climats Tempérés



Coup de Coeur des Internautes



**Green Building  
Solutions** Awards 2016

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