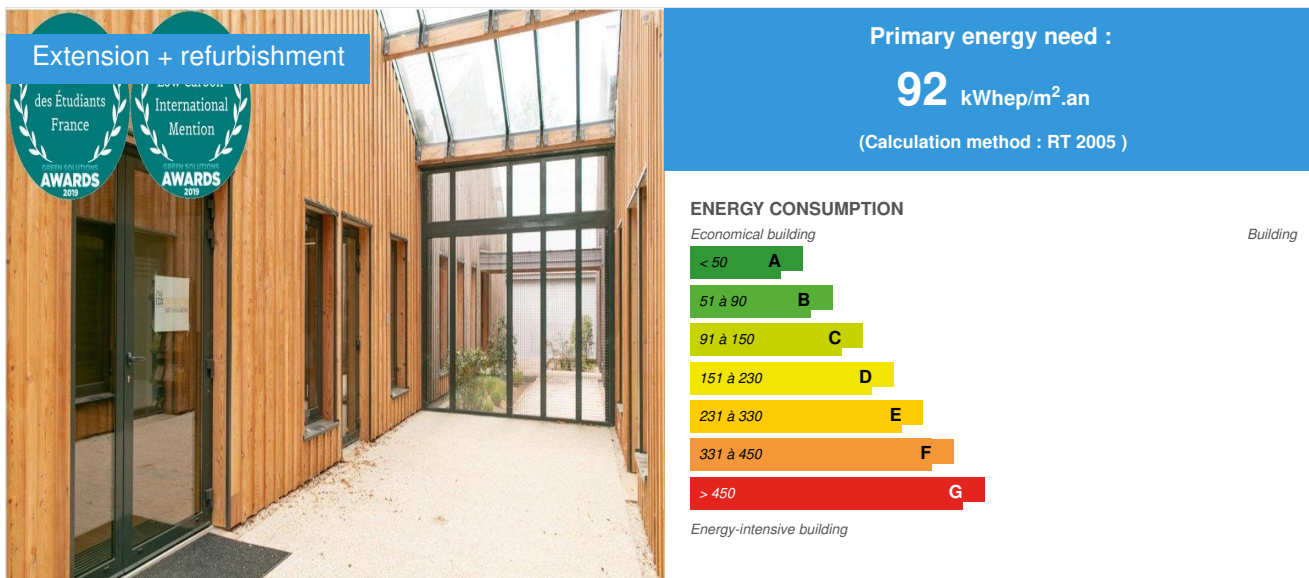


# Ecoconstruction center of Beaulieu-lès-Loches

by Emmanuel d'Envirobot Centre / 2019-06-11 09:11:22 / France / 9861 / FR



**Building Type :** Other building

**Construction Year :** 1900

**Delivery year :** 2017

**Address 1 - street :** 1 Place du Maréchal Leclerc 37600 BEAULIEU-LÈS-LOCHES, France

**Climate zone :** [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area :** 515 m² Autre type de surface nette

**Construction/refurbishment cost :** 437 090 €

**Cost/m2 :** 848.72 €/m²

Proposed by :



## General information

The Ecoconstruction center of Beaulieu-lès-Loches won the Student Award - Building of the the 2019 Green Solutions Awards at the France level and a mention for the international Low Carbon Award.

As part of the implementation of an Ecoconstruction sector on the territory of South Touraine, it was decided to create an Ecoconstruction Pole, used as:

- demonstration space of eco renovation / eco construction and agro materials
- training area for professionals (business leaders, employees, jobseekers) and the general public
- workspace and meeting place for building engineering professionals

Rather than building "out of nothing" an exemplary building, **the project manager was taken to work on the development of a building** , already partially rehabilitated. This symbolizes better the built park on which it is necessary to work within the territory of South Touraine.

A veritable showcase of the Ecoconstruction sector and energy savings, notably through energy renovation, the Ecoconstruction Pole welcomes different

audiences: local entrepreneurs, trainees for training courses, general public, building engineering companies, etc.

#### Materials implemented

Structure: Wooden frame & Wooden cladding

Insulation: Cotton, linen and hemp, rapeseed granulate.

#### Short cycle

The insulation of the Ecoconstruction Pole was carried out experimentally in "attics", by insufflation of locally grown and processed rapeseed aggregates (at 3km from the site)

## Sustainable development approach of the project owner

The design and realization of this development are meant to be in themselves demonstrators: the objective is to achieve the best thermal performance, using the maximum of agro materials, in a defined budget. The choices made by the project manager have been strongly argued, to facilitate reproducibility on other similar sites, and especially to illustrate, within the framework of the museography associated with the site, the problems related to the efficient renovation of buildings. In addition to MBS (Raw and assembled wood, rapeseed and sunflower aggregates, TrioBioFib panels, Chanvribloc), other healthy products were used: earth, marmoleum, fermacell coatings that are not included in the calculations. "Workshop" section of 470 m<sup>2</sup> is designed to accommodate experiments or training related to Ecoconstruction and agro-materials: it will be possible to isolate the locker room, designed to accommodate straw insulation, make insulating coatings on existing walls.

## Architectural description

The chosen site is located in Beaulieu-lès-Loches, in an old industrial building, whose envelope has already been redone, with an architectural signature unchangeable.

#### The eco-construction pole has several vocations:

- **Training space** of 470 m<sup>2</sup> to accommodate training organizations and manufacturers of agro-materials and expand the skills of craftsmen and their employees on eco-construction. 45m<sup>2</sup> meeting room to welcome, inform, train and support craft companies.
- **Space of awareness**, information & support of the general public.
- **Demonstration building** of local know-how and agro-materials
- **Reservoir of skills**: coworking space & individual offices for entrepreneurs, project leaders and partners working on eco-construction and energy renovation.

This cluster is located in the heart of a tertiary center dedicated to the advice and support of businesses and residents alongside the Local Mission, The National Employment Service, Consular Chambers, etc. Rather than constructing an exemplary building from zero, the eco-construction division has been set up in an old industrial building that has already been partially rehabilitated, which better symbolizes the built park on which it is necessary to work within our territory.

## See more details about this project

<http://ecoconstruction.sudtouraineactive.com/le-pole-ecoconstruction>

## Photo credit

Courtesy of Envirobat Center and eco-construction south-touraine

## Stakeholders

### Contractor

Name : Communauté de communes Loches Sud Touraine

<https://www.lochessudtouraine.com/>

### Construction Manager

Name : 180° Architectes

Contact : e.moreira[at]180degres.net

<http://180degres.net>

## Stakeholders

Function : Other consultancy agency

SOCOTEC

<https://www.socotec.com>

Control

Function : Thermal consultancy agency

EFFILIOS

<https://effilios.fr/>

Function : Structures calculist

ARCABOIS

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

Function : Environmental consultancy

C2A

02 47 67 94 26

<http://www.c2a-economie.fr/>

Economist

## Energy

### Energy consumption

Primary energy need : 92,00 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 92,00 kWh/m<sup>2</sup>.an

Calculation method : RT 2005

Breakdown for energy consumption : The heating requirements represent 15 kWh/m<sup>2</sup>.an

Initial consumption : 1,00 kWh/m<sup>2</sup>.an

### Envelope performance

Users' control system opinion :

Wall performance:

- Peripheral walls: 0.268 W / m<sup>2</sup>K
- Inner walls: 0.319 W / m<sup>2</sup>K
- Roofing: 0.099 W / m<sup>2</sup>K
- Low floor (on crawl space): 0,222 W / m<sup>2</sup>K

## Renewables & systems

### Systems

Heating system :

- Wood boiler

Hot water system :

- Individual electric boiler

Cooling system :

- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- No renewable energy systems

## Environment

### Urban environment

The old rehabilitated industrial building is located a hundred meters from the church, along the banks of the Indre. It was therefore essential to maintain its original appearance despite its low architectural value. The woodwork present already referred to a hall located just next to an old mill located 50 m. The environment is that of an immediate periphery of village heart with a narrow street separating the building from another building built at the same time.

## Products

### Product

Biofib'Trio

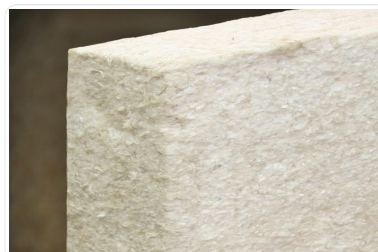
biofib'

<https://www.biofib.com>

Product category : Second œuvre / Cloisons, isolation

Biofib'Trio is a unique alliance of hemp fibers, cotton and linen, offering exceptional thermo-acoustic insulation. The semi-rigid panels Biofib'Trio (available in thicknesses from 45 to 200 mm) or rollers, are specially adapted for an ecological insulation and "any comfort" of the habitat, with thermal performances certified ACERMI.

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Block of hemp

chanvribloc

<http://chanvribloc.com>

Product category : Second œuvre / Cloisons, isolation

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	Epaisseur 10 cm, dimension 30 cm x 60 cm Résistance thermique 1.53 m <sup>2</sup> /K/W 90 unités/palette - 16.4 m <sup>3</sup> /palette Cloisons, isolation intérieure et extérieure
	Epaisseur 15 cm, dimension 30 cm x 60 cm Résistance thermique 2.36 m <sup>2</sup> /K/W 60 unités/palette - 10.9 m <sup>3</sup> /palette Cloisons, isolation intérieure et extérieure
	Epaisseur 20 cm, dimension 30 cm x 60 cm Résistance thermique 3.07 m <sup>2</sup> /K/W (supérieure aux exigences RT2005) 45 unités/palette - 8.2 m <sup>3</sup> /palette Isolation intérieure isolation extérieure et Construction de murs isolant dans la masse
	Epaisseur 30 cm, dimension 20 cm x 60 cm Résistance thermique 4.61 m <sup>2</sup> /K/W (conforme aux exigences RT2012) 45 unités/palette - 5.5 m <sup>3</sup> /palette Construction de murs isolant dans la masse

## Costs

### Construction and exploitation costs

Total cost of the building : 437 090 €

Additional information on costs :

Costs are without land and prior study

## Carbon

### Life Cycle Analysis

Eco-design material :

Materials used:

- Structure: wood frame & wood cladding
- Insulation: cotton, linen and hemp, rapeseed granulate

Quantities implemented:

- Total mass of MBS used: 98 kg / m<sup>2</sup>
- Mass out of wood work and development: 78 kg / m<sup>2</sup>

Experience "rapeseed":

- Insulation "attic lost" by insufflation of rapeseed aggregates grown and processed locally (3 km from the site)

Detail :

- Renovation of the peripheral walls by providing thermal and acoustic insulation in panels made of cotton, linen and hemp
- Inner walls: solid wood structures braced by fermacell. Filling of frames by cotton wool, linen and hemp (Trio BioFib) or by hemp bricks (Chanvribloc) coated earth.
- Low floor: rot-proof insulating solution: cork aggregates caisson system with vacuum underneath for aeration, possible drying (possibility of pumping in case of flood) and passage of networks (evacuation of water, strong and weak current arrivals). Description wooden chests: Jura fir beams + OSB water repellent + Membranes by vapor and airtightness + Granule of cork Covered with a chestnut parquet solid in the home, marmoleum on reattachment in offices and tiling in sanitary

## Reasons for participating in the competition(s)

The low-carbon aspect of this building is based on **a replicable approach in the Center-Val-de-Loire region** : the renovation of buildings that have already been partially refurbished. The carbon footprint of this type of operation is much better than a new construction and also allows to participate in the revitalization of existing places.

To continue working in a low carbon perspective, **biobased materials have been widely used while remaining in reasonable cost** , knowing that it is a demonstrator. **The rapeseed insulation experiment is also an initiative to test a material from a short and abundant sector** throughout the region. The development of this would also allow farmers to control more the selling price of their production.

This building is therefore part of a low-carbon reflection that perpetuates and energizes the socio-patrimonial landscape of the region. On the structural level, the materials used in the context of the rehabilitation serve as demonstrators: massive wood floors and ceiling , earth and insulation coatings on the walls, glass plates on the floor to see 12 solutions of bulk insulation (cork, hemp, wadding, sunflower bark, rapeseed, sunflower marrow, etc.).

Technical solutions used for the development of the site:

- Use of wood as structuring elements in the existing envelope (floor, frame)
- Creation of isolated wooden caissons on the ground, with cork: the building being located in a flood zone, it was necessary to raise the ground of 60 cm, while insulating it with a rot-proof material. This dry solution was preferred to a solution "insulating concrete" for reasons of drying and quantity of materials to provide.
- The exterior walls and some partitions are insulated with a hemp-wood fiber, incorporating cotton: this insulation solution also has interesting acoustic properties for tertiary buildings.
- For questions of inertia and sound separation, partitions were laid with Chanvribloc panels, coated with raw earth. Chanvribloc, breeze block of hemp concrete, has been favored to bunch of plant aggregates, for reasons of moisture evacuation, as part of a rehabilitation time constrained. The earth finish makes it possible to highlight this interesting material for different reasons, including the carbon footprint.
- The ceiling is insulated with local plant aggregates (sunflower granules, ground rapeseed cane). This significant choice of project management serves as a pilot site for this bulk insulation solution. The instrumentation also allows to see the behavior and the aging of this material.
- The heating is provided by a wood pellet boiler, with a good carbon footprint and a good return on investment. This solution was preferred to a water-water heat pump, to register the cluster in the "energy wood" approach of the territory. Assuming the creation of a pellet manufacturing unit, the community could also source locally.
- Double flow ventilation has been installed throughout the building, the only solution to combine air exchange and conservation of calories.
- GTB (Building Technical Management) are present on the wood boiler and the double flow ventilation. Associated with the differentiated meters, it allows to have a look at energy consumption, according to the uses.
- To limit the crossings of wall, and present the technique, the different networks (heating, electricity, double flow) are apparent.
- The finishes are natural: gypsum-cellulose panels painted on walls and ceilings, linoleum and solid wood flooring, chestnut planks on the ceiling of the reception room.

