


## Apprentice Training Center Moulin Rabaud

by Latitude 48° architecture / 2018-06-16 19:08:41 / France / 10224 / FR

Extension + refurbishment



Primary energy need :

### 80 kWhep/m<sup>2</sup>.an

(Calculation method : RT existant )

**ENERGY CONSUMPTION**

Consumption Range (kWh/m <sup>2</sup> .an)	Grade	Building Position
< 50	A	Economical building
51 à 90	B	
91 à 150	C	Building
151 à 230	D	
231 à 330	E	
331 à 450	F	
> 450	G	Energy-intensive building

**Building Type** : School, college, university  
**Construction Year** : 1974  
**Delivery year** : 2017  
**Address 1 - street** : 87000 LIMOGES, France  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 3 300 m<sup>2</sup>  
**Construction/refurbishment cost** : 1 700 000 €  
**Number of Pupil** : 700 Pupil  
**Cost/m<sup>2</sup>** : 515.15 €/m<sup>2</sup>

**Certifications :**



### General information

Overall rehabilitation: thermal, indoor and outdoor circulation, creation of convivial spaces, compliance with PMR standards.

The approach emphasizes both:

- the **environmental performance of the project**, ( beyond the BBC Renovation objective without forgetting the treatment of ventilation and airtightness, essential for the sustainability of the building and the comfort of its users)
- **high speed and quality of implementation**,
- **an architectural requalification of the renovated buildings** and the site, contributing to the enhancement of the image of the CFA, (creation of a glass roof in the heart of the building, new arrangement of interior circulations for the accessibility of the whole, landscaping of surroundings)

Thermal performance of the envelope:

- before work: 257 kWh / m<sup>2</sup>.shab
- after work: 50 kWh / m<sup>2</sup> / shab (factor 5)

## Sustainable development approach of the project owner

Request from the building owner: Reduce the energy consumption of existing buildings, improve reception areas, upgrade the image of the CFA and bring accessibility standards to the building.

The thermal approach proposed by the project management, rather than limiting itself to the regulatory calculation RT and a search for labeling, was more global: the Fiabitat thermal design office, through its tool Fiabiscopie, made a multi-criteria analysis, which is both more precise and closer to reality on the thermal aspect: dynamic thermal simulation giving real heating needs zone by zone, and wider on the environmental impact of the project: greenhouse gas emissions, greenhouse, nonrenewable primary energy, consumed gray energy, operating cost. Precisions on the Fiabiscopie approach: <https://www.fiabitat.com/thermiques-studies/le-fiabiscopie/> See the attached thermal study for the results.

## Architectural description

Two existing buildings from 1974 with prefabricated concrete facades on 2 levels, compact, with rooftop terraces, column-beam structure, which allow economical and effective solutions: external insulation in **prefabricated wood panels** (effective treatment of thermal bridges and low incidence on interior spaces, thus reduced construction nuisances).

In summary, the approach emphasizes both the environmental performance of the project, a high speed and quality of implementation, and an architectural requalification of renovated buildings. The project plans to go beyond the BBC Rénovation objective, to reduce the environmental impact of the project in a more global way: reduction of GHG emissions, low energy gray materials, sustainability and recycling at the end of life, without forget the treatment of ventilation and airtightness, essential for the durability of the building and the comfort of its users.

## Building users opinion

very positive, real added value in terms of comfort, light, fluidity of circulation, conviviality of spaces

## If you had to do it again?

Regret not having been able to use the cellulose insufflated as expected as insulation, because of fire standards in renovation

## See more details about this project



### Stakeholders

#### Contractor

**Name** : Chambre des métiers et de l'Artisanat de la Haute-Vienne

**Contact** : M. Sébastien Sahuède

<http://www.cfa-lemoulinrabaud.com/>

#### Construction Manager

**Name** : Latitude 48° architectes (Viviana Comito, Louise Ranck, Lucie Rosier architectes) - crédit photos (format carré) : Marcello DI MASI

**Contact** : Louise RANCK architecte 06 20 78 69 95 l.ranck@wanadoo.fr

<http://www.latitude48.net>

#### Stakeholders

**Function** : Thermal consultancy agency

FIABITAT CONCEPT

Frederic LOYAU : fred@fiabitat.com

<http://www.fiabitat.com>

thermal study and dynamic thermal simulation

#### Contracting method

Separate batches

#### Type of market

## Energy

### Energy consumption

Primary energy need : 80,00 kWhep/m<sup>2</sup>.an

Primary energy need for standard building : 350,00 kWhep/m<sup>2</sup>.an

Calculation method : RT existant

CEEB : 0.0002

Breakdown for energy consumption : Total distribution final consumption electricity use (kWhef / m<sup>2</sup>.an) with Surface SHON = 3300m<sup>2</sup> Heating: 46.1 ECS (out of process): 0 Auxiliaries: 0.06 Lighting: 2.41 Appliances: N.C Total breakdown final electricity consumption by type of energy (kWhef / m<sup>2</sup>.year) with Surface SHON = 3300m<sup>2</sup> Electricity: 16.89 Gas: 35.22

Initial consumption : 355,00 kWhep/m<sup>2</sup>.an

### Real final energy consumption

Final Energy : 49,16 kWhef/m<sup>2</sup>.an

### Envelope performance

More information :

Detailed U value:

Low floor 0.21

Outside wall 0.20

Joinery 1.50

Flooring high 0.17

More information of doc thermal report

Indicator : n50

Air Tightness Value : 2,31

Users' control system opinion :

The automatic regulation of the ambience in the canopy works well, no feeling of overheating.

### More information

Calculation by the PLEIADES COMFIE software in dynamic thermal simulation

## Renewables & systems

### Systems

Heating system :

- Condensing gas boiler

Hot water system :

- Gas boiler

Cooling system :

- No cooling system

Ventilation system :

- Single flow

Renewable systems :

- No renewable energy systems

Solutions enhancing nature free gains :

verrière faisant office d'espace tampon avec régulation automatique

### Urban environment

Land plot area : 20 000,00 m<sup>2</sup>

Built-up area : 13,00 %

Green space : 18 500,00

Redevelopment of outdoor spaces and circulations for accessibility, plant plantations, replacement of bitumen with deactivated concrete. Maximization of planted areas, reduction of asphalt surfaces.

## Products

### Product

Exterior joinery Guillaumie

Guillaumie

cathia.caron@guillaumie.com

<http://guillaumie.com>

Product category : Table 'c21\_china.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '10'

Exterior carpentry Douglas Limousin made on site. Wood or wood-aluminum

Very good acceptance



## Costs

### Construction and exploitation costs

Cost of studies : 119 500 €

## Health and comfort

### Comfort

Health & comfort :

Simple flow ventilation with preheating by blowing in the classrooms and offices, and extraction in the sanitary, because of the potential presence of radon in the basement.Regulatory rates 18 m<sup>2</sup> / h / pers.Modulation by programmable clock

Measured thermal comfort : hypothèse de 20°C en hiver, classe A énergie DPE

## Carbon

### GHG emissions

GHG in use : 9,00 KgCO<sub>2</sub>/m<sup>2</sup>/an

GHG before use : 69,60 KgCO<sub>2</sub> /m<sup>2</sup>

, ie xx in use years : 7.73

### Life Cycle Analysis

Eco-design material :

Douglas local Limousin for wood frame prefabricated framing panels, part of cladding, and all exterior joinery

## Reasons for participating in the competition(s)

Energy and technical devices:

- ITE (on existing prefabricated concrete) prefabricated Douglas-fir prefabricated panel, rock wool filling. Cladding: southern façades clad with douglas fir from the Limousin (treated with a gray saturator to anticipate aging) / facades made of fiber-reinforced concrete (tinted in the mass)
- ITE rockwool gables, lime plaster
- Wood-aluminum joinery in Limousin Douglas fir, sun shades
- Reinforcement of roof terrace insulation, new EPDM membrane and gravel
- Landscaping of an accessible roof terrace on the roof
- Creation of a glass roof, the nerve center of the project to the convergence of flows, and conviviality space, with automated regulation of the indoor climate.
- Creation of an insufflation ventilation circuit with preheating.
- New heating circuit
- redevelopment of reception areas
- decartmentalization of certain areas in the administration, new rubber floors and interior paints (circulation, office, classrooms)
- development of external pedestrian paths

## Building candidate in the category



Energie & Climats Tempérés



Coup de Cœur des Internautes



Prix des Etudiants



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