Lowcal: labeled E4 C2, EFFINERGIE + 2017 and BBCA Excellence.

by Thierry RIESER / 2020-05-07 11:41:07 / France / 14330 / FR

Primary energy need :

-98.7 kWhep/m².an

(Calculation method : RT 2012)

ENERGY CONSUMPTION

Economical building

Building

A

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building Type : Office building < 28m
Construction Year : 2015
Delivery year : 2016
Address 1 - street : 65 Les Balcons de l'Amourier 26160 PONT-DE-BARRET, France
Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 730 m²
Construction/refurbishment cost : 817 000 €
Number of Work station : 35 Work station
Cost/m2 : 1119.18 €/m²

Certifications :

effinergie+ BÂTIMENT BBCA BAS CARBONE E+C-

General information

Wood-straw desks, without heating, with positive energy, low carbon and controlled costs: construction of Positive energy, Low tech and low energy gray desks.

LowCal is a building demonstrating our know-how, which is innovative in terms of energy and environmental. All the work invested in this building has been rewarded with several labels at their highest levels: Energy and Carbon labels (E4 C2), BBCA Excellence and BEPOS + Effinergie 2017.LowCal is the first tertiary building to be labeled E4 C2 level. .

Sustainable development approach of the project owner

LowCal concept:

- Low Impact: wood-straw construction, inertia brought by the raw earth, quality of indoor air (healthy materials, ...).
- Low Tech: building without fixed heating installation, decentralized dual flow ventilation (network limitation), ECS only for showers (occasional use).
- Low Calories: high insulation, building without fixed heating, control of electricity consumption (lighting at 2 W / m², low-energy computing ...) and of course positive energy for all uses (ie: energy consumption heating, ventilation, lighting, office automation, computer, kitchen area, DHW production of the shower and various uses of electricity); (photovoltaics produces 7 times the total consumption measured by measurement campaign).
- Local: materials and local businesses, in addition to a rural development dynamic.
- Low cost: cost of 1 120 € HT / m²SHON (excluding HHT).

This building is a synthesis of the founding principles of the negaWatt approach.

Architectural description

Of a deliberately sober architecture and integrated in the rural village of Pont de Barret, this building reflects by its facade materials its constructive mode wood, married to a traditional lime plaster. Of bioclimatic design, joineries are generous on the southern main facade, while maintaining a natural lighting comfortable on the other orientations. The interior architecture is built around a wide central circulation on both levels, enlivened by the undulation of the mud wall.

Building users opinion

Warm, comfortable, bright and pleasant building.

If you had to do it again?

After a year in offices and good feedback, Enertech says it is ready to work on the Lowcal concept on a larger scale and adapt to other uses (eg housing). Some points could be reworked such as the improvement of wood shutters (difficult to manipulate), the improvement of acoustics between levels, the integration of electrical networks in a floor (complex with the mud floor) or a work on the water consumption of the toilets (reduction of the timers of the taps).

See more details about this project

http://leblog.enertech.fr/item/59-lowcal-le-premier-batiment-tertiaire-certifie-e4c2

Stakeholders

Contractor

Name : ENERTECH SCOP
Contact : Thierry RIESER
http://www.enertech.fr/

Construction Manager

Name : CABINET TRAVERSIER ARCHITECTURE
Contact : Thomas RICHARD
http://www.pierre-traversier.com/

Stakeholders

Function : Thermal consultancy agency

ENERTECH

Thierry RIESER - Gérant

http://www.enertech.fr/ http://leblog.enertech.fr
Thermal BE and QEB

Function :

SIB SOLUTIONS

M. PENNETIER

http://www.sibsolutions.fr/
Wood structure design office

Function :

BUREAU MATHIEU

M. SOULAT

Concrete structure design office

Contracting method

Separate batches

Type of market

Global performance contract

Energy

Energy consumption

Primary energy need : -98,70 kWhep/m^2.an

Primary energy need for standard building : 56,00 kWhep/m^2.an

Calculation method : RT 2012

CEEB : 0.0002

Breakdown for energy consumption : Heating: 2.2 Lighting: 0.6 VMC: 0.2 Positive energy building with a Cep = -98.7 kWhep / m².an Other (office automation): 2,8 Photovoltaic production: 55

Real final energy consumption

Final Energy : -4,30 kWhef/m^2.an

Real final energy consumption/m2 : -45,10 kWhef/m^2.an

Year of the real energy consumption : 2 016

Envelope performance

Envelope U-Value : 0,26 $W.m^{-2}.K^{-1}$

More information :
Walls: straw insulation (36cm) + wood wool (5cm)
Roof: 40 cm cellulose wadding
Wood joinery with triple glazing with high solar factor

Building Compactness Coefficient : 0,59

Indicator : n50

Air Tightness Value : 0,53

Users' control system opinion :

No home automation system. We have adopted a low-tech approach. It is a success ! Users have taken charge of the building and are the actors of its performance and comfort, office by office and summer and winter.

https://www.construction21.org/france/data/sources/users/10998/171012-br-bilan12mois.xlsx

More information

The final all-purpose energy consumption is expressed per m² SU, excluding photovoltaic. The building has a positive energy of a factor greater than 7 (production 7 times higher than all-purpose consumption)

Renewables & systems

Systems

Heating system :
- Others
- Electric radiator

Hot water system :
- Individual electric boiler

Cooling system :
- No cooling system

Ventilation system :

- Free-cooling
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 670,00 %

Other information on HVAC :

Low-tech approach to systems: the building is almost without heating, with a reduced need to less than 5 kW.h / m² by Passive optimization of winter and summer comfort.
Thus we were able to obtain a radical simplification of the climatic installations, with simple electric radiators (4 kW installed for 620 m² SU!) And no air conditioning.

Pan South roof covered photovoltaic collectors (24 kWp) of European manufacture.

Solutions enhancing nature free gains :

Conception bioclimatique, bonne solarisation au sud sans masque solaire ni brise soleil fixe. Excellente isolation et tripes vitrages à haut facteur solaire.

Smart Building

BMS :

Nothing of that ! Low-tech approach, we did not want to deprive the user of his role as a building actor.

Smartgrid :

Low self-consumption rate (7%) because we produce a lot and consume very little!
On the other hand the rate of self-production (more interesting for a building with positive energy) is 67%, and will be further improved in 2018 by the authorization of walking of the heating only the day (objective:> 85%).

Users' opinion on the Smart Building functions :

Great satisfaction of the whole team to be an actor of his comfort, summer as well as winter.

Environment

Urban environment

Land plot area : 1 380,00 m^2

Built-up area : 22,00 %

Green space : 312,00

Rural area (Pont de Barret: commune of 600 inhabitants)

Products

Product

Wood frame wall - prefabricated straw

Sud Est Charpente

sec.bedouin@orange.fr

http://www.sudestcharpentes.com

Product category : Structural work / Structure - Masonry - Facade

Prefabricated timber frame with straw infill

Good realization and implementation on site

Zehnder CA70

Zehnder

Rodolphe.Cherruault@zehnder.fr

http://www.zehnder.fr

Product category : HVAC, électricité / ventilation, cooling

Distributed double flow ventilation. The Low-Tech solution to do double flow ventilation without having pipes everywhere, and allow the user to control his ventilation as he controls his lighting: with a simple switch.

Very appreciated by users.

Costs

Construction and exploitation costs

Renewable energy systems cost : 38 000,00 €

Cost of studies : 217 000 €

Total cost of the building : 1 307 000 €

Subsidies : 77 000 €

Energy bill

Forecasted energy bill/year : 806,00 €

Real energy cost/m2 : 1.1

Real energy cost/Work station : 23.03

Health and comfort

Water management

Consumption from water network : 100,00 m^3

Water Consumption/m2 : 0.14

Water Consumption/Work station : 2.86

Indoor Air quality

The measurement campaign also included IAQ. This component was carried out by MEDIECO. See the measurement report in the previous section (eco-materials). The results are overall very good: very low in CO2 and fine particles. A little VOC in vacancy because the ventilation is stopped. This reminds us that even a building using only healthy materials needs to be ventilated so that the air quality is excellent.

Comfort

Measured indoor CO2 concentration :

Mesures in situ par Médiéco : < 700 ppm de CO2 dans tous les bureaux.

Calculated thermal comfort : 0 heures au-dessus de 28°C.

Measured thermal comfort : La réalité s'est avérée conforme, le bâtiment reste très agréable en été ! Aucune heure au-dessus de 28°C.

Acoustic comfort :

Good overall acoustical comfort (most of the measurements made by Médiéco are under 45 dBA) Small weakness, however, of the intermediate wooden floor filling raw compressed clay: the joist creates a sound bridge for solid sounds. This has been solved by adding acoustic ceiling in some rooms.

Carbon

GHG emissions

GHG in use : 75,60 $KgCO_2/m^2/an$

Methodology used :

Label E+/C-

GHG before use : 605,40 $KgCO_2 /m^2$

Building lifetime : 50,00 année(s)

, ie xx in use years : 8.01

GHG Cradle to Grave : 759,90 $KgCO_2 /m^2$

The results presented are respectively: USage: Impact Energy + Water / Before use: Eges PCE + Site (which actually contains the replacement and end of life of materials)

Life Cycle Analysis

Material impact on GHG emissions :
609.8

Material impact on energy consumption : 51,70 kWhEP

Eco-design material :

Straw-wood constructionGerosourced embroidery: adobe brick made with soil from the groundWooden wool insulation and cellulose waddingOuter and interior wooden joinerySoft linoleum

Contest

Reasons for participating in the competition(s)

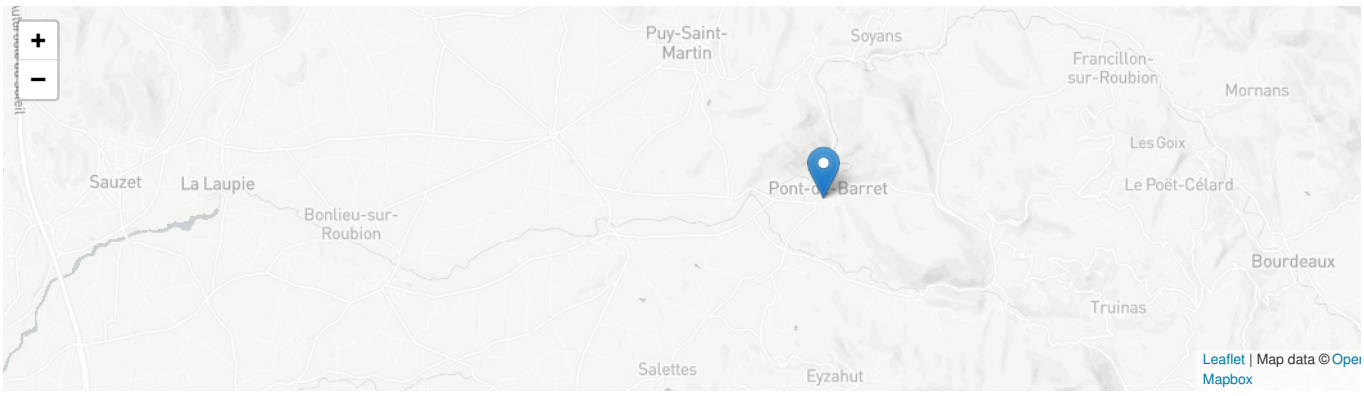
La résilience du LowCal a été abordée dans une approche très large.
Il s'agit bien sûr de répondre au *risque de canicules* par un confort d'été passif, dont l'efficacité a été démontrée par les mesures réalisées.
Il s'agissait pour nous de démontrer également que le concept LowCal est résilient face à la *déplétion des ressources naturelles non renouvelables* (dont le sable). C'est ainsi que nous avons limité l'usage du béton et des plastiques dans la construction, pour favoriser des matériaux en circuit court, locaux, et sains. Ces matériaux constituent également un puits de carbone.
Plus encore, après avoir constaté sur le terrain que les "usines à gaz" fonctionnent rarement dans la réalité, nous avons appliqué au LowCal une approche très *LowTech*. Nous limitons à la fois la dépendance aux hautes technologies (sujet de déplétion des terres rares etc.) et nous augmentons la *robustesse du bâtiment* face à une maintenance insuffisante. Pas de pompes, de climatiseur, de clapets coupe-feu, de GTC, qui risquent toujours de tomber en panne ou de se dérégler... En réalité, les seuls gestes de maintenance sont le remplacement des filtres de double flux décentralisés, qui sont réalisés par les salariés eux-mêmes !

Enfin, le concept de bâtiment sans chauffage et sans climatisation nous assure un *confort en toute saison même en cas de coupure de courant* de quelques jours comme cela a eu lieu en décembre 2019 et comme cela va se produire de plus en plus souvent (épisodes climatiques extrême, question du refroidissement des centrales en cas de sécheresse en été, etc.).

Building candidate in the category

Prix tertiaire & industriel

1ère édition
Trophées
Bâtiments résilients



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