Mauges Public High School

by Jean-Michel Buron / 2016-06-01 13:57:11 / France / 23762 / FR

Primary energy need :

35 kWhep/m².an

(Calculation method :)

ENERGY CONSUMPTION

Economical building — *Building*

< 50	A	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 : School, college, university
Construction Year : 2014
Delivery year : 2015
Address 1 - street : Route de l'Hyppodrome 49600 BEAUPRéAU, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 11 000 m²
Construction/refurbishment cost : 22 000 000 €
Cost/m2 : 2000 €/m²

Certifications :

NF HQE — effinergie — effinergie

Proposed by :

General information

Construction of a Highschool in Beaupréau in Pays de la Loire

For the record, the construction of school Mauges is the culmination of a fight 50 years in the Region militants for secular education in the country of Mauges. Etienne DAVODEAU recounts this fight in his comic strip "The Bad People". I raise this point to say that this adventure has obviously heavily inspired us to design this building.

The Mauges high school is a positive energy building as part of an HQE certification.

Sustainable development approach of the project owner

From the environmental point of view, the school is a building that not only does not consume energy but produces. The building is HQE certified and labeled BEPOS with many amenities:

- Firstly, the atrium that acts as a bioclimatic space fed by a pipe system 28 000 m3 / hour. This space provides great convenience to users,
- The type of heat pump air / water for the production of heating
- Photovoltaic panels for electricity generation,
- A system "solar carpet / heat pump" specific (Heliopac system) that supplies the hot water boarding,
- Green roofs,
- A BMS to control all devices.

Architectural description

The architecture is based on the will of valuing nature of this site and the area's identity. The buildings have been designed as strips of land that are inflected, rise and accompany the morphology of the place. These promontories appear symbolically leave the soil, red clay from the land of Mauges, a retaining wall designed as a visible geological section from the forum and circulations. The materials were chosen in the same spirit: integration to the site through the use of natural resources.

The volume is simple and consists of larch facades. This choice is based on the ability of wood to harmonize with other materials and fit naturally into the landscape. Moreover, the larch has mechanical properties and durability that predisposes him to a job outside. Wood siding is implemented in various ways as vertical blades and horizontal battens openwork, occasionally incorporating shutters in perfect continuity with the siding. The alternation of continuous surfaces and perforated overlaid on solid or glazed panels gives a lot of dynamic facades.

The interiors also use wood that is very present in the whole building. This material brings a stain and a natural warmth that greatly contributes to the feeling of comfort and conviviality searched. In addition it features invaluable acoustic qualities including bioclimatic space (atrium).

Building users opinion

Good use, felt very positive from the public and staff.

See more details about this project

http://www.epicuria-architectes.com
http://www.construction21.org/france/articles/fr/laureat-grand-prix-construction-durable-gbcsawards-2016-lycee-public-des-mauges-france.html

Stakeholders

Stakeholders

Function : Designer

EPICURIA ARCHITECTES

Jean-Michel Buron

http://epicuria-architectes.com
Project management

Function : Construction company

EIFFAGE Construction

http://www.eiffageconstruction.com/home.html

Function : Others

BERIM

http://www.berim.fr/

AGI2D

Energy

Energy consumption

Primary energy need : 35,00 kWhep/m^2.an

Primary energy need for standard building : 57,00 kWhep/m^2.an

Calculation method :

Breakdown for energy consumption : Heating: 5.6
Hot water: 6.1
Lighting: 12

Real final energy consumption

Final Energy : 552 595,00 kWhef/m^2.an

Envelope performance

Envelope U-Value : 0,40 $W.m^{-2}.K^{-1}$

More information :

Facades:
Sails concrete with external insulation 20 cm R = 5.7: 0.20

Roofing / senior floors:
Green roof Polyurethane 14 cm R = 6.1 cm foam glass 5 R = 1.2 Concrete slab: 0.13low floors on exterior or crawlspace: Extruded Polystyrene 16 cm R = 4 on the underside of concrete slab: 0.20

low floors on full ground: Polystyrene extruded 10 cm R = 4 on the underside of concrete slab: 0.17 eu

Building Compactness Coefficient : 0,60

Indicator :

Air Tightness Value : 0,96

More information

Balance sheet KWH EP / m2 / year for the first 11 months of operation since the end of July 2015: 552,595 kWh EF

Renewables & systems

Systems

Heating system :

- Heat pump
- Radiant ceiling
- Canadian well

Hot water system :

- No domestic hot water system

Cooling system :

- Canadian well

Ventilation system :

- Nocturnal Over ventilation
- compensated Air Handling Unit
- Double flow heat exchanger
- Canadian well

Renewable systems :

- Solar photovoltaic
- Micro wind
- Other, specify

Renewable energy production : 100,00 %

Heliopac system, heat pump connected to a web system http://www.heliopac.fr/

Solutions enhancing nature free gains :

- Sur-isolation - Atrium faisant espace tampon - Optimisation des surfaces vitrées

Smart Building

BMS :

building management system in place, no centralized technical management

Users' opinion on the Smart Building functions : Good ownership of users

Environment

Urban environment

Land plot area : 30 440,00 m^2

Built-up area : 8 360,00 %

Green space : 11 700,00

Located in rural areas, in the middle of the grove, on a steep slope, facing the town of Beaupréau. Apart from a few houses and a gym, the immediate environment is free of construction.
This school, highly awaited by the region for decades, allows access to area students in varying formations. Near sports facilities in the town, it also offers a residential care home, a restaurant, a function room, accessible out of school time for all audiences.

Products

Product

POLIECO

POLIECO

info@polieco.fr

http://www.polieco.com/

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

The Canadian well consists of 6 layers of 54 m long. Its flow rate of 30 000m3 / h.

An open gallery on the bottom floor of the building allows the public to observe the well.

Costs

Construction and exploitation costs

Renewable energy systems cost : 400 000,00 €

Health and comfort

Water management

Consumption from water network : 1 920,00 m^3

Consumption of harvested rainwater : 465,00 m^3

Water Self Sufficiency Index : 0.19
Water Consumption/m2 : 0.17
Water Consumption/Pupil : 2.65
Annual rainwater consumption is an estimate, pending first year of operation for the balance sheet.

Indoor Air quality

The materials have FDE & S or recognized environmental labels (VOC and formaldehyde, substances, sources and treatment, etc.) were systematically favored. It will take into account the emissions of formaldehyde and VOCs in the choice of interior finishes.The linings are known in their majority emissions, they benefit to a lot of classification A +

Comfort

Health & comfort : Valuation of the contribution of natural light: big picture windows, choice of glazing second day ...Getting natural ventilation possible to ensure the thermal comfort of users in summer and mid-season: natural ventilation of the atrium and the possibility of using underground heat for coolAcoustic monitoring and measures

Calculated indoor CO2 concentration :
Le taux de renouvellement de l'air va au delà des arrêtés ministériels. Des systèmes de détection de CO2 ont été mis en place dans les locaux d'occupation intermittents et en classe pour gérer le flux.

Calculated thermal comfort : La chaleur du bâtiment n'excède pas 28°C pendant plus de 20h dans l'année dans une salle de classe et 35h dans les bureaux.

Acoustic comfort : Room of music education, studies, practical activities, medical or social room, infirmary; health; administration; home; meeting room ; library ; documentation center, CDI, should be between 0.4

• Room of music education, studies, practical activities and multipurpose room of volume greater than 250m3, should be between 0.6 • dining room with a volume greater than 250 m3 must be less than 1.2 s;

• other local and circulating a volume greater than 250 m3 shall be such that: 0.15 ≤ Tr V1 / 3. So we have the two halls: Tr ≤ 1.2 s if 250 m3

Carbon

GHG emissions

GHG in use : 1,00 $KgCO_2/m^2$/an

GHG before use : 1,16 $KgCO_2$ /m^2

Building lifetime : 100,00 année(s)

, ie xx in use years : 1.16

Life Cycle Analysis

Material impact on GHG emissions :
1.74

Material impact on energy consumption : 6,82 kWhEP

Eco-design material : Wood: French Larch

Contest

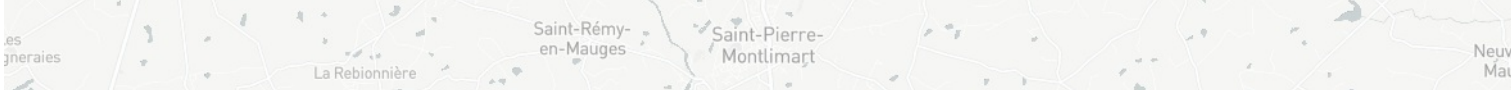
Reasons for participating in the competition(s)

In studies of this project we have explored many possibilities to reach the BEPOS level with advanced simulations (Cogeneration , rapeseed oil sector , geothermal, photovoltaic cells different locations ...).
The objectives have pushed us to excel . The client (Pays de la Loire , department of schools) was the engine, while remaining extremely vigilant about the appropriateness of the techniques and their maintenance.En consultation with the MO , successful systems (bioclimatic space and Canadian , heat pumps , photovoltaic cells, solar hot water) are best suited to the site, and the management and maintenance of a building of this type. Such synergy has been possible thanks to the cohesion of the whole of construction players .

Building candidate in the category

Energie & Climats Tempérés

Grand Prix Construction Durable



Coup de Coeur des Internautes

Date Export : 20230401085325