Tri Pemorch Bihan, The Childhood Pole

by Florence DEVERNAY / 2018-06-15 10:09:53 / France / 6127 / FR

Primary energy need :

18 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 : Preschool, kindergarten, nursery
Construction Year : 2015
Delivery year : 2015
Address 1 - street : 56310 QUISTINIC, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 375 m²
Construction/refurbishment cost : 612 764 €
Number of Children : 120 Children
Cost/m2 : 1634.04 €/m²

Proposed by :

General information

Environmental involvement:
The energy efficient design of this building has a passive purpose, based on the following bioclimatic principles:

- efficient insulation
- Solar gains and inertia
- roof overhang to protect summer overheating.

Reduce the project's carbon footprint: The environmental footprint remains low due to the use of bio-sourced materials:

- country wood for untreated framing (Douglas fir, chestnut),
- organic straw of the town for the insulation of walls and roof,
- cork for floor insulation and clay-based earthenware on straw walls.

Sustainable development approach of the project owner

The primary objective of this project was to provide equipment that meets the expectations of residents and especially the 120 students divided equally between the public and private. The problem to be solved was the upgrading of their respective canteens. Rather than renovating these two spaces, the municipality proposed to build a single piece of equipment on land that is equidistant from both sites.

The actors of the project were associated very early with the reflections of the elected representatives: the users (teachers, parents of pupils and municipal agents), the CAUE, the DDTM and BRUDED. Bringing all the students together in a single canteen helps to reduce the still vivid public / private divide and optimize the work of the communal staff. This also leaves the possibility of raising children's awareness of eating well by promoting the local organic sector and the health benefits of walking before and after meals. This equipment also houses a daycare, a relay of childminders and a room for young people.

On the technical side, the energy performance of the building approaches the liabilities thanks to the south orientation of the building, its compactness and good insulation, with the treatment of summer overheating. The environmental footprint remains low due to the use of bio-sourced materials: wood for the frame, straw for insulation and earth coatings.

On the financial side, the building will have cost less than expected.This is explained by the optimization of surfaces, the pooling of some of them and to a lesser extent the economy related to participatory projects.

To participate in the building sites, a call was launched among the population and neighboring communes who signed a convention of volunteer. Covered by the insurance of the town hall, they were supervised by the company Echopaille de Larré (56) and the Terraterre de Spézet (29) who have guaranteed the good realization of these lots with their decennial. Previously, straw harvesting and storage was directed by Denis Le Gall, deputy works and organic farmer, with the participation of volunteer residents.

The architectural approach of this project was therefore to register as long as possible in the landscape of the site. Thus the building is curling up against the existing slope of the ground and closing the axis of the road from the cemetery. The courtyard becomes a transition space punctuated by a courtyard cantilevered on the forecourt, providing a shelter for parents. The volume of this equipment on one level is simple, compact and open to the maximum on its south face.

Made with materials that are preferably bio-sourced, such as wood, straw and earth, it has made Quistinois aware of the local natural resources. This project was used as a teaching tool for both children and adults (site visits, discovery of natural building materials ...). Its energy-efficient design, with a passive purpose, is also based on the following bioclimatic principles: high-performance insulation, solar gains and inertia.

Architectural description

The program of this project includes the creation of a school restaurant, an after-school reception and a youth area.

The municipality is committed to an environmental approach to create this project in continuity with the town center. This approach can be summed up in several points:

- The choice of location respecting the sunshine on the plot, the surrounding urban and landscape context with the integration of the hedgerow
- Eco-construction and bioclimatic design (preferably bio-sourced materials such as wood, straw and earth) to serve as a teaching tool to sensitize Quistinois to local natural resources
- The etymology of Quistinic, the chestnut grove, and therefore the forest, the wood, used in different ways in the project (structure, heating booster ...)

The architectural approach of this project is to register as long as possible in the landscape of the site. The building is wrapped in the slope of the land and closes the axis of the road from the cemetery. The courtyard becomes a transition space punctuated by a courtyard in port on the forecourt.

Stakeholders

Contractor

Name : Mairie de Quistinic
Contact : Guilbart Gisèle (Maire) 02 97 39 71 08 mairie.quistinic@wanadoo.fr
http://www.quistinic.fr/

Construction Manager

Name : Devernay Architecte
Contact : Florence Devernay 09 77 66 64 75 accueil.devernayarchi@gmail.com
http://www.devernay-architectes.fr/

Stakeholders

Function : Thermal consultancy agency

Efficience Construction Environnement

06 81 83 45 11

http://www.ece-etudes-conseils.fr/
Conception passive

Function : Thermal consultancy agency

FT2I

02 97 29 01 92

http://www.ft1i.fr

Air permeability measurement

Function : Structures calculist

Konstruktif

02 98 82 15 34 kontakt@konstruktif.fr

http://www.konstruktif.fr/

Structural calculation

Function : Company

Sotrabat

Lot 2: Structural work

Function : Company

Loy

Lot 3: Carpentry / Wood Framing / Insulation Lot 4: Exterior Carpentry Lot 8: Interior Carpentry

Function : Company

Jego

Lot 5: Cover

Function : Company

Echopaille

Lot 6 : Isolation paille

Function : Company

Terraterre

Lot 7: Earthen plaster

Function : Company

JC Andre

Lot 12: Electricity

Function : Company

LMI peinture

Lot 14: Painting

Energy

Energy consumption

Primary energy need : 18,00 kWhep/m^2.an

Primary energy need for standard building : 47,00 kWhep/m^2.an

Calculation method :

Breakdown for energy consumption : Energy consumption : Heating: 20 to 25% Domestic hot water: 15% Ventilation: 15 to 20% Specific consumption: 40%

Real final energy consumption

Final Energy : 195,00 kWhef/m^2.an

Envelope performance

Envelope U-Value : 0,17 $W.m^{-2}.K^{-1}$

More information :

360mm straw insulated wall for West and North West
Surface: 263.99m² U: 0.138 Percentage on the whole envelope: 20.51%
Glazing surface 30.39m² U: 0.6 Percentage on the entire envelope: 2.36%

220mm wood wool insulation wall for the southern part
Area: 156.35m² U: 0.139 Percentage on the whole envelope: 12.15%
Glazing surface 56.26m² U: 0.8 Percentage of the entire envelope: 2.36%

Roof insulation with straw insulation
Area: 393.84m² U: 0.142 Percentage of the entire envelope: 30.60%

Floor tile
Area: 386m² U: 0.132 Percentage of the entire envelope: 30.00%

Building Compactness Coefficient : 0,21

Indicator : n50

Air Tightness Value : 0,67

More information

The following electricity consumption was noted at the beginning of 2016: - January 1 to 18: 3316 kwh, 60 kwh / d in HC and 113 kwh / d in HP - From 1st to 15th of February: 2735 kwh, ie 62 kwh / d in HC and 120 kwh / d in HP - From February 16 to March 19: 6983 kwh, or 72 kwh / d in HC and 140 kwh / d in HP Daily consumption is therefore relatively constant, although with 15% increase in March 2016. Need heat: For this same period, the calculated heating requirement for the building is: - From January 1st to 18th: 1,000 kWh of useful electrical energy (electric heating coil). - From February 1st to 15th: 630 kwh in useful electrical energy. - From February 16th to March 19th: 1080 kWh in useful electrical energy. This requirement is calculated for an advertised efficiency of 86 to 91% (recovery yield of heat) of the double-flow plant, an average flow over the period and an internal temperature of 20 ° C. The building being at 15 kwh / m² / year of heating heat requirement is the passive standard. Other important items of consumption: - Central double-flow (fans): 400 w per fan for a medium flow on the period, - Dishwasher: installed power of 10.5 kw - Washing machine: 3 kw - Solar DHW and electric booster: 4.5 kw - Kitchen (hood and plate warmer): 2.75 kw - Refrigerators: 0.3 kw - Microwave oven: 0.8 kw - Kitchnette (local young): 4 kw - Other devices (computer, radio ...): 1 kw - Lighting: 4.5 kw That's a total of about 32 kw installed.

Renewables & systems

Systems

Heating system :

- Others

Hot water system :

- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- No renewable energy systems

Environment

Urban environment

Land plot area : 1 885,00 m^2

Built-up area : 20,00 %

The project of the childhood center was built in the subdivision Korrigans located near the town center, to facilitate travel. The building was to be equidistant from the two schools of the communes

Products

Product

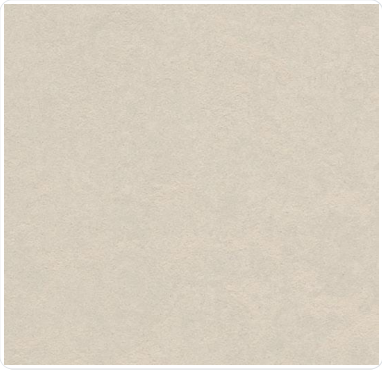
Marmoleum Real

Forbo

Siège Social Reims 63 rue Gosset BP 62717 51055 Reims - FRANCE Tél : 03 26 77 30 30

https://www.forbo.com/flooring/fr-fr/

Product category : Second œuvre / Revêtements de sol



Eco-friendly flooring
The raw materials used in the design of linoleum are:
- linseed oil, derived from the seeds of the flax plant
- wood flour from controlled forests
- jute, natural support on which linoleum is calendered.

Easy installation by artisans
Easy maintenance by municipal agents

Organic straw

Denis Le gal

Product category : Second œuvre / Cloisons, isolation

Organic straw grown on the commune

Technical characteristic
Material properties
Thickness 37 cm, dimensions 47cm x 50 to 120cm
Density: 100 kg / m³
Compressive strength: 150 kPa

Thermal properties
Thermal resistance: 7.11 m²K / W
Thermal conductivity λ: 0.052 W / mK
Thermal mass capacity: 1500 J / kgK
Phase shift (ISO 13786): 12h 30min

Acoustic properties
Sound reduction index: 43 dB
Other
Resistance factor to water vapor diffusion μ: 1 to 2
Reaction to fire: Euroclass E
Sound absorption coefficient αw = 0.65

To isolate the building in straw was a wish of the mastery of work.
Participatory workshops were also organized, with the aim of raising the awareness of future occupants and parents of students about straw insulation.

Land of the site

Product category : Second œuvre / Peinture, revêtements muraux

Clay plaster is mainly composed of clays and sand.

density: about 1,600 kg / m3
thermal conductivity: 0.91 W / m.
not combustible

Ecological balance: excellent for coatings produced on site. This natural material requires relatively little gray energy for its production (mainly extraction and sieving) and is completely recyclable.

Using the resources present on the site and its surroundings was a desire of the project owner.
In the same way as for straw insulation, participatory workshops have also been organized, with the aim of raising the awareness of future occupants as well as parents of students about the plastering of the land.

Costs

Construction and exploitation costs

Reference global cost : 1 634,00 €

Reference global cost/Children : 1634

Cost of studies : 89 320 €

Total cost of the building : 815 434 €

Subsidies : 506 000 €

Carbon

Life Cycle Analysis

Eco-design material :

The environmental footprint remains low due to the use of bio-sourced materials: wood for untreated framing (Douglas fir, chestnut), organic straw for the insulation of walls and roof, cork for soil insulation and earth-based clay plaster on the straw walls. The choice to use straw in the main insulation of the building was multiple: - a will to implement a natural material from agricultural production and identified as a resident wish to be able to produce this material on the commune thanks to the farmer Denis Le Gal who proposed to sow a wheat from organic farming which allowed to recover the straw by isolating.- organic straw, a healthy material, breathable with a very good thermal coefficient- the harvesting of the straw and the put in boots in a participative way: inhabitants and elected volunteers came to join hands voluntarily.

Contest

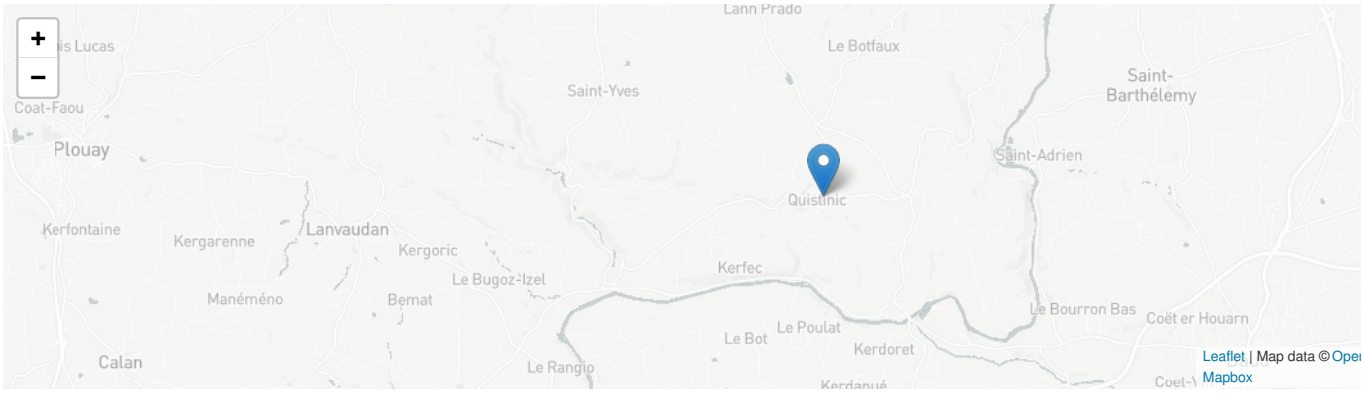
Reasons for participating in the competition(s)

Environmental involvement:
The energy efficient design of this building has a passive purpose, based on the following bioclimatic principles:

- efficient insulation
- Solar gains and inertia
- roof overhang to protect summer overheating.

Reduce the project's carbon footprint: The environmental footprint remains low due to the use of bio-sourced materials:

- country wood for untreated framing (Douglas fir, chestnut),
- organic straw of the town for the insulation of walls and roof,
- cork for floor insulation and clay-based earthenware on straw walls.



Date Export : 20230612094446