


Eco-construction of the bioclimatic wooden building at the Aubevoye wastewater treatment plant

by AR ARCHITECTES / 2018-06-12 11:31:34 / France / 7997 / FR

New Construction



Primary energy need :

50 kWhep/m².an

(Calculation method :)

ENERGY CONSUMPTION

Consumption Range (kWh/m ² .an)	Grade	Category
< 50	A	Economical building
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 **A**

Building Type : Factories
Construction Year : 2014
Delivery year : 2014
Address 1 - street : 27940 AUBEVOYE, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 710 m²
Construction/refurbishment cost : 1 775 000 €
Number of Installed Kw : 2 Installed Kw
Cost/m2 : 2500 €/m²

Certifications :



Proposed by :



General information

The entire Aubevoye wastewater treatment plant responds to an innovative HQE® approach, proposing a bioclimatic timber frame construction building made of Douglas fir class 4, combined with natural and high-performance materials, enabling healthy, comfortable and sustainable construction. , with positive energy by an integrated photovoltaic roof at the heart of a remarkable site. The building is oriented on a North-South axis allowing to benefit from an optimal sunshine during the period of the winter and during the summer the heat is dissipated by the dual-flow ventilation and devices on the roof of solar shading. The whole building is part of a green setting. Landscaping is offered through different landscape units that make up an eco-landscape throughout the site, supporting a walkway integrated into the educational pathway and promoting the development of biodiversity.

Sustainable development approach of the project owner

The client's wish was particularly focused on the following environmental issues:

- Creation of a bioclimatic building with wood frame and accessible to the public;
- Integration of buildings and equipment into the environment;
- The use of materials easily recyclable;
- Use of photovoltaic panels;
- Integration of an anaerobic digestion unit within the building for the valorization of the heat network and the use of the energies produced to supply the equipment of the municipality;
- The quality of life of the operating staff and residents by taking priority into consideration of olfactory and acoustic comfort conditions;
- The acquisition of a new attitude, more responsible vis-à-vis the resources especially the water of the air of energy.
- Special attention for the restoration of biodiversity on site.

Architectural description

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Building users opinion

The occupants are fully satisfied with the thermal comfort inside the building, the sanitary quality of the interior spaces, the visual comfort, the quality of the indoor air, the quality of the natural light inside the spaces. of work as well as acoustic comfort.

If you had to do it again?

We would have redone the same project by integrating all aspects that will make this project a reference from an eco-construction point of view.

See more details about this project

http://www.ar-architectes.com/eco_fiche.php?id=aubevoye

<https://www.construction21.org/france/infrastructure/fr/eco-station-d-epuration-d-aubevoye.html>

Stakeholders

Contractor

Name : Communauté de communes Eure-Madrie-Seine

Contact : Mme. Laure BASTIDE: laure.bastide@ccems.fr, Tél: 02 32 53 82 93

<http://www.cc-euremadrieseine.fr/>

Construction Manager

Name : SOGETI Ingénierie

Contact : M. Pierre PERARNAUD: pierre.perarnaud@sogeti-ingenierie.fr, 02 35 59 60 08

<http://www.sogeti-ingenierie.fr/>

Stakeholders

Function : Designer

AR ARCHITECTES

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HQE® prime contractor, landscaping and HQE® approach

Function : Designer

GROUPE 3 ARCHITECTES

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Architect

Function : Company

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Function : Company

SOURCES

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Function : Company

EIFFAGE CONSTRUCTION

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<http://www.eiffageconstruction.com/>

Function : Company

JOUEN

M. LONCLE: loncle@jouen.screg.fr

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

Contracting method

General Contractor

Type of market

Table 'c21_maroc.rex_market_type' doesn't exist

Energy

Energy consumption

Primary energy need : 50,00 kWhep/m².an

Primary energy need for standard building : 200,00 kWhep/m².an

Calculation method :

CEEB : 0.0001

Real final energy consumption

Year of the real energy consumption : 2 013

Envelope performance

Envelope U-Value : 0,50 W.m⁻².K⁻¹

More information :

The building consists of a pinewood frame class 4 and wood facing, insulated by cellulose wadding insufflated. The composition of wood frame walls from the outside to the inside is as follows:

- Horizontal exterior wooden cladding: larch 21mm
- Vertical cleat 45x45
- Rain barrier
- Working sail OSB 9mm
- Vertical upright 145x45, center distance 600: douglas.
- cellulose wadding insulation infused 145 mm
- TargoVAP vapor barrier V25, consisting of thermally reinforced fabric and polypropylene film, high vapor permeability, airtight and tear-resistant
- Cleat 9x45mm
- Horizontal rails
- Interior lining, Fermacell plates: Gypsum board (80%) reinforced by cellulose fibers (20%), high fire resistance and high sound insulation.

The windows used are triple glazed with anodized aluminum exterior joinery, whose thermal insulation coefficient is 0.5W / m²K.

Users' control system opinion :

The building is managed by automated home automation systems grouped on a station used by the operator who manages the presence detector system, LED lighting, heating, ...

Renewables & systems

Systems

Heating system :

- Heat pump
- Canadian well

Hot water system :

- Heat pump

Cooling system :

- Canadian well

Ventilation system :

- Double flow heat exchanger
- Canadian well

Renewable systems :

- Solar photovoltaic
- Biogas boiler
- Energy recovery from waste
- Heat pump

Renewable energy production : 40,00 %

- Annual electricity production of 51366 kWh / year for a return on investment in 15 years.

- Treatment of the sludge of the station by anaerobic digestion by Biogaz de Gaillon, for the electricity production towards the ERDF network and the thermal production thanks to the production of more than 1000 megawatts to heat the public buildings of the CCEMS. Thanks to anaerobic digestion, the CCEMS was able to save nearly 2 million euros on the facilities of the wastewater treatment plant.

Environment

Urban environment

Land plot area : 35 000,00 m²

Built-up area : 1,40 %

Green space : 24 900,00

The project site is located in the municipality of Aubevoye, located in the department of Eure in the Normandy region. The parcel is bounded on the North-East by the TER railway line and the industrial zone, and on the South-West by the residential zone 300 meters from the station.

Products

Product

The Pine

Durapin

Piveteau-Bois

<http://www.piveteauboiss.com/fr/>

Product category : Gros œuvre / Structure, maçonnerie, façade

Frame made of treated pinewood class 4, from sustainably managed European forests, ensuring dimensional stability, strength, mechanical resistance, adapted to a warm and humid environment, and resistant to insects, termites and rot.

Product very well accepted by all the stakeholders of the project, and which allowed a clean (dry) and fast construction site for the assembly of the whole structure.



Construction and exploitation costs

Cost of studies : 400 000 €

Total cost of the building : 1 775 000 €

Subsidies : 4 500 000 €

Health and comfort

Water management

- Wastewater treatment at the outlet of the wastewater treatment plant of 34,400 population equivalents with a daily volume of 400 m³ / h and a peak peak flow of 600 m³ / h, thanks to wetlands and vegetated root planted with aquatic and semi-aquatic species, before discharge of water into the natural environment, creation of ecological habitats.
- The management of surface rainwater is managed by a plot of 80% permeable: grassland surface and stabilized pedestrian paths allow the infiltration of rainwater to the plot.
- Road water and runoff are transported to the wetland and released into the natural environment.
- Methanization: treatment of the sludge of the station by the company Biogaz de Gaillon, for the electrical production towards the ERDF network and the thermal production to heat the public buildings of the CCEMS with a thermal capacity of 588 kWh.

Indoor Air quality

Implementation of a Canadian well coupled with a dual flow VMC to maintain a pleasant and stable temperature all year round. Natural device allows to filter and deodorize the air inside the technical building and to exploitation, in the form of a horizontal vegetated garden attached to the building. 28m² of vegetated surface will treat 4,600 m³ / h of stale air (treatment of pollution by plants).

Comfort

Health & comfort :

- o Bioclimatic building oriented on a North-South axis
- o Natural light thanks to the south-facing bay windows
- o Interior comfort: implementation of a Canadian well coupled with a dual flow VMC for cooling and maintaining a pleasant and stable temperature all year round.
- o Visual comfort on landscaped and aquatic outdoor spaces.

Acoustic comfort :

Fermacell interior lining: gypsum board (80%) reinforced with cellulose fiber (20%), high fire resistance and high sound insulation. Insulation by insufflation of cellulose wadding. Fibralth insulation of the operating premises (wood fibers coated with gray or white cement).

Carbon

GHG emissions

GHG in use : 5,00 KgCO₂/m²/an

Methodology used :

Primary Energy / Final Energy - Electricity Coefficient: 2.58 CO₂-eq emission rate. - electricity: 84 gCO₂-eq./ kWhEF SO₂-eq emission rate. - electricity: 0.51 gSO₂-eq / kWhEF

Life Cycle Analysis

Eco-design material :

Use of eco-materials: wood frame, laminated timber frame and exterior wood siding autoclave treated cladding. Insulation in agro-materials: cellulose wadding blown on the roof, for walls and floor, insulated interior walls made of hemp wool. All internal lining is made of Fermacell sheets: gypsum board (80%) reinforced with cellulose fibers (20%), high fire resistance and high sound insulation.

Contest

Reasons for participating in the competition(s)

The entire Aubevoye wastewater treatment plant responds to an innovative HQE® approach, proposing a bioclimatic timber frame construction building made of Douglas fir class 4, combined with natural and high-performance materials that allow for a healthy, comfortable construction. perennial, positive energy by an integrated photovoltaic roof at the heart of a remarkable site.

The building is oriented on a north-south axis allowing to benefit from an optimal sunshine during the period of the winter and during the summer the heat is dissipated by the ventilation double flux and the devices in roof of brise-soleil. The building incorporates a biogas plant that transforms sludge from the station into biogas and reused as energy, supplying the heat network of public buildings.

The whole building is part of a green setting. Landscaping is offered through different landscape units that make up an eco-landscape throughout the site, supporting a walkway integrated into the educational pathway and promoting the development of biodiversity. The environmental character of the building is inseparable from its inclusion in the green box consisting of landscaping, but also from the wetland of the treated water to the point of discharge into the natural environment.

Building candidate in the category



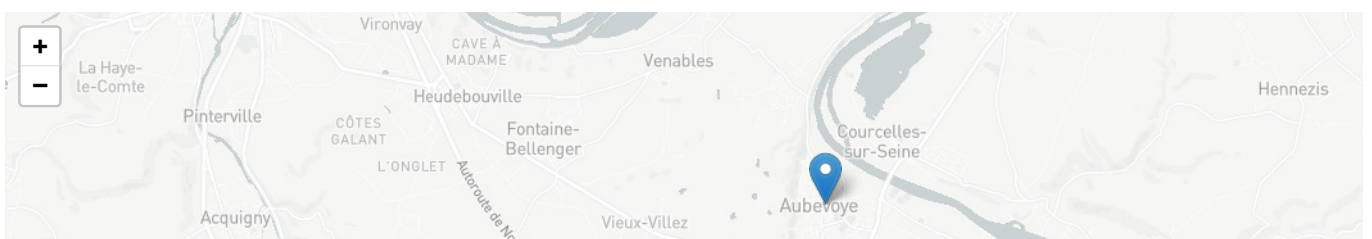
Santé & Confort

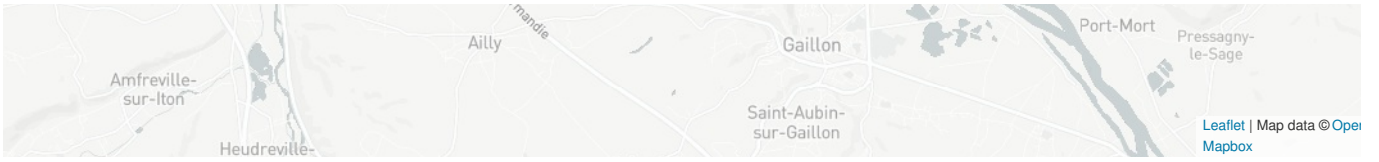


Coup de Cœur des Internautes



Prix des Etudiants





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