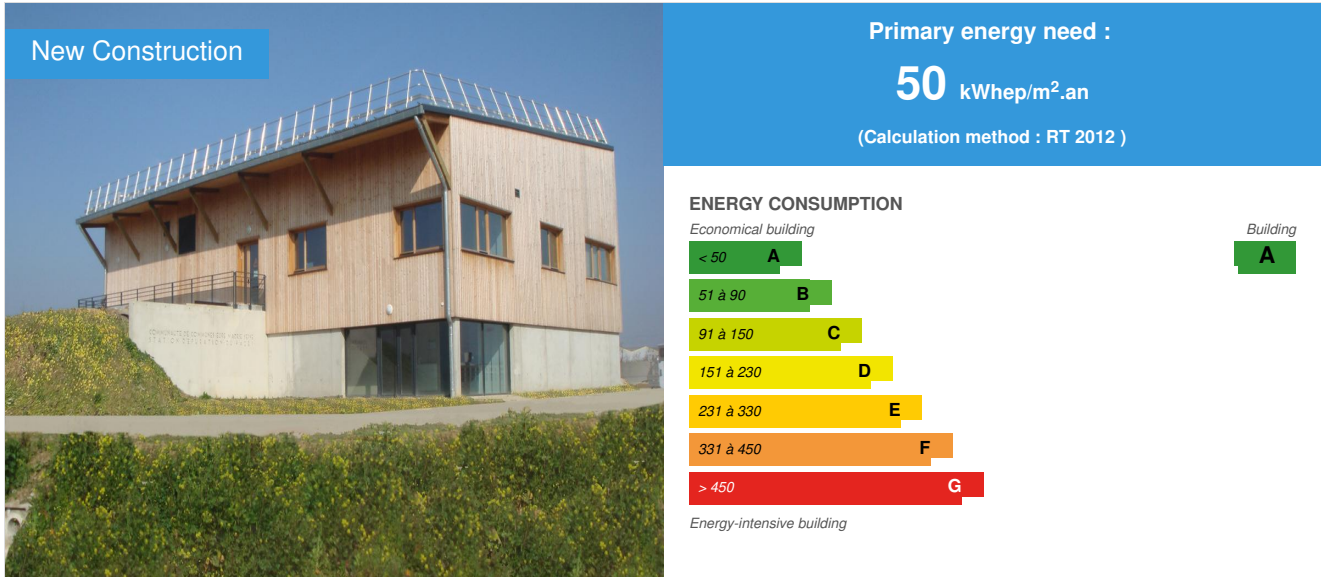


## Eco-construction of the bioclimatic wooden building at the Aubevoye wastewater treatment plant

by RUBA ALABED / 2018-06-12 11:31:34 / Francia / 7776 / FR



**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 m<sup>2</sup>  
**Construction/refurbishment cost :** 1 775 000 €  
**Cost/m<sup>2</sup> :** 2500 €/m<sup>2</sup>

**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

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.

## 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](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

Mme Ruba ALABED: contact@ar-architectes.com, Tél: 01 44 23 89 48

<https://www.ar-architectes.com/>

HQE® prime contractor, landscaping and HQE® approach

**Function** : Designer

GROUPE 3 ARCHITECTES

M. Franck MAVIEL: f.maviel@g3architectes.com, Tél: 02 35 98 74 05

<http://www.groupe3architectes.com/>

Architect

**Function** : Company

DHV

M. HEKELAAR: hans.hekelaar@dhv.com 0031 33 468 22 97

<https://www.royalhaskoningdhv.com/>

---

Function : Company

SOURCES

M. LAROCHE: laroche@sources.fr

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

---

Function : Company

EIFFAGE CONSTRUCTION

M. CHICOT: marc.chicot@eiffage.com

<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\_italy.rex\_market\_type' doesn't exist

## Energy

### Energy consumption

Primary energy need : 50,00 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 200,00 kWh/m<sup>2</sup>.an

Calculation method : RT 2012

CEEB : 0.0001

### Real final energy consumption

Year of the real energy consumption : 2 013

### Envelope performance

Envelope U-Value : 0,50 W.m<sup>-2</sup>.K<sup>-1</sup>

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 / m<sup>2</sup>K.

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

## 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 m<sup>2</sup>

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.piveteauba Bois.com/fr/>

Product category : Table 'c21\_italy.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 = '6'

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 m<sup>3</sup> / h and a peak peak flow of 600 m<sup>3</sup> / 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. 28m<sup>2</sup> of vegetated surface will treat 4,600 m<sup>3</sup> / h of stale air (treatment of pollution by plants).

### Comfort

#### Health & comfort :

- Bioclimatic building oriented on a North-South axis
- Natural light thanks to the south-facing bay windows
- 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.
- 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. Fibralith insulation of the operating premises (wood fibers coated with gray or white cement).

## Carbon

### GHG emissions

GHG in use : 5,00 KgCO<sub>2</sub>/m<sup>2</sup>/an

#### Methodology used :

Primary Energy / Final Energy - Electricity Coefficient: 2.58 CO<sub>2</sub>-eq emission rate. - electricity: 84 gCO<sub>2</sub>-eq./ kWhEF SO<sub>2</sub>-eq emission rate. - electricity: 0.51 gSO<sub>2</sub>-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

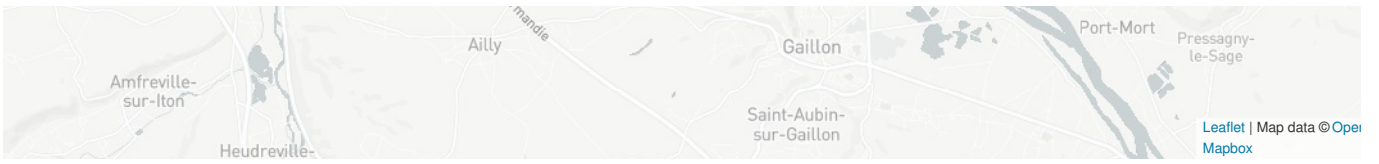


Coup de Cœur des Internautes



Prix des Etudiants





Date Export : 20230419035323