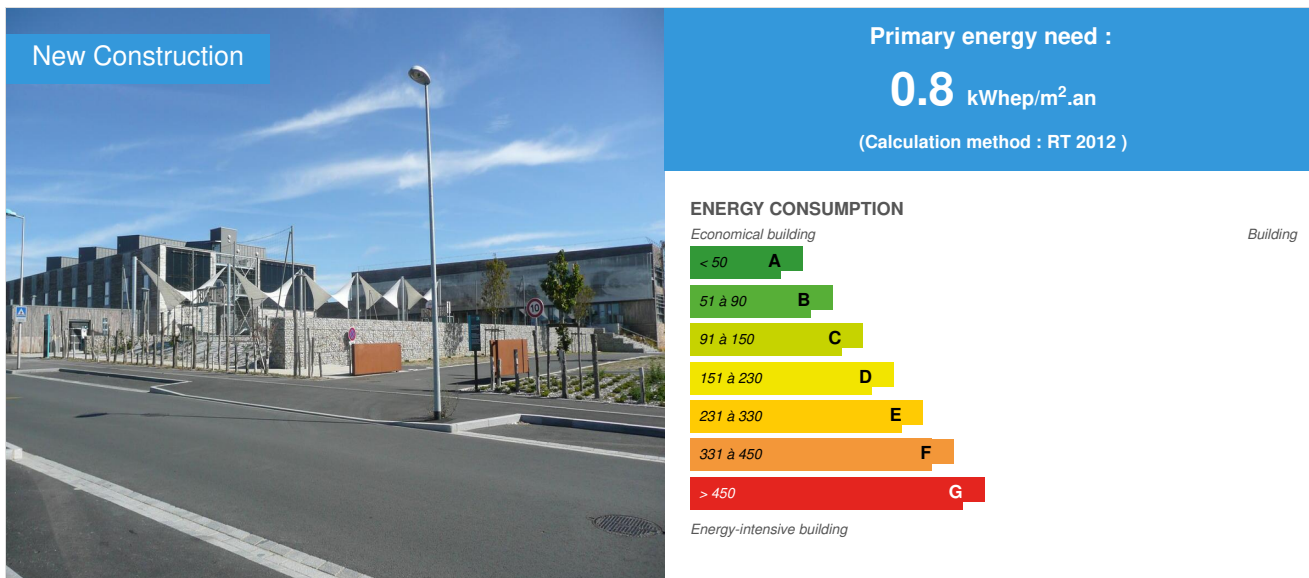


## Lycée Professionnel Maritime Florence Arthaud

by Christelle DANDE / 2016-06-29 11:56:23 / France / 10945 / FR



**Building Type** : School, college, university  
**Construction Year** : 2014  
**Delivery year** : 2016  
**Address 1 - street** : 35400 SAINT MALO, France  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 8 600 m<sup>2</sup>  
**Construction/refurbishment cost** : 17 000 000 €  
**Number of Pupil** : 300 Pupil  
**Cost/m<sup>2</sup>** : 1976.74 €/m<sup>2</sup>

**Certifications :**



### General information


Construction of the new Lycée Professionnel Maritime (Professional Maritime Highschool) Florence Arthaud in Saint Malo, on the development zone Croix Désilles north-east of the city. Positive energy building. Design according PassivHaus criteria. The property will welcome about 300 students in initial training, it will have a boarding an estimated capacity of 112 beds and a 300 meals catering service. The main goals and challenges of the project are:

- Develop the training offer of the highschool,
- Increase capacity in initial training and continuing education,
- Provide students and staff with quality equipment,
- Build a High School meeting the coming evolutions of education,
- Achieve exemplary building in terms of sustainable development in the sense of "eco-repository" of Brittany.

**Sustainable development approach of the project owner**

Eco-referential in Brittany.

Eco repository schools confirms the strength of the commitment of the community to Sustainable Development: The development of "eco standard" was piloted by a committee chaired by elected representatives. It is the result of extensive consultations with experts, representatives of the various users of high schools, and regional technical officers in charge of building maintenance sites. More than thirty people were involved in its preparation. With a high level of demand, "eco repository" presents specific, quantified commitments grouped into four thematic issues:

- The preserving users' health in buildings by the quality of air, water, the choice of materials ...
  - The reduce of energy consumption in buildings and renewable energy production ...;  reducing the environmental impact of facilities requiring more efficient water management, more efficient processing of building waste and activity, the preservation of biodiversity, differentiated management of green spaces ...
  - The optimization operation and maintenance of buildings. Eco repository includes all the requirements of Brittany, for the most environmentally friendly schools.
- These four main issues are available through two framework documents. The first is on "eco-design". The second is "eco management" of the premises. Thus, "the repository eco" integrates all stages of school life, from design premises in their operation and maintenance.

## Architectural description

Volume of wood in justifying class 2 of the Decree of 15/03/2010, corresponding to > 44 dm<sup>3</sup> SHON

For the boarding: There will be a mixed structure with concrete slab in the central part of the massive building and wood flooring on both side of this central core (intermediate floors R + 1 and R + 2). KLH (wood reference) will be apparent in the boarding room of the ground floor; upstairs, it will be hidden by a false ceiling. For externship: part of the intermediate floors of R + 1 are provided in alveolar slab (kitchen area, canteen & technical workshops); other floors are laid in solid wood.

## See more details about this project

<http://www.lycee-maritime-saint-malo.fr/>

## Stakeholders

### Stakeholders

Function : Thermal consultancy agency

TPF INGENIERIE

Pierrick LEGENDRE, 02.99.14.59.60 - rennes@tpfi.fr

<http://www.tpf-i.fr>

Function : Designer

AGENCE LIARD ET TANGUY

Patrice LIARD - 02.99.67.54.55 - liard.tanguy@wanadoo.fr

### Contracting method

Separate batches

### Type of market

Global performance contract

## Energy

### Energy consumption

Primary energy need : 0,80 kWhep/m<sup>2</sup>.an

Primary energy need for standard building : 0,80 kWhep/m<sup>2</sup>.an

Calculation method : RT 2012

### Envelope performance

Envelope U-Value : 0,10 W.m<sup>-2</sup>.K<sup>-1</sup>

Air Tightness Value : 0,30

## Renewables & systems

## Systems

### Heating system :

- Water radiator
- Wood boiler
- Solar thermal

### Hot water system :

- Individual electric boiler
- Solar Thermal
- Wood boiler

### Cooling system :

- VRV Syst. (Variable refrigerant Volume)

### Ventilation system :

- Nocturnal Over ventilation
- Double flow heat exchanger

### Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Wood boiler

## Smart Building

### BMS :

The Local Station Remote management will be installed on the site to control. He will perform the following functions: • Acquisition of IO Acquisition of IO will be using integrated or external input-output cards Post

## Environment

### Urban environment

Land plot area : 12 000,00 m<sup>2</sup>

Built-up area : 71,66 %

The school is located on the town of SAINT MALO. SAINT MALO is a French commune located in Brittany in the Ile-et-Vilaine department, and the main port of the northern coast of Brittany. The tourism sector is also highly developed. High School was built in the northwest sector of the city, at the interface of the dense urban areas and farmland, this is an area combining several functions: crafts, trade and services, education (IUT and college) and sports. Because of its diversity, the built environment is very heterogeneous as the template by the architectural forms of buildings. The area is served by two county roads: one belt agglomeration and the other leading to the city center.

## Products

### Product

BOILER WOOD

FROLING

+33 (0) 3 88 193 269

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

Product category : HVAC, électricité / heating, hot water

Placing two mixed wood boilers (operation with wood chips or pellets with pellet-type) brand FROLING kind TX 150 or technically equivalent comprising:

- Rated Power: 150 kilowatts
- Maximum Pressure operating: 3 bars
- Ventilated stepped grate for drying the fuel and optimal combustion
- Tilting combustion grate for combustion and complete cleaning during operation
- Ashing screw removal, flue
- Combustion bedroom concrete refractory
- Heat exchanger tube three courses vertical smoke, and performance optimization system (WOS) with turbulators for cleaning heat exchanger tubes in the boiler thermal safety



- Thermostat + security heat exchanger
- Automatic self-programmable igniter-Combustion air fan,
- Electrical box with control and regulation board Lambdatronic H 3200 modular by microprocessor
- Modem connected to the controller of the boiler for remote control of the parameters of the boiler by the service provider in charge of maintenance and maintenance (direct analog phone line provide in the local BOILER)
- MODBUS connector for connection of boilers on the Building automation (GTB)
- A 100mm thick insulation and jackets made of sheet steel,
- Yield at rated load from 90 to 92%.
- Modulation Load 30 to 100% maximum working
- Temperature: 110 ° C maximum flow -Temperature: 90 ° C Minimum return
- Temperature: 65 ° C
- Temperature of fumes at rated power: 150 ° C

This product has been validated because of its mixed operation: with wood chips or pellets with pellet types. Supply boilers with a stirrer system specific to each boiler.

## Costs

## Contest

### Reasons for participating in the competition(s)

Ce bâtiment à énergie positive (BEPOS) a été conçu suivant les objectifs suivants :

- démarche HQE,
- optimisation de l'efficacité énergétique,
- récupération d'énergie sur tous les fluides en sortie du bâtiment (ventilation, EU, ...),
- production solaire ECS et photovoltaïque permettant le classement en énergie positive,
- matériaux et techniques de construction respectant la santé des usagers et les principes de développement durables de l'éco-référentiel de la Région.
- volume de bois dans la construction permettant de justifier la classe 2 du décret du 15/03/2010, soit >44 dm<sup>3</sup>/m<sup>2</sup> SHON.

Objectifs du projet :

Externat :

- Bbio projet : 27,8
- Bbio max : 47,3
- Gain % Bbio : 41,2
- Cep projet : 0,8 kwh ep/m<sup>2</sup> SHONRT
- Cep max : 64,3 kwh ep/m<sup>2</sup> SHONRT
- Gain % Cep : 98,8 %

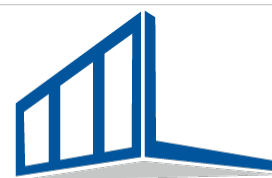
Internat :

- Bbio projet : 27,8
- Bbio max : 63,8
- Gain % Bbio : 57,4
- Cep projet : 38,6 kwh ep/m<sup>2</sup> SHONRT
- Cep max : 89,9 kwh ep/m<sup>2</sup> SHONRT -
- Gain % Cep : 57,1 %

### Building candidate in the category



Energie & Climats Tempérés



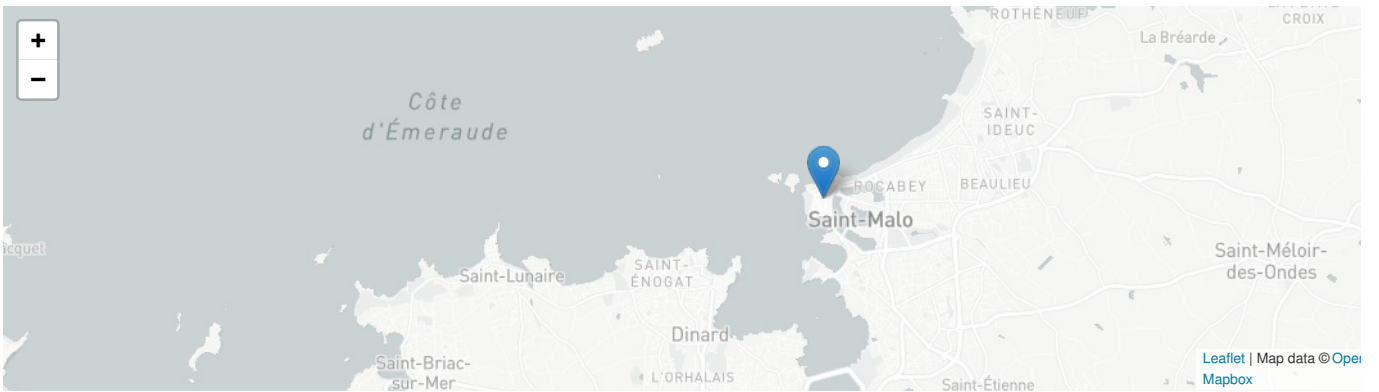
**Green Building  
Solutions Awards 2016**

powered by  Construction21.org





## Coup de Coeur des Internautes



Date Export : 20230511124813