Racine Secondary School - Saint-Brieuc

by Marie Le Potier / 2021-02-25 15:41:52 / France / 7678 / FR

Primary energy need :

19.5 kWhep/m².an

(Calculation method : RT 2012)

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 : 2018
Delivery year : 2021
Address 1 - street : 1 rue Racine 22000 SAINT-BRIEUC, France
Climate zone : [Cwb] Mild, dry winter, cool and wet summer.

Net Floor Area : 7 154 m² Autre type de surface nette
Construction/refurbishment cost : 9 800 000 €
Cost/m2 : 1369.86 €/m²

Certifications :

Proposed by :

General information

The Departmental Assembly of Côtes d'Armor decided to rebuild the RACINE college on its original site.
The program of the new college includes teaching facilities for 600 students, supplemented by a catering center and a kitchen, as well as an existing gymnasium center, which has been renovated.

Built in the early 1960s, the college buildings were a source of discomfort, were no longer functional or adapted to current pedagogies and no longer responded to current environmental challenges (presence of asbestos, very poor insulation, very energy intensive). The decision to rebuild the teaching building, the school canteen and to renovate the sports center is part of a high environmental quality approach in order to greatly limit the impact of the reconstruction.

Sustainable development approach of the project owner

Climate change is a reality that no one can ignore anymore. At the Côtes d'Armor Department, we have been working for several years, but have decided to go further. To a punitive vision, we prefer an incentive and unifying vision, because this fight can only be won collectively.

The result of the work of the “Environmental Responsibility” working group, the Departmental Council has drawn up a document that reveals the Department's ambition for the next 5 years in the field of energy transition. 5 axes have been chosen to be as transversal as possible, so that as many departmental policies as possible integrate our ambition for the climate:

- Strategic axis 1 - promote information

- Strategic axis 2 - work on uses

- Strategic axis 3 - accentuate the energy renovation of departmental buildings

- Strategic axis 4 - deploy renewable energies

- Strategic axis 5 - act on mobility

Architectural description

The new design is based on the compactness of the frame which makes it possible to bring together all the college students and teachers around an interior street lit and shaded by a photovoltaic canopy. During the time of at noon, users cross the courtyard to reach the restaurant.

In general, the architectural bias asserts itself in a search for sobriety, see stripped down which carries a message of simplicity, solidity, rigor, durability away from fashions. It is a solid image, without fantasy that characterizes the establishment from the public domain, while on the courtyard side, the atmosphere is open, brighter in a green, even rural context.

Between April 2018 and July 2020, the new college was built in the heart of the site which was maintained in service. After a reorganization and a regrouping of the pupils in the north and west wings, the space available for the construction of the new premises was cleared. Finally, the courtyard was completed after moving to the new buildings, and delivered for the 1st quarter of 2021.

Photo credit

Pierre Béout / Stepcam

Stakeholders

Contractor

Name : Conseil Départemental des Côtes d'Armor
Contact : Maxime MORFOUASSE, Direction du Patrimoine, maxime.morfouasse[a]cotesdarmor.fr
https://cotesdarmor.fr/

Construction Manager

Name : Nunc Architectes
Contact : Pierre Béout, Architecte, nunc.bretagne[a]nunc.fr
www.nunc.fr

Stakeholders

Function : Thermal consultancy agency

Ingérop Conseil & Ingénierie

Marie Le Potier, Ingénieur HQE, marie.lepotier[a]ingerop.com

www.ingerop.com
Fluid design, thermal studies, environmental studies (LCA)

Function : Structures calculist

BSO

Patrick Leroux

https://bso22.fr/
BET Structure Reinforced concrete

Function : Structures calculist

Arborescence

Pierre Bregeon

https://arborescence-concept.com/
BET Structure Wood

Function : Other consultancy agency

Acoustibel

http://www.acoustibel.fr/
BET Acoustics

Function : Other consultancy agency

Kegin Ingénierie

https://kegin-ingenierie.com/
BET Kitchen

Type of market

Global performance contract

Energy

Energy consumption

Primary energy need : 19,50 kWhep/m^2.an

Primary energy need for standard building : 55,00 kWhep/m^2.an

Calculation method : RT 2012

Breakdown for energy consumption : Heating: 2.3 kWhEp / m².year DHW: 1.1 kWhEp / m².year Lighting: 11.6 kWhEp / m².year VMC auxiliaries: 12.3 kWhEp / m².an Photovoltaic production: 7.8 kWhEp / m².year

Envelope performance

More information :
Energy requirements: heating: 3.8 kWhEp / m².year

Building Compactness Coefficient : 0,22

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,34

Renewables & systems

Systems

Heating system :
- Heat pump

Hot water system :
- Individual electric boiler

Cooling system :
- No cooling system

Ventilation system :
- Double flow heat exchanger

Pompe a chaleur gaz absorption
Renewable systems :
- Solar photovoltaic

Renewable energy production : 28,60 %

Environment

Urban environment

The reconstruction of the Jean RACINE college is an opportunity to transform the district, by creating an opening at the heart of the plot: an east-west transparency between the Place de la Liberté and the Ty-Coat park. At the heart of the new
college, the new landscaped courtyard connects the teaching building, the restaurant and the sports complex.

Costs

Construction and exploitation costs

Total cost of the building : 9 800 000 €

Additional information on costs :

This cost is the total cost of the operation (teaching building + catering + renovation of the gymnasium) or the surface area / Eges results / energy consumption only concern the teaching building.

Carbon

GHG emissions

Methodology used :

E + C- Method

Building lifetime : 50,00 année(s)

GHG Cradle to Grave : 1 091,08 $KgCO_2$ /m^2

Life Cycle Analysis

Material impact on GHG emissions :

964.23

Eco-design material :

Mixed wood-concrete structure

Timber frame walls

Cellulose wadding walls and roof insulation

Contest

Reasons for participating in the competition(s)

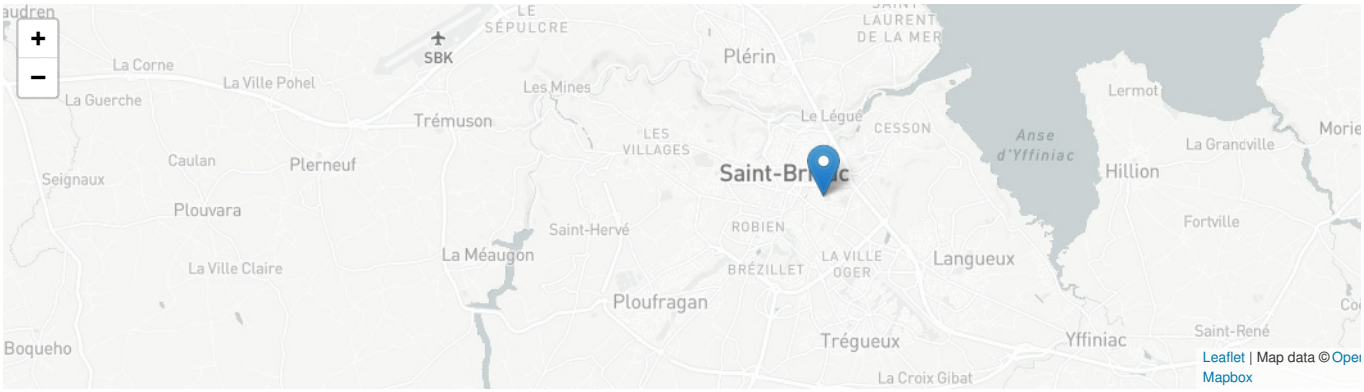
As part of the experiment "Positive energy buildings and carbon reduction: E + C-" piloted by ADEME, the project has contributed to initiating the future 2020 environmental regulations which aim for the positive energy level and a commitment to high environmental quality. The orientation of the facades, the efficient insulation and airtightness, the choices of ventilation, geothermal heating, photovoltaic production, the rainwater circuit and recovery, soil permeability and use massive amounts of bio-sourced materials are all subjects to achieve this objective.

The choice of location for buildings is the result of a strong desire to strive for very high energy performance. The environmental objectives were to reach level E3C2 for the teaching building, E2C1 for restoration (levels E3C1 and E0C1 respectively reached at the end of the project). The project was monitored throughout (design and implementation) as part of ADEME's OBEC program and we are continuing to monitor energy consumption during the operation phase.
The teaching volume is characterized by optimal compactness, offering North or South façade orientations, the best solution to guarantee protection to external inputs without restricting mobile and mechanical devices, to guarantee minimum heating consumption, but also to find the "summer" comfort at any time of the year.
In the North, the classes benefit from a generous and constant light supply, without constraints of glare or thermal overheating. To the south, a mesh of inclined aluminum slats with variable pitch protects the rooms from overheating at any time of the year, by controlling the views and the light.

The project gives pride of place to biobased materials: mixed wood-concrete structure, wood-frame walls, roof in wooden boxes, cellulose wadding insulation, wood joinery, ... The in-depth work of itirative life cycle analyzes and of variant studies enabled the architect and the BET to optimize the choice of materials to tend towards the lowest possible carbon footprint.
In terms of energy, an educational building powered by gas absorption heat pump, a photovoltaic canopy and high efficiency photovoltaic panels. In addition, very high attention in the works phase on the airtightness of the aeraulic networks and the envelope, ultimately for a project with very high energy and environmental performance.

Building candidate in the category

Bas Carbone



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