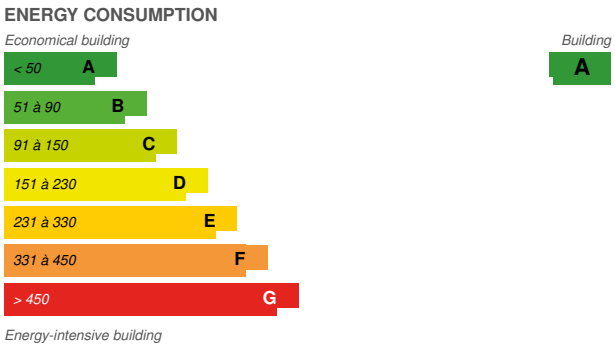
The Astrolabe

by pierre baux / 2017-10-09 16:08:22 / France / 9630 / FR

Primary energy need :

90 kWhep/m².an

(Calculation method : RT 2012)



Building Type : Public or private hospital
Construction Year : 2016
Delivery year : 2016
Address 1 - street : 178 Rue des Renouillers 92700 COLOMBES, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 1 280 m² SHON
Construction/refurbishment cost : 1 800 000 €
Cost/m2 : 1406.25 €/m²

General information

Program: Construction of a passive hospitalization unit for adolescents

Area of the operation: 1000 m², heated volume: 3005 m3

Keywords: Hospital building, solid wood wall

Sustainable development approach of the project owner

The AP-HP (Assistance Publique Hôpitaux de Paris) is deeply committed to a sustainable development approach with the following lines of application of this strategy: reducing the greenhouse gas footprint, lowering energy consumption, l improvement of purchasing and waste management. The HUPNVS group (which includes the Louis-Mourier hospital) pursues, among other things, the objective of reducing its energy consumption and primarily those of fossil origin. The project to build a building to house a new hospitalization activity for child psychiatry, intended to receive and treat adolescents with social and psychiatric difficulties, has created the opportunity to consider a passive standard construction goal. The building had to contribute to reduce the environmental footprint of the AP-HP and improve the quality of life at work of the staff as well as the care of the patients. Three other targets were also included in the program: economic construction, speed of execution and low operating costs.

Architectural description

From the outset, the MOE team sought to conserve natural resources, control environmental and health impacts, and create comfortable and healthy indoor environments. The general form is relatively simple, in "T". The simplicity of the volumes, the thermal quality of the walls and the unhooked of very limited facades make this building a building both economic and passive. The technical choices of design and construction have been oriented towards a sober energy and a simplicity of exploitation, while preserving a comfortable and healthy interior environment (quality of indoor air in particular).

If you had to do it again?

Always a wooden building! Prefabrication makes it possible to complete the structure of the building in a few weeks and to work in a dry sector, sheltered. The APHP teams visited the site several times and found that the wood gave a particularly pleasant atmosphere even if it was only the infrastructure and the joinery was not yet installed. Indeed, there was not the cold and wet sensation of concrete yards. Given the shape and the varied activities of the building zones, we would use one or two more CTAs to simplify the network and the regulation of the CTA. The ECS represents a significant part of consumption, it would be interesting to provide heat recovery on the showers. Since the end of the project, solutions have appeared on the market to integrate the recovery of the showers in the slabs or to be able to integrate them in the shower screeds with reduced reservations. The flexible connections of the ventilation outlets had been banned to ensure an excellent airtightness of the ventilation network. This choice may occasionally cause acoustic problems. Even if the airtightness of the ventilation network is slightly degraded, the use of flexible connections would make it possible to solve certain problems of noise on the mouths.

Stakeholders

Stakeholders

Function : Contractor

Hôpitaux Universitaires Paris Nord Val de Seine - Assistance Publique Hôpitaux de Paris

Grégoire RIGAL Ingénieur Travaux – Hôpital Beaujon 01.40.87.56.45

http://www.aphp.fr/

Function : Construction Manager

Menguy Architectes

Bernard Menguy

http://www.menguy-architectes.fr/

Function : Thermal consultancy agency

Sunsquare

Pierre Baux

http://www.sunsquare.fr

Type of market

Global performance contract

Energy

Energy consumption

Primary energy need : 90,00 kWhep/m^2.an

Primary energy need for standard building : 120,00 kWhep/m^2.an

Calculation method : RT 2012

Breakdown for energy consumption : Heating: 18,5 kWh_ep / m² / year Cooling: 0 ECS: 12.9 Lighting: 15.2 Auxiliaries: 7.6

Real final energy consumption

Final Energy : 115,00 kWhef/m^2.an

Envelope performance

Envelope U-Value : 0,19 $W.m^{-2}.K^{-1}$

More information :
CLT solid wood panels, exterior insulation in wood fiber.
Coated finish or wood cladding

Indicator : n50

Air Tightness Value : 0,52

Users' control system opinion :

no home automation

More information

System for automatic recording of consumption during installation

Renewables & systems

Systems

Heating system :

- Geothermal heat pump

Hot water system :

- Condensing gas boiler

Cooling system :

- Others

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Heat Pump on geothermal probes

Other information on HVAC :

The building has been broken down into areas in which the heating and ventilation needs are very different:
-Zone "night" on the ground floor with 12 rooms equipped with sanitary facilities;
-Zone "day" on the ground floor including activity rooms, relaxation, catering, reception and a maintenance office;
-Technical area on the ground floor including the technical premises, the linen room and the household and waste premises;
-Room "staff" area including cloakrooms, offices and meeting rooms.
Heating and cooling of the building are provided only by the building's double-flow ventilation system (CTA with high efficiency rotary exchanger). The ventilation network is divided into three branches at the exit of the double-flow CTA: "night" zone, "day" and "technical" zones and finally "personal" zone.
This separation into three sub-networks is carried out directly in the technical room and each branch departure includes a hot battery and a flow control valve.
This organization allows to group the main organs in the technical room not to intervene in a building housing a sensitive public.
Heating requirements for hot batteries will be provided by a heat pump on 5 vertical geothermal probes of 80 m depth (thermal power 28.8 kW, electrical power 6 kW, exchangers on evaporator and brazed plate condenser, against a current).
In summer, the CAP is bypassed and cooling is provided in geocooling, by recovering the freshness of the soil via geothermal probes.
A buffer tank has been put in place between production and distribution in order to avoid compressor operation in short cycles.
The ECS is produced by a semi-instantaneous gas DHW cylinder and is distributed by an over-insulated DHW loop.

Environment

Urban environment

Adjoining plot at Hôpital Louis Mourier. Suburban fabric, two-lane road in front of the plot, sports field in the back.

Products

Product

Gold RX 8 TOP

Swegon

Responsable Agence IDF / Nord 01 45 15 09 70

http://www.swegon.com

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

CTA double flow

WWP S 26 ID

Weishaupt

WEISHAUPT - PARIS 9 Avenue de de l'Epi d'or 94807 Villejuif Tel: 01.45.60.45.62

http://www.weishaupt.fr/

Product category : Génie climatique, électricité / Chauffage, eau chaude

Reversible PAC on geothermal probe. In summer, geocooling bypassing the CAP. The heat pump is connected to batteries on the start of the ventilation networks

Geothermal energy was chosen by the tablecloth of the Seine is close

Geothermal probes

Weishaupt – Geoforage

Christophe LUTTMANN luttmann@weishaupt.fr www.weishaupt.fr

http://www.weishaupt.fr/produkte/waermepumpen/waermequelle-erde/waermequellen-erschliessung

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

Costs

Construction and exploitation costs

Renewable energy systems cost : 40 000,00 €

Cost of studies : 141 290 €

Total cost of the building : 1 626 831 €

Subsidies : 60 000 €

Health and comfort

Indoor Air quality

Double flow ventilation with high efficiency heat recovery

Comfort

Health & comfort :

Filtration of fresh air on the CTA

Carbon

GHG emissions

GHG in use : 8,00 $KgCO_2/m^2/an$

Methodology used :
RT2012

Contest

Reasons for participating in the competition(s)

The program of the operation initially targeted the RT2012 but the Project Manager had already expressed its desire to use geothermal energy, solid wood panels (CLT) and significant thicknesses of wood fiber insulation. The thermal resistance of the building envelope was therefore already much better than what would have been expected for a building RT2012. Regulatory calculations and simulations carried out at the beginning of the projects showed that the building was close to the heating consumption of a passive building.

The project management team therefore proposed to the APHP to improve the building to achieve the performance of a passive building, which represented several advantages:

- To be able to do without heating equipment in the building: Given the risky behavior of some patients, the risk of injury was too great with radiators. The floor heating would have responded to this risk but given the low consumption, these equipment would anyway were little used.
- Simple design and operation by not using any heating network and heat emitters in the building.
- The cost of the improvements to be expected was reasonable: Choose a double-flow CTA with excellent performance, strengthen
- By targeting the passive level, the project was able to receive ADEME aid under the PREBAT program, which covered part of the additional costs

Do not use heating networks in a tertiary building however has a sore point: The building is divided into 3 areas at the CTA. The heating is provided only by a hot battery on the fresh air outlet of each zone. The heating setpoint is adapted according to the temperature measured on the air of each return network.

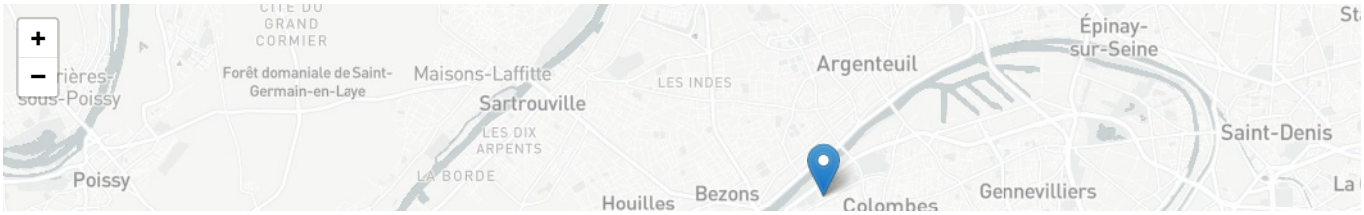
Building candidate in the category

Green Solutions AWARDS powered by Construction21.org

Santé & Confort

Coup de Cœur des Internautes

Prix des Etudiants



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