Construction of the new regional headquarters of KUMPEN in Wallonie in Fleurus, a passive building and zero energy

by Nathalie ABRASSART / 2017-01-11 16:18:52 / Belgique / 8198 / FR

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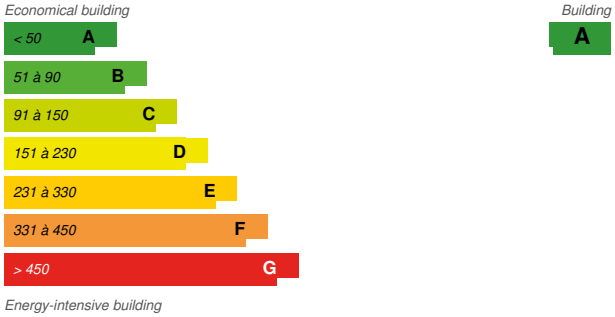
Primary energy need :

38 kWhep/m².an

(Calculation method :)

ENERGY CONSUMPTION



Building Type : Office building < 28m
Construction Year : 2013
Delivery year : 2013
Address 1 - street : 6220 FLEURUS, Belgique
Climate zone : [Cfc] Marine Cool Winter & summer- Mild with no dry season.

Net Floor Area : 529 m² Autre type de surface nette
Construction/refurbishment cost : 1 320 000 €
Number of Work station : 1 Work station
Cost/m2 : 2495.27 €/m²

General information

As part of the expansion of Kumpen's activities in Wallonia, a new office building with an office and an industrial storage hall was built in Fleurus.

Respect for the environment and the comfort of the staff were the driving forces of the project. Thanks to the know-how of the design and execution teams combined with the quality of the materials, the building complies with passive principles and is autonomous in energy.

Building users opinion

The occupants moved into the building at the beginning of January 2014 when the outside temperatures were very low. In March 2014, the degree of satisfaction of the occupants was very good.

See more details about this project

http://www.startech-group.eu/nosreferences/

Data reliability

Self-declared

Stakeholders

Stakeholders

Function : Contractor

Kumpen

http://www.kumpen.be

Owner and construction company

Function : Designer

Startech Management Group

Barattucci Marcel

http://www.startech-group.eu/

Mission of architecture and energy performance studies of the building

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Function : Other consultancy agency

Bureau d'étude Boydens

http://www.boydens.be/

Contracting method

Other methods

Owner approach of sustainability

The client's approach was to build a regional operating center of the Kumpen company from an energy point of view and to highlight the competence of this construction company in building construction at very high High energy performance. The project is designed with a view to sustainable development by: • Choosing the level of the soil slab to optimize the cuttings / embankments using land cleared on site (stabilized with lime), which limits the transport of land to the discharge and thus the cargo and limits the embankments with the neighboring lands, • The passive design of the offices, by the installation of the following elements: Excellent compactness of the protected volume, Limitation of thermal losses by an excellent thermal insulation of the walls , mastery of the construction nodes in order to limit their impact, control of the air tightness of the envelope. Particular attention has been paid to limit summer overheating by: • the orientation of the building to the west limiting the excessive solar contributions during the period of occupancy of the offices, • the reduction of internal inputs by the use of high-performance lighting, • the placement of automated external blinds, • the excellent thermal inertia provided by the use of a concrete structure. • the choice of high energy production equipment and / or renewable energy: Heat pump and geothermal probes, Dual flow ventilation system with heat recovery, A lighting installation high-performance LEDs with automatic ignition via presence sensors, a roof-mounted photovoltaic system. • The choice of durable materials requiring little or no maintenance (façades made of solid wood panels on the hall) • Recovery of rainwater by 2 tanks of 10,000 L disposed close to the drawings for use of sanitary facilities Offices and filling tank trucks for the water needs of the road works, • Limiting as much as possible the amount of rainwater discharged into the sewers by: compensating for the reduction of the permeable surface of the soil following the construction of the building by rejecting the waters storm. limiting impermeable surfaces (tarmac) in favor of draining zones: storage and storage area in dolomite, parking in sidewalks in draining pavement, etc.), shrubby plantations to catch water from the soil. Moreover, the construction of this building in self-construction allowed this company to increase its experience in the construction of buildings with very high energy performance and thus train its entire team in some innovative positions (implementation enabling to limit the construction nodes, placement of barriers of sealing with the air ...).

Architectural description

On the one hand, the project includes a storage hall for the goods necessary for the smooth running of the sites and which can not be delivered directly, a small buffer stock for the good advancement of construction sites and small equipment and tools for workers and , on the other hand, offices for staff responsible for the management of construction sites and for the study of new projects to be developed in Wallonia. The West orientation was favored for the offices so as to limit the summer solar contributions during occupation period. The offices are therefore installed perpendicularly to the road network. They are of relatively compact shape and articulate on two levels. In order to boost volumetric play, the separation wall between the "Storage Hall"; and "Offices" was extended outside the building. The choice of facade cladding materials also makes it possible to distinguish these two functions. The facades of the storage hall are made of solid wood panels. A dark-colored brick lining is the ground floor of the offices, while a light-colored insulation has been placed on the facades of the floor. A slight overhang reinforces this distinction between the two floors. The entrance of the building is marked by a complementary volume welcoming an entrance airlock which makes it possible to limit the entrance of cold air in the protected volume. The interior layout of the offices was designed in the following way: All the service rooms and the stairwell are grouped together and located along the separation wall with the hall. This interior design makes it easier to adapt office and meeting space to meet changing business needs. The technical installations of heating, ventilation, cooling ... are placed in the storage hall. The approaches have been designed to facilitate the accessibility of the construction vehicles: two accesses are present from the road and a large maneuvering area is provided at the rear of the building.

Energy

Energy consumption

Primary energy need : 38,00 kWhep/m^2.an

Primary energy need for standard building : 207,00 kWhep/m^2.an

Calculation method :

CEEB : 0.0001

Final Energy : 15,00 kWhef/m^2.an

Breakdown for energy consumption :
Consumption for heating 19% Consumption for cooling 6% Consumption for auxiliaries 53% Lighting consumption 61% Photovoltaic savings -40%

More information :
Total energy consumption between June 2014 and June 2015: only 5000 kWh according to invoice supplier electricity, ie 9.5 kWh / m² (including office equipment).

Real final energy consumption

Real final energy consumption/m2 : 9,50 kWhef/m^2.an

Real final energy consumption/functional unit : 9,50 kWhef/m^2.an

Year of the real energy consumption : 2 014

Envelope performance

Envelope U-Value : 0,21 $W.m^{-2}.K^{-1}$

More information :
The performance of the envelope has been studied to meet the passive building standard: - the exterior walls are insulated with 20cm of EPS graphite for the walls with insulation coatings on the floor and 18cm of PIR for the walls of bricks on the ground floor. - the separation walls with the hall are insulated with 18cm of PIR are placed side hall. - 16cm of PUR are projected in floor slab. - Roof includes 30cm of PIR. - Passive chassis with triple glazing are installed. A special study has been carried out to adapt the construction nodes to minimize the thermal bridges and to ensure a very good airtightness (especially for all separation walls with the hall).

Building Compactness Coefficient : 1,83

Indicator :

Air Tightness Value : 0,48

Renewables & systems

Systems

Heating system :
- Geothermal heat pump

Hot water system :
- No domestic hot water system

Cooling system :
- Geothermal heat pump
- Chilled Beam

Ventilation system :
- Free-cooling
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic
- Heat pump on geothermal pile

Surface 80m² (40 panels) Placement: on weighted structure deposited on roof of the storage hall. Power of 10 kW peak DC, Electrical production by photovoltaic panels arranged on the hall: Active power ratio 90% Active power: 9Kw Estimated annual energy yield at 8466.2 kWh / year The electricity produced by photovoltaic panels installed during construction, was used for the needs of the site. Installation of 10 geothermal probes at a depth of 100m.

Solutions enhancing nature free gains :
Production of chilled water for water-water heat pump passively using geothermal probes.

Environment

Urban environment

The building is located in the industrial zone of Martinroux in Fleurus. It is of appearance and template similar to the type of industrial buildings located in the zoning. It is implanted parallel to the separative limit with recoil.

Land plot area : 5 046,00 m^2

Built-up area : 635,00 %

Green space : 1 011,00

Products

Product

WSHN / WSH-XEE 82-802

Clivet

http://www.clivet.com/

http://www.clivet.com/

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

Heat pump coupled with geothermal probes to ensure heating production.

10 geothermal probes were installed at a depth of 100m. The system is based on the following principle: Winter regime: the heat of the ground is extracted for the heating of the building, the water circuit arrives at the pump at 10 ° c to come out at 35 ° towards the cold beams. Summer regime : The inertia of the soil which remains cooler than the exterior provided cold; The heat pump is bypassed and the brine goes directly to a free-cooling exchanger. In the mid-season, when there is a simultaneous need for heating and cooling, the heat pump and the heat exchanger operate in parallel simultaneously and optimally. This solution makes it possible to dispose of the cold at a lower cost in summer, contrary to the solution (air-water), but requires a greater basic investment. (+/- 30,000 € vs. 8,000 €) estimated depreciation at 7-8 years.

Costs

Health and comfort

Water management

Recovery of rainwater by 2 tanks of 10.000 L disposed near the places of drainage for the use of the sanitary of the offices and the filling of the tank trucks for the water needs of the road works.

Indoor Air quality

Mechanical dual-flow ventilation with filtration to ensure good air quality.

Comfort

Health & comfort : A dynamic simulation of the building was carried out to ensure thermal comfort for the users. In order to guarantee optimum interior comfort, in addition to the external sunshades, a cold beam cooling system powered by a geothermal heat pump has been installed. The façades of the offices are largely glazed, which ensures a good supply of natural light and views of the outside environment.

Calculated thermal comfort : A dynamic simulation of the building was carried out in order to ensure thermal comfort for the users: the number of hours above 25 ° C less than 5% of the time occupied by the offices on the basis of passive certification criteria In Belgium

Carbon

GHG emissions

GHG in use : 19,00 $KgCO_2/m^2/an$

Methodology used :
PEB method

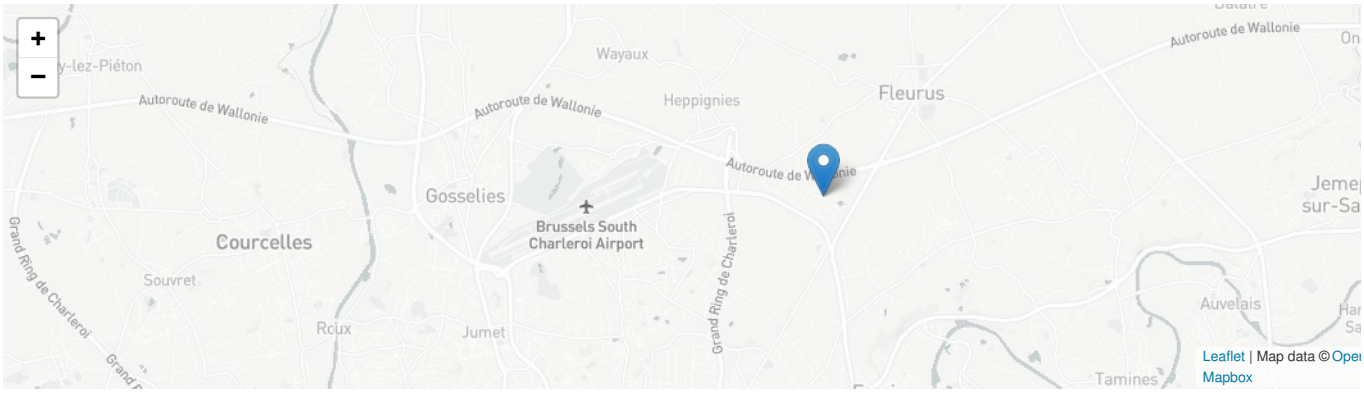
Contest

Building candidate in the category

Energie & Climats Tempérés

Santé & Confort

Coup de Cœur des Internautes



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