Delta Green

by Anne ROUVEYRE / 2018-04-20 10:51:10 / France / 14150 / FR

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Primary energy need :

100 kWhep/m^2.an

(Calculation method :)

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 : Office building < 28m
Construction Year : 2016
Delivery year : 2017
Address 1 - street : 44800 SAINT HERBLAIN, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 4 608 m^2
Construction/refurbishment cost : 6 570 000 €
Number of Work station : 380 Work station
Cost/m2 : 1425.78 €/m^2

Certifications :

Certifiée
Maison Passive
Passivhaus Institut
classic | plus | premium

General information

On delivery, the only building in France that produces, stores and recovers electrical energy via a hydrogen station.

Delta Green is a building that meets the Passiv Haus certification requirements for high energy performance of the building.

This labeling process is not the least restrictive but in our opinion the most relevant and the most consistent with the requirements of this project.

He was also awarded in 2017 at the Silver Pyramids of the REIT (Federation of Real Estate Developers) at the regional level and ranked among the 3 best

projects at the national level: Pyramids of gold.

A postulate "ALL USES" The whole of all the consumptions is taken into account.
A reasoning: GLOBAL COST at the market price by integrating investment AND operation - maintenance (all rental charges AND own consumption).
One objective: AUTONOMY To be autonomous in annual smoothing:

To produce globally more than all the consumptions over one year.

Sustainable development approach of the project owner

Today, we design buildings that are theoretically more and more efficient, but in reality energy consumption

realities are not mastered. The desire is to create an office building that is energetically positive, every day, and tends towards self-sufficiency. (with smoothing of annual energy consumption)

ONE OBJECTIVE: 4 CHALLENGES TO BE TAKEN

- **TO AVOID :**

Minimize energy consumption by designing a building with low energy requirements. For this, the south and north orientations, the diffusion of natural light and the innovative materials were favored.

- **PRODUCE:**

Achieve a higher energy output than that consumed by the building using photovoltaic panels, a wood boiler and a passive cooling system.

- **STORE:**

Store the energy produced to cope with building consumption during periods of energy deficit.

- **USE :**

To sensitize the occupants in an awareness of their energy impact by presenting them in a pedagogical way the consumptions and the productions of energy in order to make them actors of the good use of their place of work.

Architectural description

The Deltagreen project places these fundamentals at the center of its design:

1. NATURAL LIGHT

- Variable geometry for optimization of natural light: distance between frontage of 12m without central core at 20m with central core.
- Cutting of the constructive influence to favor the North and South orientations for the glazed parts and East and West for the solid parts in order to optimize the solar protections
- Faced with the first energy consumption that is artificial lighting, the workspaces have been sized according to the ideal penetration of natural light.

2. FLEXIBILITY OF SPACES

Structure "neither wall nor post":

- No rests or beams in fallout (No reservations)
- No lintels in front (High entrance of the light)
- Supports façade panels (no facade structure)
- Free trays
- "Structure" and "Skin" differentiated and separated (plane of the brakes-steam)
- Economic: Mutualization of floor structures and joinery
- Architectural freedom of writing (horizontal or vertical overlap on the facade)

The goal is to give users freedom. They must be able to arrange the space without constraints. We manufacture the fixed parts of buildings in which the user will not bump.

3. PERFORMANCE OF THE ENVELOPE

- Timber frame fixed on structure "neither wall nor post"
- Airtightness
- Vacuum insulator on full part of openings
- Management of thermal bridges

Building users opinion

"This relocation project reflects our ambitions for further development of FIDAL in the region. Our installation in these new premises, modern, spacious, functional in a very innovative building will allow us to welcome our customers in optimal conditions and to provide an even more fulfilling working environment to our teams. In addition, we are pleased to integrate this positive energy building, which is fully in line with the firm's environmental policy. "
Eric Joanne, Regional Director of FIDAL, operator of the building on 2 levels.

If you had to do it again?

We would do everything in the same way but had imagined fewer administrative and legal constraints. The initial ambition was "Can we imagine unplugging the

building network: 100% autonomy" In the end a self-contained building smoothed over the year the only obstacle to ambition: the costs would have imposed a balance of storage and production of hydrogen for several million euros. Incompatible with the economy of the project ... The future may allow it ...

See more details about this project

http://galeo.fr/programmes/deltagreen/
https://www.construction21.org/france/data/sources/users/10929/divisibilite-du-batiment.docx

Stakeholders

Contractor

Name : GALEO
Contact : Alain RAGUIDEAU - 02 40 85 00 00 - a.raguideau@galeo.fr
http://www.galeo.fr

Construction Manager

Name : CR&ON ARCHITECTES
Contact : Thierry RAMPILLON - 04 76 56 24 04 - t.rampillon@creon.archi
http://www.creon.archi

Stakeholders

Function : Thermal consultancy agency

ITF

Bruno GEORGES - 04 79 75 00 29- contact@itf.biz

https://www.itf.biz/fr/
ENGINEERING ENERGY DESIGN - THERMAL -

Function : Structures calculist

SERBA

Yoann GUITTENY- 02 51 11 10 99 - serba44@serba.fr

http://www.serba.net/
DESIGN - ENGINEERING STRUCTURE AND ECONOMY

Function : Construction Manager

ESSOR

Caroline DEHAUT - 02 51 80 66 20 - c.dehaut@groupedelta.com

https://www.essor.group
ENGINEERING OF REALIZATION

Function : Facility manager

SOLARIS GESTION

Karl BRICHETEAU - 02 85 52 49 00 - karl@solaris-gestion.fr

https://www.solaris-gestion.fr
MANAGER - PILOT OF THE ENSEMBLE

INSITECH

Vincent VILLENEUVE - vvilleneuve@insitek.fr - 09 52 90 30 70

https://www.insitek.fr

Function : Company

POWIDIAN

Bertrand CHAPUIS - Bertrand.chapuis@powidian.com - 06 70 16 60 05

http://powidian.com
HYDROGEN STATION

Contracting method

Separate batches

Type of market

Table 'c21_maroc.rex_market_type' doesn't exist

Energy

Energy consumption

Primary energy need : 100,00 kWhep/m^2.an

Primary energy need for standard building : 110,00 kWhep/m^2.an

Calculation method :

Breakdown for energy consumption : No details yet regarding the age of the building

Real final energy consumption

Final Energy : 44,01 kWhef/m^2.an

Real final energy consumption/m2 : 27,34 kWhef/m^2.an

Year of the real energy consumption : 2 017

Envelope performance

Envelope U-Value : 0,52 $W.m^{-2}.K^{-1}$

More information :

The objective is to obtain spaces that are not constrained by walls or columns, for this we use load-bearing facades and an intermediate metal beam that is based on the technical blocks. The facades consist of carrying needles made of steel. A false ceiling plenum conceals the central beam and the distribution of fluids. The east and west facades are opaque and are mainly used to contravene the building. The other facades are made of curtain walls.

Building Compactness Coefficient : 0,32

Indicator :

Air Tightness Value : 0,33

Renewables & systems

Systems

Heating system :

- Geothermal heat pump
- Others
- Electric floor heating
- Solar thermal

Hot water system :

- Individual electric boiler

Cooling system :

- Geothermal heat pump
- Floor cooling
- Others

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Heat Pump on geothermal probes
- Other, specify

Renewable energy production : 51,27 %

Other information on HVAC :

Two heat pumps for on-site heating and cooling production with active slab emission (prefabricated concrete slabs traversed by PER networks)

Solutions enhancing nature free gains :

Stores automatiques sur les vitrages commandées avec gestion selon le vent, l'ensoleillement

Smart Building

BMS :

Centralized technical management on the building allowing:
- piloting and programming of dual flow plants;
- control and programming of the production of heating water or cooling water;
- control and programming of the demand for heating or cooling of the various trays of the building;
- control and programming of electric awnings;
- control and programming of indoor lighting and outdoor lighting;
- system of exploitation of energy data on the building.

Environment

Urban environment

Land plot area : 4 825,00 m^2

Built-up area : 2 268,00 %

Green space : 1 912,00

Close to the ring road and well served by public transport, Delta Green offers easy access to all the regional capitals and easy access to Nantes Atlantique Airport and the TGV station in the center of Nantes.

On the spot, you can also benefit from aerated pedestrian paths and cycle tracks that cross the islands of offices, as well as 2100 public parking places.

Multiple services are at your fingertips: inter-company crèche open 5 days 7 from 7:30 to 21:30, restaurants, gyms, ATLANTIS commercial center, (151 shops), medical center and clinics, 26 movie theaters, banks, hotels, cultural space, theaters (ZENITH Nantes Métropole and Onyx Theater), ...

And the beaches of La Baule are only 47 minutes ...

Products

Product

PHOTOVOLTAIC PRODUCTION

AR MOR GREEN

Nicolas ROLLAND

http://www.armorgreen.fr

Product category :

Photovoltaic production: part of the production is used for self-consumption, the rest is reinjected into the network. The entire periphery of the roof of the building is equipped with panels. A roof was also intentionally created and covered with photovoltaic panels.

YES

Hydrogen station

POWIDIAN

Bertrand Chapuis - Bertrand.chapuis@powidian.com - 06 70 16 60 05

https://www.powidian.com

Product category :

Hydrogen station: under certain conditions; the surplus of photovoltaic production intended for self-consumption is injected into a hydrogen station: by electrolysis of hydrogen is then produced and stored. In low sunlight conditions (mainly winter), hydrogen is then used as a fuel in a hydrogen cell to reinject electricity into the building.

YES

Costs

Construction and exploitation costs

Reference global cost : 1 100,00 €

Renewable energy systems cost : 300 000,00 €

Reference global cost/Work station : 1100

Cost of studies : 50 000 €

Total cost of the building : 6 570 000 €

Subsidies : 23 000 €

Energy bill

Forecasted energy bill/year : 21 400,00 €

Real energy cost/m2 : 4.64

Real energy cost/Work station : 56.32

Health and comfort

Water management

Consumption from water network : 427,00 m^3

Water Consumption/m2 : 0.09

Water Consumption/Work station : 1.12

Indoor Air quality

No measurement of the air quality in the building. Operation of dual flow plants during the day and on reduced time intervals at weekends

Comfort

Health & comfort :

A very important focus has been on natural lighting in DeltaGreen. 78% of the surface of the trays is in natural light, but better, 100% of the workspaces are, whatever the type of disposition chosen (closed offices or open space). In addition to the reductions in energy consumption allowed by the decrease in artificial lighting, it is also the gain in user comfort that has been thought out. Caps on the south facade reduce summer solar energy intake while allowing the building to capture a maximum of solar energy in winter. To achieve these results, here are the main design factors:

- the optimizations of orientations of the facades, the maximum north and south
- cutting the building, varying the thickness of the trays from 12.2 to 14 meters maximum
- the height of 3.3 m between slabs to penetrate the light to the furthest
- the absence of lintel on the facade thanks to the system neither wall nor posts

Calculated thermal comfort : 20 ° C in winter 25 ° C in summer

Measured thermal comfort : 20 ° C in winter 25 ° C in summer .The GTC settings have been adapted to provide comfort to the occupants

Acoustic comfort :

In order to improve the inertia of the building, only the central part has acoustic false ceilings. The rest of the surfaces are raw concrete. Acoustic correction is provided by hanging baffles planned according to demand.

The spines (in 10cm x 20cm concrete steel) of the Stabalux type frames, combined with 98/48 type partitions with wool of RA ³ 47 dB index, make it possible to achieve isolations between offices of 42 dB which is the objective regulation between offices.

Carbon

GHG emissions

GHG in use : 3,00 $KgCO_2/m^2/an$

Building lifetime : 25,00 année(s)

GHG Cradle to Grave : 946,00 $KgCO_2 /m^2$

Estimating GHG emissions in the use phase for the building per m² and per year can be feasible on energy, with this detailed 4-step methodology: Computational scope: building energy consumption (indirect energy emissions)

Contest

Reasons for participating in the competition(s)

STRONG POINTS From the energy point of view

- 3 photovoltaic fields:

-In roofs for resale.

-In acroterium for self-consumption and storage

-In the shade for resale.

- A shadows propels a photovoltaic field to a height of 16 meters, a real signal of the program's environmental and energy ambitions. Thermal comfort:

-Heating and cooling is provided by a complex of active slabs and a PAC system on vertical probes in geocooling.This mode of emission ensures a very high comfort for the occupants (no draft, exchange by radiation) .
- Annual global energy balance Annual photovoltaic production is estimated at 520 MWh of primary energy when the annual consumption of the building (all uses) reaches 476 MWh of primary energy.

- Smooth on the year, the building is autonomous in energy and even surplus.
HIGHLIGHTS From an environmental point of view

- To optimize natural resources, the North and South orientations were favored with largely glazed facades and protected from direct sunlight by 4 different solar shading devices depending on the exposure.
- To preserve nature, existing trees and the "undergrowth" aspect of the environment have been preserved. All materials used for facades are part of a logic of sustainability and simplified maintenance.
- In the long term, all these materials are recyclable. Technological advances could encourage these facades to evolve easily by inter-changing the panels without structural intervention.
- Total adaptability thanks to the concept "Neither beam nor post" That is 92% of free spaces of structure and having access to the natural light (92% of the surface with FLJ> 2.5%)

From a digital point of view (BIM, etc.):

- A 10-month fine job to highlight this unique concept by modeling the whole building under a BIM model.

From the point of view of uses, practices:

- A system of centralized technical management of the building (GTC) ensures the control of the building, the management of the equipments, the measurements and controls of the data which allow the follow-up of the site in an optimal way to reach and optimize the expected performance in a logic of permanent improvement.

-A "Welcome Home" user's guide, intended for all users.

-A home screen that informs users and visitors in real time about the energy data of the building accessible remotely

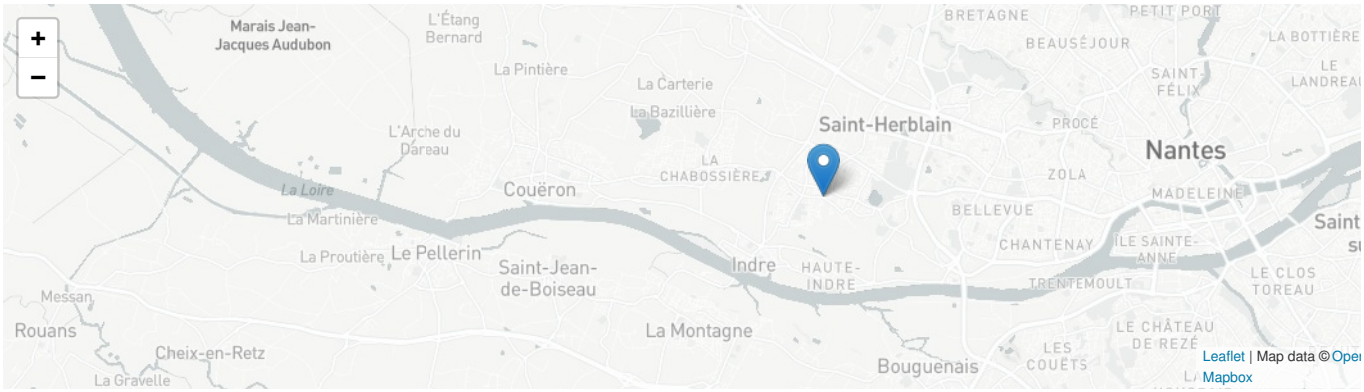
Building candidate in the category

Energie & Climats Tempérés

Coup de Cœur des Internautes

Grand Prix Construction Durable

Prix des Etudiants



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