CONSTRUCTION21

Ecoffice

by Claire Lheureux / () 2015-06-30 11:37:03 / Belgique / () 12730 / FR





General information

A project studied from every angle!

The "Ecoffice" results from a research project laréalisation liability and sustainable commercial building DESBUREAUX the same cost as standard. It is certified liabilities and labelisé BREEAM "Very Good" for its sustainable building qualities.

This project is unique because all its parameters were studied and optimized manièresystématique by the partners to make a modèlereproductible, flexible and versatile. The research aimed to determine desoptima between functional requirements, technical choices, critèreséconomiques and principles of sustainable construction.

The parametric analysis focused on constructive energy and environmental aspects, through general themes as varied quel'implantation and building form, structure and choice desmatériaux, the isolation level, performance and choice of system design, lighting issues and natural light, etc.

In addition, a monitoring procedure has been set up by IeCSTC: it began with the monitoring of future occupants in their bureauxactuels and will continue for three years after their installation in lesnouveaux offices.

Implantation

Work on the implementation and the shape of the building permisd'optimiser contributions in natural light while reducing dépenditions heat. The optimization of solar gains, natural lighting and ventilation desbesoins has reduced the heating requirements in winter and the risks of overheating in summer.

The project was installed in the ground in a north-south orientation; it uses the existing height difference to separate sonparking building. The remarkable trees have been preserved and integrated into the project.

Initially a simple compact rectangle shape in TheLength was divided to form two strips, which were shifted to improve lapénétration of natural light in the heart of the plates. An atrium is encorevenu strengthen this objective. In doing so, the blind nucleus (where rassembléssanitaires and vertical circulations) was reduced in favor of espacepériphérique offices.

Functionality and template

The design process has incorporated from the outset àl'énergétique aspects and lighting. All work spaces and have natural lighting, a guarantee of defonctionnement economy.

The design of the structure, technical installations and desfaçades sought to preserve the greatest possible flexibility in usagede space. The template has been optimized and corresponds to trays of ± 1 000m2, who accommodate as well as landscaping bureauxcellulaires.

The party retained the north-south orientation, reducing faces is etouest (the most difficult to control in terms of overheating). Façadessud the north and correspond to the same frame openings (randomly distributed manièresemi), but the side facing to the north is slightly glazed qu'ausud. In front, a color scheme forms a set of pixels surdimensionnésrépondant accents in the landscape.

Architecture

The parametric analysis focused on the constructive aspects, energy and environmental, through themes as varied as implantationgénérale and building form, structure and material selection, leniveau insulation, performance and choice of technical facilities, issues of lighting and natural light, etc.

In the evolution of the architectural approach, the estnaturellement liabilities associated with the logic of the building life cycle. He drove àinvestir the particular durability of structures, walls and walls, as projet. Réduire space technologies for the benefit of their architectonic A represents paradoxical challenge, which engaged them in a toujoursplus built energy, low tech and less delivered technology. It is also in what cecadre adopted Trias Energetica logic - "less better, otherwise", which control first reduce the need (energy, but also desurface, materials, water, etc. .) by working on the form and matter, before considering the improvement of technical systems and the use has other forms of resources (renewable, etc.).

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Material

Several constructional variants were studied. The present variantelourde improved cooling needs combinaisonavec intensive night ventilation and helps mitigate detempérature peak during heat waves.

A typical analysis LCC (Life Cycle Cost) allowed the comparison del'impact environmental m2 of facade on the basis of an LCA for deuxdifférentes life (30 and 60) and considering different scenarios deremplacement.

The building is constructed of concrete frame and closed by a concrete block masonry remplissageen traditionally. External insulation Neopor ENEPS is then reported and coated. The gables are covered with unparement concrete blocks.

The building meets the passive standard with walls having U desvaleurs between 0.17 and 0.23 W / m2K. The windows are fitted detriple glazed north, but double glazing to the south.

Ventilation is dual-stream, of course, and the wheel exchanger permetde regulate humidity. The inertia of the building is utilized by Ades partial false ceilings in the office areas.

Geothermal (natural and nightcooling) = maximum energy saving significant investment maiscoût and need an extra in summer. The solutions are: backup heating: gas condensing boiler and heater + ventilation: double flow with heat recovery wheel. VMC.surdimensionnée for intensive ventilation in summer

(nightcooling) + extra cold: cold VMC Group.

Comfort

The initial choice of a lightweight construction was abandoned in profitd'une heavy structure for its qualities of inertia and mechanical strength, but also for its cost to comparable environmental impact.

Particular attention was paid to occupant comfort, a guarantee of good use of the building. To allow bureaupar office regulation, the heat is distributed by a circuit traditionnelet the extra hot water is provided by a condensing gas boiler. The system of ventilation is oversized to provide the necessary flow enventilation night intensive summer and a cold group is expected in réservepour possible heatwaves. Lighting installations are optimiséesgrâce choice of low-energy appliances and well positioned unerégulation by dimmers and motion sensors.

Passive and BREEAM certification label "Very Good" attest del'efficacité of the solutions and sustainability of the building.

One of the standard criteria tertiary liability is checking duconfort according to EN 13 251.

We must encode the building in a dynamic simulation program endécoupant trays by zones. This encoding also assess, Surle long term performance in naturally ventilated buildings. Cecritère is based on the comfort of theory of adaptive T °.

This model takes into account the adaptability of a building (and occupation) to external conditions. The passive building into the mind of an "adaptive" building, which allows interaction between the occupant and interior leconfort (opening windows, clothes fit for unepériode hot ...)

Natural lighting

The lighting consumption are one of the commercial buildings plusimportants positions.

Daylighting simulations encoding the building in lelogiciel radiance and 3D models in the lab tests CSEC réaliséssous an artificial sky (mirror-box) were used to investigate the influence of light on puitsde daylighting.

More? : Http://a2m.be/eco_office.html

Building users opinion

Below are reported the opinions of office occupants from a series of interview: - Not really a priori but positive surprise; - The work environment has improved; -The heat is correct, we have not got cold despite the harsh winter; - Automatic blinds are well regulated; - The space is very well thought out, everyone has enough space; - It feels good, it's good to live; - It is gratifying to work in a nice building, beautiful, representing the image of the company. Link to interview: http://www.ecoffice-building.be/

See more details about this project

If http://a2m.be/eco_office.html
If http://a2m.be/2013_publication_febelcem_sur_ecoffice_et_haren.pdf

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Designer A2M

willem@a2m.be

Mission complete

Function : Other consultancy agency

http://www.cstc.be
Monitoring, control and project studies

Function : Other consultancy agency IMTECH

M.Hoebeke ; colin.hoebeke@imtech.be

Special Technical Bureau

Function : Contractor Thomas & Piron et Holcim

Contracting method

Other methods

Owner approach of sustainability

As part of assisting innovative companies in the Walloon Marshall Plan 2.0 Green, the company Thomas & Piron has managed to bring together a consortium of architects, engineers, researchers and companies to study "in vitro "and detailed optimization of all parameters of a passive tertiary project. This pilot project has led to the construction of a passive and sustainable office building achieved at the same price as a standard desktop. It is occupied by the company Holcim. This project of "liability for all" is detailed on the www.ecoffice-building.be site. This project is certified Passive (certificate of a third party) and BREEAM assessed.

Architectural description

Concept of "design facade" The facade is designed based on a module of 1.20 m The volume set is accentuated by the inclinations of the parapets. Finally, dressing plays with an impression of the site before work. The image has been pixelated to reach a resolution to the size of the building frame. The result illustrates the work done on the report of nature and architecture which is inscribed.

Energy

Energy consumption

Primary energy need : 47,90 kWhep/m².an Primary energy need for standard building : 250,00 kWhep/m².an Calculation method : Final Energy : 25,88 kWhef/m².an Breakdown for energy consumption :

Heating: 11.2 kWh / m².year (43%) ECS: 0.00 Lighting: 9.22 kWh / m².year (36%) Domestic: 0.00 Auxiliary 5.1 kWh / m².year (20%) Cooling 0.36 kWh / m².year (1%)

More information : The calculation method used is the PHPP 2007 software.

Envelope performance

Envelope U-Value : 0,33 W.m⁻².K⁻¹

More information :

Structures and concrete floors sails (prédalle air deck with concrete cast in place) and coated outer insulation. The building meets the passive standard with walls having U values between 0.17 and 0.23 W / m2K. The windows feature triple glazing to the north, but double glazing to the south.

Building Compactness Coefficient : 3,32 Indicator : Air Tightness Value : 0,30

Systems

Heating system :

Condensing gas boiler

Hot water system :

Condensing gas boiler

Cooling system :

Others

Ventilation system :

- Nocturnal Over ventilation
- Double flow heat exchanger

Renewable systems :

No renewable energy systems

Smart Building

BMS :

The building is intelligent because first it was thought so as to have reduced requirements. Then the building intelligence resides in the same energy use. The precise regulation of the atmosphere (external blinds, ventilation, etc.)

Smartgrid :

Followed by live internet interface of building consumption

Users' opinion on the Smart Building functions : Automatic blinds are well regulated. Link to interview: http://www.ecoffice-building.be/

Environment

Urban environment

The tenant of the project, the company Holcim, the project wished implanted near the seat she currently holds in Europe Gates Park located in Nivelles near the E19 motorway. The functioning of the company requires indeed close to the motorway and car use. However, the bus 76 connects the Business Park to the town of Nivelles. The project was installed in the ground in a north-south orientation; it uses the existing height difference to separate the building from its parking. The remarkable trees have been preserved and integrated into the project.

Land plot area : 10 000,00 m² Built-up area : 10,00 %

Green space : 8 842,00

Products

Product

Steelroc

HOLCIM

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Thttp://www.holcim.be

Product category : Gros œuvre / Structure, maçonnerie, façade Metal fiber-reinforced concrete



Neopor

BASF

-

http://www.basf.be/

Product category :

EPS graphite insulation

Easy application

Dual flow ventilation unit

Swegon

info@swegon.fr

Attp://www.swegon.com/

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

CTA including a comfort ventilation High efficiency with low energy consumption (85% and 0.45 Wh / m^3 certified by PHI) despite significant usage rates (up to 9000 m^3 / h). This type of group is very suitable for passive tertiary buildings.

Validated

Gas condensing boiler

Remeha

info@remeha.be

http://www.remeha.be

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

Gas condensing boiler

Validated







Foamglas

info@foamglas.be

http://be.foamglas.com

Product category : Second œuvre / Cloisons, isolation

This product is used to achieve the thermal breaks junction walls (wall / roof, wall / floor slab; lambda value about 0.05 W / mK)

Validated

Chassis (frame)

Salamander

jckaes@sip.de

Attp://www.sip-windows.com

Product category : Second œuvre / Menuiseries extérieures Performance PVC frame (Uf = 0.89 W / m².K)

Validated





Triple glazing

Sprimoglass

-

http://www.sprimoglass.be

Product category : Second œuvre / Menuiseries extérieures Triple glazing with high energy efficiency (Ug = 0.6, g = 0.61) Validated

Costs

Construction and exploitation costs

Total cost of the building : 4 107 000 €

Health and comfort



Water management

Consumption from water network : 550,00 m³

Water Consumption/m2: 0.15

Water Consumption/Work station: 2.21

As the exact number of building users is not yet known (some still to be rented), the volume of water consumed in the use phase was estimated based on the building's surface (approx. 4000m2) with 550m3 of water / year. This figure comes from measurements collected for 71 office buildings in Belgium between 2006 and 2010 and the surface-consumer relationship that was deducted (internal study).

Indoor Air quality

Room ventilation is ensured by a system D (with recovery and evaporative cooling). Ventilation is therefore constantly monitored. Air filter unit which maintenance should be ensured The double flow units are equipped with filters.

Comfort

Health & comfort : The initial choice of a lightweight construction was abandoned in favor of a heavy structure for its qualities of inertia and mechanical strength, but also for its cost to comparable environmental impact. Particular attention was paid to occupant comfort, a guarantee of good use of the building. To enable desk-regulation, the heat is distributed by a traditional hot water circuit and the support is provided by a condensing gas boiler. The ventilation system is oversized to ensure the necessary flow rates in intensive night ventilation in summer and a cold group is expected in reserve for possible heat waves. Lighting installations are optimized through the selection of well positioned with low consumption appliances and regulation by dimmers and motion sensors. Passive and BREEAM certification label "Very Good" attest to the effectiveness of the solutions and sustainable building character. One of the standard criteria tertiary liability is checking comfort according to EN 13 251. We must encode the building. This criterion is based on the comfort theory of adaptive T°. This model takes into account the adaptability of a building (and occupation) to external conditions. The passive building into the mind of an "adaptive" building, which allows interaction between the occupant and the interior comfort (opening windows, clothes fit for a warm period, ...) Daylighting simulations of a building in the software encoding radiance and 3D models in the lab tests CSEC made under artificial sky (mirror-box) were used to study the influence of skylights on natural lighting.

Calculated thermal comfort : Entre 0 et 95 heures au dessus de 25°C sur le temps d'occupation selon le local

Acoustic comfort : Within the framework of BREEAM, an acoustic control was carried out to ensure compliance with the criteria.

Carbon

GHG emissions

GHG in use : 12,86 KgCO₂/m²/an

Methodology used :

Calculation of CO2 emissions from heating consumption, ECS, lighting and auxiliary using conversion factors of primary energy / CO2 (0.198 kg CO2 / kWh EP for gas and 0.29 kg CO2 / kWh for EP electricity)

Life Cycle Analysis

On the lifecycle Ecoffice building (for a lifetime of 60 years), the impact of the materials considered more important than the impact associated with energy consumption if we consider that the positions covered by the PEB or similar gra

Contest

Building candidate in the category







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