MECO – Mouvement Écologique Centre

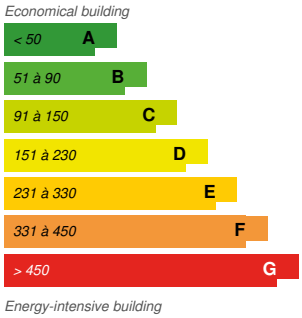
by Nicolas Clarys / 2015-07-07 10:28:03 / Luxembourg / 14244 / FR

Primary energy need :

116.4 kWhep/m².an

(Calculation method : Other)

ENERGY CONSUMPTION



Building Type : Office building < 28m
Construction Year : 2011
Delivery year : 2014
Address 1 - street : 6, rue Vauban L-2663 LUXEMBOURG- PFAFFENTHAL, Luxembourg
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 1 070 m²
Construction/refurbishment cost : 5 251 245 €
Number of Work station : 31 Work station
Cost/m2 : 4907.71 €/m²

General information

This is a new building which is home to the Mouvement Écologique Centre (Ecological Movement), known as MECO. In terms of layout, the building houses the centre's offices, along with the associated facilities (administrative offices, meeting room, archives, brasserie). The first floor is for the general public, with a library and open spaces for the public. For this building, it was decided to create a showcase building, complying with the required ecological and energy values in relation to the environment and in terms of sustainability. The building is almost entirely made from solid timber, both the structural parts and the cladding. The use of reinforced concrete has been limited to the areas where it is strictly necessary. The result is a simple building with a number of open and flexible floor areas.

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Other consultancy agency

T6-Ney & Partners s.à.r.l

http://www.ney.be/fr/contact.html
Civil engineer

Function : Designer

Steinmetzemeyer architectes et urbanistes

stdm@stdm.lu

http://www.steinmetzdemeyer.com/
Architect

Function : Certification company

Hubert Schmitz

http://www.hubert-schmitz.lu/
Conducting the blower-door test

Function : Other consultancy agency

Jean Schmit Engineering s.à.r.l.

http://www.jse.lu/
Technical engineering

Function : Others

HBH S.A

http://hbh.lu/
Coordinator-Leader

Owner approach of sustainability

For the Mouvement Écologique Centre the City of Luxembourg, as the client, wanted this building to be based on the passive building model, with aim of becoming a showcase for the solutions devised in response to sustainable development issues. As a result, the new building has been constructed in accordance with ecological principles and it fulfils the criteria of a passive building, with very good thermal insulation across the whole of the building's outer shell, with optimisation of the windows and doors in the outer walls, efficient sun shades, the ability to absorb internal heat energy, ventilation heating and potentially a heat pump to generate heat.

Architectural description

As the old building had serious issues with stability, damp and available floor space, the decision was taken to demolish it and erect a new building in its place. The proposed building, MECO, was to be built using materials that are healthy, innovative and environmentally friendly both today and in the future and which reduce the consumption of resources. It had to convey an ecological message whilst also ensuring its quality in terms of architecture and energy efficiency.

Building users opinion

"The resultant use of materials which fulfilled the ecological and health criteria unquestionably represents a benchmark. The overall mood inside created by, amongst other things, the generous use of natural light, wood and glass walls and the choice of paint gives a feeling of well-being. The windows overlooking the remains of the fortress and the old town as well as the terrace alongside the Alzette river form part of the building's genius loci." B.W.

Energy

Energy consumption

Primary energy need : 116,40 kWhep/m^2.an

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

Calculation method : Other

Final Energy : 60,30 kWhef/m^2.an

Breakdown for energy consumption :
Heating: 23% or 14.0 kWh / (m^2.year);
ECS: 25% or 15.0 kWh / (m^2.year);
Lighting and domestic consomation : 47% or 28.4 kWh / (m^2.year);
Auxiliary: 5% or 2.9 kWh / (m^2.year);

Envelope performance

Envelope U-Value : 0,22 $W.m^{-2}.K^{-1}$

More information :

The outer shell is made from wood, the various walls and external surfaces (facades, roofs, retaining walls, floor slabs, etc.) have been carefully designed to provide the optimum response in terms of thermal insulation and the thickness of the structure (with a view to improving the usable floor space). The joins between the various layers of the walls in between the different building components have been carefully designed to prevent any thermal bridges. It was also vital for it to be fully air-tight. In addition to all of this, it is vital for the correct thermal inertia to be established and correctly operated. Sheets of PCM (phase-changing material) made of plasterboard containing capsules of resin which change from a solid to a liquid state at 23° or 26° C, absorbing excessive heat loads on summer days and re-emitting them at night through forced ventilation of cool outdoor air. The external load-bearing walls are made from traditional "post and beam"-type wooden frames. These external walls are filled with insulation made from blown paper cellulose, finished on the external sides with an insulating panel of wood fibre, giving the whole assembly an optimum insulation thickness of 23.5 cm. Cellulose insulation is entirely natural and has a very high thermal insulation coefficient. The external covering of the facades is wooden cladding made from indigenous FSC-certified larch wood, left natural. The external window frames are wooden and are triple-glazed, meeting the requirements for passive buildings. All of the windows are fitted with external sun blinds made from fabric which can be rolled up. On the roof, the boxes in the wooden floors are filled with wood fibre thermal insulation which is reinforced with a double layer of external insulation with 155-mm panels of wood fibre. An extensive green roof installation over the liner provides a good degree of solar protection against over-heating in summer. Average U-values: [W/(m2K)] Windows: between 0.760 and 0.782 (0.814 west) Wall in contact with the outside air 0.152 Wall in contact with the ground 0.190 Roof/floor in contact with the outside air 0.129 Floor slab 0.241

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

Air Tightness Value : 0,59

Renewables & systems

Systems

Heating system :

- Condensing gas boiler

Hot water system :

- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Natural ventilation
- Nocturnal ventilation
- Double flow heat exchanger

Renewable systems :

- Solar Thermal

Smart Building

BMS :

SOMFY System

Smartgrid :

The SOMFY system can be used to provide a log of energy usage by level (heat consumption, temperature curve, etc.)

Users' opinion on the Smart Building functions : "It is clear that such an innovative design requires close cooperation between the various different professions as well as a change in behaviour by the building's occupants and that the necessary changes and configurations take time. But it is well worth it." B.W., occupant of MECO However, it is important to note that the building gives a certain freedom to users. These days we are used to living in places where everything is automatically controlled. In terms of thermal comfort we live, in a manner of speaking, in thermostat houses. In the MECO building, which has few occupants, some functions can be controlled by the room's occupants. This is the case with the opening of the windows, for example. It is possible to open a window for shorter or longer periods, provided that the door to the corridor is closed and the mechanical air supply is turned off for this room. This avoids wasting electricity on the ventilation units.

Environment

GHG emissions

GHG in use : 28,00 $KgCO_2/m^2/an$

Life Cycle Analysis

Eco-design material : Principal usage of wood: framework, finishings and external woodwork. - Wooden frame (post and beam) - Floors: Lignatur prefabricated wooden box floor slabs (very positive overall environmental impact) - Blown paper cellulose insulation (entirely natural) - Thermal insulating material on the roof made from wood fibre - Insulation panels made from wood fibre - Cladding on the facade made from indigenous FSC-certified wood (larch) All of the materials used to construct MECO meet the Oekofoire criteria. Details can be found in the "certificate" below. This was a mandatory requirement which had to be met in order to be part of the project. Fulfilment of the criteria was included in the specifications right at the very beginning.

Comfort

Health & comfort : In terms of the spatial quality, special attention was paid to the orientation of the rooms, the views and the provision of natural light in them. In effect, given the position of the building at the bottom of the valley and with nearby buildings, light and views are sometimes limited. As a result, the building's layout, using the most favourable orientation and positioning of the windows, was an initial step towards improved efficiency in the management of natural light and of the energy that it can provide. The sizing of the windows is tailored to the functions that they illuminate and to the position of the views and of the light. Daylight is visible in all of the areas of movement or where people remain for prolonged periods, with no dark areas noticeable. The windows are positioned in a way that provides the best possible framing of wide panoramas that they provide. Because of the desire to meet the passive building criteria, special attention was paid to the control of the temperature inside the building and the air quality, particularly through the glazing, the building's inertia, ventilation, night-time cooling and sun shades. The systems are operated automatically, which means that the occupants are kept separate from the technical operation of the building. Their working environment is healthy and comfortable all year round.

Products

Product

PCM Panels

RIGIPS

info@rigips.ch

http://www.rigips.ch/home.asp

Product category : Second œuvre / Équipements intérieurs

In order to increase the building's thermal inertia, the walls and ceilings are made of plasterboards which contain "Phase-Changing Materials", PCMs. These materials are capable of storing thermal energy in large quantities and retaining it for a long time with small losses. This is made possible by the change in the thermal state from solid to liquid of a high-quality paraffin: when it melts after reaching a given temperature, it stores the heat energy which is given off (fusion heat) and returns it later when it solidifies. This phase change can be repeated as often as necessary.

This product has been well received by the various parties. Its thermal inertia properties are interesting and have provoked some positive feedback from the various different stakeholders.

Lignatur box floor

Lignatur

info@lignatur.ch

http://www.lignatur.ch/fr/home/

Product category : Gros œuvre / Structure, maçonnerie, façade

This type of box design fulfils some of the vital load-bearing structural criteria and fire resistance and also has a very positive environmental impact. These box elements also house some of the technical facilities and, lower down, sound-absorbing surfaces. These have been chosen over other products because of the very small amount of glue used in the manufacture of these elements.

Leaving these boxes visible gives a warm feeling to the rooms which increases comfort for the users.

Blown cellulose insulation

ISOCELL

guy.gommes@isocell.at

http://www.isocell.com/fr

Product category : Second œuvre / Cloisons, isolation

The external walls are made of a traditional wooden structure and blown paper cellulose insulation. The benefit of the blown cellulose insulation lies in the way it fills all of the voids, leaving no gaps and thereby ensuring optimum efficiency. This material is entirely natural and has a very good thermal conductivity coefficient which is highly sought-after for its energy-efficiency qualities.

Good reception in view of its energy performance and its natural source.

Costs

Urban environment

The project is located in the Pfaffenthal district, at the bottom of the valley in Luxembourg City. MECO is part of a wider urban development project which has been in development since 2002 (construction general plan, district development plan, master plan and specific development plan). The urban general plan recommended increasing the building density, renovation of the school and even the reworking of the public spaces. The aim of the project was to restore the urban fabric which had been significantly damaged by demolitions and new buildings between the 1950s and 1970s by improving, amongst other things, the green aspect of the district, giving it a new eco-friendly dimension. The overall project has used techniques and materials which play an important role in the eco-friendly and energy-efficient future of the district and the city. In addition, it incorporates new planted areas and establishes new public outdoor spaces. In fact, new areas have been created. The external layout of the project can be divided into three parts: the passage, the extension of Boulevard de l'Alzette towards Parc Odendahl and all of the public areas of the school and MECO with the entrance to the school, the schoolyard with a playground and MECO's terrace and a small garden for the flat.

Green space

Green space : 571,00

Parking spaces

The urban development meets growing requirements and demand for mobility, providing the inhabitants and users with an underground car park for 25 vehicles as well as 7 outdoor parking spaces and a partially covered bike garage.

Building Environnemental Quality

Building Environmental Quality

- Building flexibility
- indoor air quality and health
- energy efficiency
- integration in the land
- products and materials

Contest

Reasons for participating in the competition(s)

With regard to comfort and health, it can be said that from the very outset when the building was being designed both were taken into consideration. The commitment to design an exemplary building, use high-performing, mostly natural and eco-friendly materials and install systems to regulate the building (automatic ventilation and sun protection systems, etc.), but first and foremost the commitment to design ergonomic, high-quality architecture provide proof that this project has given great consideration to the well-being of the people using the building.
As for spatial quality, particular attention has been paid to the direction in which the rooms face, the views and the amount of natural light in the rooms. Indeed, given that the building is sited at the bottom of a valley with buildings adjacent to it, the light and outlooks available tended to be somewhat limited.

So a first step towards managing the natural light more efficiently and the energy it could contribute was to ensure that the functions in the building were arranged so as to provide the most favourable orientations and openings. The size of the openings is proportionate to the light needed for the functions and fits with the light and outside views available. Day light is visible everywhere without any areas being felt to be dark, whether people move around or stay put for an extended period. The openings are positioned so as to best frame the outdoor views which they allow to freely flow into the building.

The commitment to comply with passive-building criteria meant that particular attention was paid to ways of managing air quality and temperature inside the building, in particular through the building's inertia, the windows and the ventilation, night cooling and sun protection systems. These systems run automatically so that the occupants do not have to get involved with the building's technical functioning. Their working environment is healthy and comfortable all year round.

Building candidate in the category

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