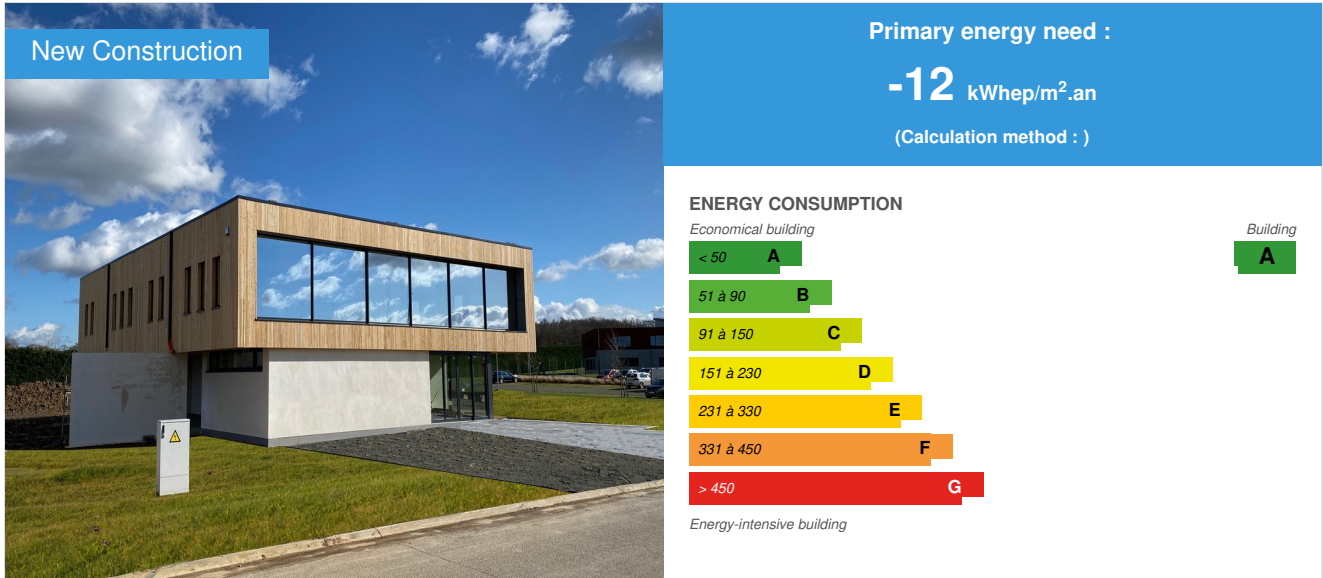


C-Blue: ecology and data

by Nathalie LEBRUN / 2023-03-03 11:06:38 / Belgique / 189 / FR



Building Type : Office building < 28m
Construction Year : 2019
Delivery year :
Address 1 - street : rue de l'innovation 3 5020 NAMUR, Belgique
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 675 m²
Construction/refurbishment cost : 662 600 €
Cost/m2 : 981.63 €/m²

General information

The CBlue building was a challenge that was as much philosophical as it was environmental. The owner of this IT startup managing data wanted above all to build a building with a minimal environmental impact, in short circuits, in order to offset IT carbon.

Architecture with the environment in mind

In addition to the Client's wishes, the location of the building clearly required a building designed for the environment. The Ecolys business park, located in the Namur region, effectively imposes buildings that take sustainable aspects into account. These two vectors coming together, the project focused on two elements: the choice of wood, biosourced, local and sustainable materials for elevation materials, and creating an energy-autonomous building.

Employee well-being

An IT startup has a permanent challenge: recruiting and retaining its employees. The young boss bet on the creation of a serene, soothing workplace, which would allow workers to feel good in their workplace. Principles of biophilia have been put in place, with the choice of visible wood (elevation material), a good supply of light, open and friendly spaces. The architecture has participated in this well-being, by focusing on bioclimatic principles, shading by overhangs, integration of solar glazing, on the integration of large bay windows depending on the orientation to maximize the entry of light natural.

Controlled energy footprints

The client's first wish was to build an energy self-sufficient building. The installation of solar panels at the end of the construction allowed this energy sufficiency, as well as the installation of charging stations for electric cars to participate in sustainable mobility.

The energy footprints relating to construction have been minimized. First of all by the choice of wood, a biosourced material requiring little embodied energy. Then by choosing a local manufacturing company, which limits the transport of materials. Then by the choice of a majority construction system integrating local wood. It is a project in short circuits, where each stage has relied on the rationalization of the energies used to reduce the environmental impacts.

Wood construction in a 'smart attitude'

Even if we cannot speak of major technical innovations for this building, because it is rather focused on bringing together a desire for environmental optimization with known systems (construction in bonded CLT, photovoltaic panels, etc.), it is appropriate to highlight an optimization of materials and systems that positions it as an optimized or "smart" building.

Indeed, an eco-design implemented from the sketch of the building, has made it possible to rationalize the wood material, in production and on the site. The right material, in the right place and in the right quantity: an over-exploited recipe on this site, which allows the building to evolve over the long term.

Building users opinion

The occupants are mainly the people working in this office building. Their return is positive on three points. The first relates to the pleasant atmosphere given off by the working environment, with the exposed, warm wood, which, according to some, gives a holiday air, and the contribution of natural light which emerges from the whole building. . The second positive point relates to the organization of the space, because the vast majority of the interior partitions are glazed, which offers a sharing of luminosity, whatever the time of day. These glass partitions also allow more sharing, more communication, while maintaining separate activity areas. Finally, the third return is a sharing of philosophy. The majority of employees are young workers, sensitive to the environment. They are proud to work in a building made in short circuits, with a philosophy close to their ideas.

If you had to do it again?

The building and the renewable energy infrastructure were designed in perfect harmony with the initial specifications. All the actors are delighted with the result. The only modification, if it were to be redone, would be to increase the number of solar panels from the start. The production of renewable electricity is sufficient and allows the management of the C-Blue building.

The installation of additional solar panels has been put in place, not for the building itself, but to provide additional energy for the charging stations for electric cars, installed in the C-Blue car park.

To redo, the surface of the solar panels would have been directly thought for this complementary use.

See more details about this project

<https://www.stabilame.be/rhisnes>

Data reliability

Self-declared

BIM approach

The whole project was modeled in 3D at Stabilame, in order to produce the production BVNs for the automated tapping centers at the same time. This 3D modeling makes it possible to share files, of the WEB GL type, so that architects have access to documents requiring agreement (constructive nodes, specific details, etc.) because they know how to use the tool made available to them, with measurement, travel in the file, etc. The use of Cadwork software makes it possible to work in open IFC files, in order to go further in the BIM if desired. Here, the BIM part is on the one hand internal between the Stabilame services, in order not to copy any files and therefore to avoid any erroneous copying. The external BIM part is a sharing of Cadwork source files with certain external parties, such as suppliers of EPDM tarpaulins for flat roofs, or specific fittings, or exterior joinery elements. The suppliers do not redraw any element, it is the Stabilame files that allow direct control of their tool. It is already part of the BIM in action, even if it is not a complete BIM.

Photo credit

Sketch Architects - Stabilame - CBlue

Stakeholders

Contractor

Name : C-Blue

Contact : info@cblue.be

<https://www.cblue.be/>

Construction Manager

Name : Esquisse Bureau d'Architecture

Contact : mv@esquisse.be

<https://www.esquisse.be/>

Stakeholders

Function : Construction company

Stabilame

info@stabilame.be

<https://www.stabilame.be/>

Carcass wood closed out of air / out of water

Function : Manufacturer

Menuiserie Riche

welcome@chassisriche.be

<https://www.chassisriche.be/fr>

manufacture of wooden windows and curtain walls

Contracting method

Separate batches

Owner approach of sustainability

The owner's environmental approach is the genesis of the project. This tertiary building being the head office of a young IT company, it was essential for the client to offset the environmental impact of the sector by creating an exemplary sustainable building. The first choices of the project owner targeted wood materials (for their renewable, recyclable aspect, and less energy-consuming than geo-sourced or petro-sourced materials). local companies to respect short circuits and energy self-sufficiency. Inclusion was one of the project owner's priorities, requiring PMR access. In the same way, the well-being of employees is a principle that he quickly integrated, having been sensitive to the principles of biophilia presented by the company and the architect, in order to create a soothing, friendly, conducive to profitability and staff stabilization.

Architectural description

To meet the ecological wishes of the functional needs of the client, the proposed building is based on a simple and compact architecture. The form is limited essentially to the needs, which is why the project has a flat roof. The building is divided into two strata: the ground floor, acting as a "base", and the floor which overhangs the entire ground floor (overhang on the 4 facades), a little like the foliage of a tree, which makes it possible to manage the sunshine and free up covered outdoor spaces in places. There is therefore a real relationship between the interior space and the exterior space, reinforcing the pleasantness of the working environment. The architect took care to follow the profile of the land as well as possible. It is for this reason that the rear of the building is not located at the same level as the front. The percolating and vegetated car park also follows the slope of the land. The caretaker's accommodation is located at the back of the building in direct relation with the garden located at the back of the plot. This layout allows judicious use of the land and enhancement of residual spaces. At the construction level, the architect opted for a construction technique with a low energy footprint and measured costs. To do this, they decided to work with a solid wood structure, which would remain visible inside. In this way, interior finishings and the use of plaster are avoided. In addition to the use of rainwater for all the toilets, the project is self-sufficient in electricity, thanks to solar panels. A complete IT management of the building was carried out by the client, also allowing precise energy monitoring.

Energy

Energy consumption

Primary energy need : -12,00 kWh/m².an

Primary energy need for standard building : 115,00 kWh/m².an

Calculation method :

CEEB : 0.0002

Breakdown for energy consumption :

In Belgium, the PEB certificate is not compulsory for tertiary buildings. On the other hand, an EPB certificate has been established for the housing part, and allows to have an overall idea since it is the part that consumes the most energy (real house for a household).

heat: 9,550 kwh/year - heating loss -6,952 kwh/year + need for domestic hot water + 1,383 kwh/year + auxiliary energy + 654 + cooling energy +633 kwh/year = final consumption = 5,268 kwh/year - electricity self-production -5810 + transformation losses of the above items consuming electricity + 7,902 kwh/year - transformation losses avoided thanks to self-production of electricity -8,716 kwh/year

More information :

Housing heat requirements: 9,550 KWh/year

loss of the heating installation: - 6,952 KWh/year

Need for DHW and installation losses: 1,383 KWh/year

energy consumption of auxiliaries: 654 KWh/year

energy consumption for cooling: 633 KWh/year

either :

Final consumption: 5,268 KWh/year

Self-production of electricity: 5,810 KWh/year

transformation losses of the above items consuming electricity: 7,902 kWh/year
transformation losses avoided thanks to self-production of electricity: -8,716 kWh/year
either
Annual primary energy consumption of housing: - 1,356 kWh/year
 $-1,356 / 105\text{m}^2 = -12 \text{ kWh/year}$

Real final energy consumption

Real final energy consumption/m² : 50,17 kWh/m².an

Year of the real energy consumption : 2 020

Envelope performance

Envelope U-Value : 0,28 W.m⁻².K⁻¹

More information :

CLT walls + insulation + plaster or cladding:

U: 0.16 W/m²K

roofs U: 0.12 W/m²K

frame on average Uw 1.22 W/m²K

Building Compactness Coefficient : 1,29

Users' control system opinion :

Users of home automation systems are of two types.

First of all, the employees who use the office and meeting spaces, the very essence of the project. The employees are delighted with the various systems made available, Automatic energy management is not the application that serves them the most, but as they are young workers aware of the environment, they are proud to be part of system users. Especially since rechargeable terminals are part of this home automation, and this part directly involves employees using hybrid or full-electric cars

Renewables & systems

Systems

Heating system :

- Heat pump

Hot water system :

- Individual electric boiler

Cooling system :

- Reversible heat pump

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 100,00 %

120 panels of 335 Wp mounted East-West on a flat roof, i.e. a total power of 40.2 kWp. Average annual production of 38,000 kWh.

Environment

Biodiversity approach

As the building was built in a ZAC, biodiversity was not a priori a basic requirement. However, 3 distinct approaches have been implemented.

The first is the conservation of a green zone, in a garden alternating lawn and flowers. This garden is available to the caretaker's accommodation. It also makes it possible, in a business and industrial zone, to accommodate biodiversity, both for insects and for other animals.

The second step concerns parking. Rather than providing asphalt, percolating and vegetated car parks have been installed. This allows water absorption in the soil, but also increased vegetation in the area.

Finally, the third approach to biodiversity is more subtle but no less important. The construction is made of local wood, which is PEFC certified. PEFC certification takes into account, to establish forest felling certificates, respect for biodiversity. Using PEFC wood is therefore a guarantee of not destroying the original biodiversity of the wood (the wood used is local wood, from Belgium).

Mitigation actions on soil and biodiversity :

For the car parks, rather than providing asphalt, percolating and vegetated car parks have been installed. This allows water absorption in the soil, but also increased vegetation in the area.

Risks

Hazards to which the building is exposed :

- o Flooding/Slow flood
- o Heatwave

Risks measures put in place :

The overheating of the building was taken into account from the first sketches of the architect. The entire ground level + 1 of the building overlaps the ground floor. This allows shade and prevents the entry of the sun. The main meeting room has been positioned on the north side for optimal light without overheating.

The luminosity was important, but to preserve important glazed surfaces, it is an anti-solar glazing which was privileged. This glazing contains an additional layer, which filters the rays of the high sun in summer, but allows the rays of the winter sun, which are more grazing, to pass through to benefit from a passive heat supply. On the large bay, anti-sun screens have been provided in order to be able to hide the sun if necessary.

The risks of flooding have been taken into account. In order not to make the ground waterproof, all car parks are percolating (draining pavers and gravel), to allow maximum infiltration.

Urban environment

The project is installed in a "green" zone, of the ZAC type. The architecture and the typology fit perfectly into this framework. The area is intended for environmentally friendly buildings, and the C-Blue building corresponds perfectly to this, including the developments made on the land, namely the vegetated percolating car parks, the maintenance of the gardens, ... As far as transport is concerned, the area is served by public transport (buses), and is close to major highways (E42 and E411, two major Belgian highways). To promote green mobility, semi-fast charging stations have been installed in the building's car park.

Products

Product

Biosourced CLT panels from local wood and circuit-courses

STABILAME

info@stabilame.be

<https://www.stabilame.be/index.php/>

Product category : Structural work / Structure - Masonry - Facade

Stabilame's CLT solid wood elements are made from local wood, 98% biosourced and have a B-EPD for TOTEM (Belgium) and an FDES for INIES (France). They can be used on walls, floors and roofs

CLT panels have been widely accepted by users, architects, and building residents. The great speed and the visible wood finish impressed them. The contribution of the warm aspect of wood brings concentration and well-being in offices and meeting rooms, and a feeling of fullness in the conciergerie.



Posts-Beams mixed structure STABILAME in glued laminated

STABILAME

info@stabilame.be

<https://www.stabilame.be/index.php/>

Product category : Structural work / Structure - Masonry - Facade

Post-beam structures intended for large buildings are specifically studied in combination with glued CLT or nailed CLT. This notion of diversity brings large volumes that can evolve through the posts and beams, and the stability of the walls with the CLTs.

The load-bearing glued-laminated superstructure, integrating the posts and the beams, made it possible to open up the interior of the building and to pace it with glazed partitions. This brings great luminosity and well-being. This ingenious construction principle has particularly met with the approval of the client and the architect



RICHE High Performance Frames and Curtain Walls

Menuiserie Riche

welcome@chassisriche.be

<https://www.chassisriche.be/fr>

Product category : Finishing work / Exterior joinery - Doors and Windows

La Menuiserie Riche frames offer very high thermal, static and environmental performance. Labeled biosourced (84% in 80 mm thickness), they have received level A+ in indoor air quality, and benefit from ACV and DEP (B-EPD for TOTEM in Belgium and FDES for INIES in France).

The frames and curtain walls were very well received by the occupants. The interior wood finish brings additional warmth to the project. No reverberation of feeling hot in summer or cold in winter. The frames are very efficient and contribute to the well-being of the building.



Costs

Health and comfort

Water management

Water consumption is quite low compared to the volume of the building. A rainwater tank is used to collect the latter, which supplies all the sanitary facilities. The only water consumption is drinking water from the tap for the offices and the caretaker's accommodation.

Indoor Air quality

Particular attention has been taken to indoor air quality. On the one hand with the ubiquitous double-flow controlled mechanical ventilation. On the other hand, in the quality of the materials. Indeed, in order to increase the brightness, there are not only a lot of windows on the exterior walls, but the glass partitions are inserted into interior window elements. All these elements are manufactured by Menuiserie Riche, which has obtained the Indoor Air Quality label A+, the best possible result.

Comfort

Health & comfort :

The well-being of the occupants was a prime motivation for the client to build his tertiary building in wood.

Wood has made it possible to introduce the notions of biophilia and well-being through the visual contribution of natural materials. Serious studies, such as "Workplaces: wellness + wood = productivity", published by Pollinate, provide clear data on improving concentration and productivity in workspaces. Thus they consider that productivity increases by 8%, and the increase in personal well-being by 13% compared to a workplace made of traditional materials. In the case of C-Blue, we fit well into this case study, because the solid wood walls remained visible, so as to benefit as much as possible from this principle.

Thermal insulation and controlled mechanical ventilation complete this feeling of comfort in the offices, as does the A+ label for the indoor air quality of certain materials (as seen above).

Calculated indoor CO₂ concentration :

-3,32 kg CO₂ / m².an (voir PEB)

Acoustic comfort :

The acoustics have been the subject of several attentions. The floor, made of solid wooden CLT elements, was completed with an insulit-type membrane, then screed over 7cm, with a carpet floor covering. At the level of the roof, it is made of steel deck, and insulated from above. A false acoustic ceiling in slab was made from the inside, on a suspended structure.

The acoustic comfort is very interesting, with a serene atmosphere on all the office floors but also in the caretaker's accommodation.

Temperature level :

The building does not have heating as such. It is equipped with double flow ventilation and air conditioning/heating support powered by a heat pump. This system is linked to presence detection in the offices and constantly adapts according to the presence, the ambient temperature and the temperature requested.

Humidity control :

Dual-flow controlled mechanical ventilation helps control humidity.

The use of biosourced materials also makes it possible to absorb the possible excessive presence of occasional humidity, but in the presence of a VMC, this function becomes negligible.

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Visual comfort :

Visual comfort is provided by two main principles.

On the one hand the contribution of natural wood material, which offers a direct wood finish is essential. This gives a warm, soothing appearance. These are soft, non-aggressive shades, always pleasing to the eyes, and restful to the mind.

On the other hand, the large windows have been put in place for a maximum supply of natural light. This great luminosity is an integral part of visual comfort, as it bathes in a healthy natural clarity.

This luminosity is also transmitted thanks to the fully glazed interior partitions.

Ergonomic design :

The ergonomics of the project lies in the easy use of spaces. The ground floor, which includes the technical areas and a kitchen, provides easy and quick access to the large meeting room. The floor includes office spaces and meeting rooms, partitioned between them by glass partitions (solid wood + glazing). The spaces are very versatile and modular. Reading the space is simple and reassuring.

It is important to note that the ergonomics took into account PMR use, both in the passages of the doors, and the inclusion of adapted sanitary facilities, and an elevator for access to the floor.

Quality of life and services

Within the building, the spaces are planned so that the users feel good there. To relieve any work stress, in addition to restful walls in natural wood, employees benefit from 3 relaxation areas. A way to slip away from the office, to share with colleagues. It's the new way of working by offering both work and sharing spaces on the same structures. The C-Blue building is a commercial building. It nevertheless includes concierge accommodation, which shares access to the garden and car parks with the company's employees: it is also a desire to "live together", in a positive dynamic.

The third service is the most concrete, it is access to semi-fast charging stations for electric cars. There are currently 4 terminals, a number which should be increased with the second phase of additional photovoltaic panels planned.

Finally, inclusion was part of the deal from the start of the project. The building was designed to be accessible to people with reduced mobility. This is fully the case, since all office passages and meeting rooms have specific width doors, and adapted toilets are provided, as is an elevator to access the floor. This implies that inclusion is desired both for potential visitors and for new colleagues who may have specific PRM needs.

Carbon

General infos

The project is essential to avoid carbon emissions, in two main ways.

First of all, the majority of elevation materials are made of wood: walls, structure, floor, openings and cladding. This represents 168 m³ of wood. Considering the ACV/DEP of the main materials, this allows us to propose a carbon sequestration of 126 tons, which is more than interesting.

Especially since the building is self-sufficient in energy, and also supplies energy to shared charging stations. An extension project of up to 80 additional kWp is under study, to be placed on a carport, to supply electric vehicles.

Ic Energy

Ic Energy : -3,32 KgCO₂/m²

Carbon sink

the majority of elevation materials are made of wood: walls, structure, floor, openings and cladding. This represents 168 m³ of wood. Considering the ACV/DEP of the main materials, this allows us to propose a carbon sequestration of 126 tons, which is more than interesting.

Initiatives promoting low-carbon mobility

In the car park, accessible to all, 4 semi-fast charging stations have been placed for charging electric cars. In view of the success, it was decided to extend the solar panels, with up to 80 additional kWp, to be placed on a carport and with production solely dedicated to powering electric cars. This will allow employees, customers, but also users of the Ecolys park to have easily accessible charging points.

GHG emissions

GHG in use : -3,32 KgCO₂/m²/an

Methodology used :

PEB report

Complete calculations of greenhouse gases have not been made. However, the main materials making up the structure of the building, namely: glued CLT walls and roofs, glued-laminated beams and wood-aluminum frames benefit from LCA and DEP allowing their impact on the various greenhouse gas. B-EPD for Belgium and FDES for the INIES database in France.

Life Cycle Analysis

Material impact on GHG emissions :

Les calculs complets des gaz à effets de serres n'ont pas été réalisés. Cependant, les matériaux principaux composant la structure du bâtiment, à savoir : les murs et toitures en CLT collé, les poutres en lamellé-collé et les châssis en bois-aluminium bénéficient d'ACV et de DEP permettant de calculer leur impact sur les différents gaz à effet de serre. B-EPD pour la Belgique et FDES pour la base INIES en France.

Eco-design material :

The client's primary desire was to work as much as possible with natural and biosourced materials. Thus, the structural and closing materials are made of wood, as well as the cladding.

The glued CLT walls, which form the exterior walls of the buildings, are made of local wood in a company located less than 60 km from the site. These glued CLT walls benefit from the biosourced label (98%) with the extension of the label indicating the "Walloon sector" provenance (proof of local wood). ACV and DEP were performed. This allows Stabilame's glued CLTs to be present in TOTEM, the environmental impact calculation software (Belgium, via the B-EPDs verified by a third party), as well as to present an FDES and be included in the database. INIES (France).

The glulam beams and posts are made of European wood, with the PEFC label. They have also been the subject of a B-EPD (to enter the TOTEM program in Belgium) and an FDES for the INIES database (France).

The wooden-aluminum frames also have the following environmental labels: PEFC certification, biosourced label (70%), and ACV and DEP for Belgium (BEPD to enter TOTEM and for France (FDES for the INIES database) .

The cladding, facing of the building on the entire level ground + 1 is made of solid wood, which made it possible to use a biosourced, renewable and recyclable material. Even if it is not labeled, it was important to point it out.

Contest

Reasons for participating in the competition(s)

Présenter le projet de C-Blue aux Green Solutions Awards était une évidence, car il s'agit d'un bâtiment assurément « Green building ». En effet, il rassemble tant les atouts environnementaux au niveau des matériaux, que de l'éco-conception, de l'autosuffisance énergétique ou encore la prise en charge du bien-être des occupants.

Les matériaux de constructions, en bois, sont non seulement biosourcés, renouvelables et recyclables, mais ils bénéficient pour la plupart de labels environnementaux et d'analyses de cycles de vie (B-EPD et FDES), permettant d'éviter le greenwashing. De plus, ces matériaux ont fait l'objet d'un schéma de démontabilité pour pousser au ré-emploi en phase de déconstruction.

Mais avant de déconstruire, il convient de construire pour longtemps. Et l'éco-conception mise en place permet une évolutivité du bâtiment, d'en changer l'organisation intérieure, afin de pouvoir modifier l'affectation sans devoir déconstruire.

L'éco-conception a aussi misé sur le bien-être des occupants dès le départ, en prenant en compte des principes de biophilie, tels que le bois visible, une grande luminosité, brefs des confort tant visuels que thermiques pour que chacun s'y sente bien. (concentration, bien-être, rentabilité, ressources humaines optimisées).

Enfin, l'autosuffisance énergétique du bâtiment couronne les efforts du maître d'ouvrage qui le voulait exemplaire, au départ surtout pour son activité propre. Aujourd'hui, il pourrait être une vitrine pour démontrer la possibilité de construire respectueusement.

