


# Atmos building

by Nathalie LEBRUN / 2023-02-20 11:54:27 / Belgique / 86 / FR



**Primary energy need :**  
**37.55 kWh<sub>ep</sub>/m<sup>2</sup>.an**  
(Calculation method : PEB - Wallonie )

**ENERGY CONSUMPTION**

Consumption Range (kWh <sub>ep</sub> /m <sup>2</sup> .an)	Energy Class
< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

*Economical building* (Classes A-C) | *Energy-intensive building* (Classes D-G)

**Building Type** : Other building  
**Construction Year** : 2021  
**Delivery year** :  
**Address 1 - street** : rue du Vivier 16B2 6900 MARCHE-EN-FAMENNE, Belgique  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

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**Net Floor Area** : 516 m<sup>2</sup> SHON  
**Construction/refurbishment cost** : 800 000 €  
**Cost/m2** : 1550.39 €/m<sup>2</sup>

## General information

### Atmos: Offices vs HAPJC housing

The Atmos building was born from the desire to create new offices for their own eponymous architect studio. A desire: to create a showcase building: in line with current energy requirements, and to use wood, to ensure local provenance and a healthy interior. One requirement: respect a tight budget, as any young company must do.

Multi-functional, the Atmos building includes two tertiary areas and two housing units. The tertiary zones, very distinct spatially, are devoted on the one hand to the office of the architects, on the other hand to a modular space intended for medical practices. The housing units are created with two bright apartments.

An assignment reviewed by town planning, a limit by the land

Respecting the town planning requirements was the most important architectural and budgetary constraint. The initial program concerned a commercial building. Located in a suburban street, town planning required the creation of housing in addition to the professional function.

This urban planning constraint, which directly impacted the project, joined another physical constraint, namely the topology of the plot of land. Indeed, the size of the plot, relatively narrow and sloping, did not take this housing factor into account. The architects had to completely revise their program, both in volumetry and in the use of mid-levels. The end is interesting, because an important program could be installed on a small plot, while maintaining the privacy and independence of each.

Scalability: eco-design to anticipate the future

The office spaces have been designed in modular trays, in order to adapt to the needs of the occupants. An initial occupation intended for medical offices provides the necessary comfort for the assignment: 4 offices, a waiting room, toilets, a secretarial space. The offices are nevertheless designed to be switched to other assignments, whether other types of offices or housing (3-bedroom apartment).

The owner also anticipates its potential economic expansion. The two office spaces benefiting from a common entrance, it would be easy in the future to expand their own offices in the current rental space.

Eco-design, with the direct consideration of these subsequent modifications, will make it possible to avoid major work, to deconstruct certain parts: a simple redevelopment will bring the assignment up to date.

#### Link profitability and well-being

The impositions of town planning have given rise to in-depth reflection. It was necessary to make the most of the spaces, in relation to the plot, including the parking areas. The most positive modification was undoubtedly the solution of integrating a mid-level to the building, so that the ground floor is attached to the garden in the rear part. This made it possible to make the most of the space, but also to create a semi-underground area that was very cool in summer, while benefiting from a magnificent working environment with the gardens directly accessible. This completes the architects' initial desire to bring well-being to the workplace.

#### CLT, an unknown solution for the tertiary sector in rural areas

While CLT wood panels are used in urban settings, the region of Belgian Ardennes has almost no tertiary buildings made of wood. The innovation for our architect's office lies in the use of CLT, to show clients what are the technical possibilities and the environmental and personal advantages.

The CLT was also a response to our desire to work in short circuits, using local wood, to promote a good life cycle of the building, with a low-carbon solution, due to its low gray energy, its capacity to store CO<sub>2</sub>. Especially since the elements are prefabricated in the factory, there is no waste on construction sites, and the elevation materials and the frames have environmental labels (biosourced label, FDES and DEP, etc.), while this guaranteed us a truly environmental building. Working with a local company, using local wood: this was a response to the need to promote the economy of the territories from which we come.

## Building users opinion

As the building was recently occupied, we collected two types of opinions.

The first opinion is that of the users of tertiary spaces, both for architectural offices and for tertiary spaces for rent. For the latter, the visual wooden parts bring a warm touch, which allows to bring well-being, serenity, in the appointments. Initially for medical use, it will bring a touch of humanity to a sanitized sector.

In the architectural office, visitors are charmed by the use of visual wood. This element gives architects the opportunity to express themselves on their environmental values, to share them. Employees noted a more pleasant working environment, conducive to concentration and creativity.

A first occupant of the 2 housing cells indicated that visible wood was part of her choice of housing. The warm aspect immediately seduced her, and as soon as she moved in, she felt at home there.

The second type of opinion is paradoxically the non-occupants, namely the neighborhood. The speed of the structural work, thanks to the prefabrication of the CLT wooden elements, enabled them to avoid long inconveniences. They appreciate the integration of the project into the environment. Some don't even feel like it's a new project. Stone facings from the circular economy (recovery) may have something to do with it...

## If you had to do it again?

The project initiated 6 years ago by a very young office of architects and for their own offices, the financial means were very limited. Some choices were restricted by the budgetary side. To be redone, with an even more environmental current motivation, the choice of biosourced insulation, as well as certain interior finishes, would be defined according to environmental criteria.

For the same budgetary reason, the installation of renewable energy production could not be considered. On the other hand, as this stage can be done later, a reflection with budget and optimization study is in progress concerning the addition of solar panels, to achieve the quasi-autonomy of the tertiary volumes.

The choice of solid wood in CLT, wood-aluminum frames, and the overall architecture, would not however be modified. These are strong points, which win very positive opinions.

## Data reliability

Self-declared

## BIM approach

The Atmos project used part of the BIM with the design office Stabilame. Indeed, the Cadwork software performs 3D modeling allowing direct communication of production data to automated machining centers. The information being transmitted fully automatically, there is no risk of error. Stabilame also uses the software to draw the details of elements manufactured by suppliers, such as fittings, roofing sheets, frames, etc. Stabilame files are provided to suppliers, who use them directly for manufacturing, without recopying, again avoiding potential errors.

Stabilame uses the Web GL which allows to send open and measurable files to the architects, like open IFC files, intended for BIM.

## Photo credit

Atmos Architects - Stabilame

## Contractor

Name : Atmos Architectes

Contact : Mr Jean-Christophe PONCELET et Mr Arthur HUART

<https://www.atmos-architectes.be/>

## Construction Manager

Name : Atmos Architectes

Contact : Mr Jean-Christophe PONCELET et Mr Arthur HUART

<https://www.atmos-architectes.be/>

## Stakeholders

Function : Construction company

STABILAME

info@stabilame.be

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

Construction of the closed wooden shell, biosourced certification, FDES and B-EPD

## Contracting method

Separate batches

## Owner approach of sustainability

Since the contracting authority is the project manager (architects), the sustainable development approach is a key factor from the start of the project. An eco-design linked to the scalability of certain spaces (to avoid heavy work or deconstruction), the desire to establish principles of biophilia (well-being at work), take advantage of orientation to avoid overheating of the building, are principles included in architectural design. On the other hand, the selection of natural materials such as solid wood, such as wood-aluminum frames, because these materials sequester carbon and thus participate in the decarbonation of the construction sector, were voluntary philosophical principles. To set an example and motivate their clients to limit their construction impact on the environment

## Architectural description

During contacts with town planning, the latter ordered the architects to add housing units to the initial project, focused on tertiary spaces. The architects then chose to optimize the space on the ground, in width on the ground to preserve an integration in the environment (houses on 2 to 3 levels). This made it a multi-functional building. To preserve the identity of the functions, as well as to increase the privacy of the inhabitants, two separate entrances have been imagined: one to the office spaces, the other for the accommodation.

The vision of sustainability was integrated into the project from the start, with the choice to build in local wood and in short circuits. The selection of a Belgian CLT manufacturer, using local wood, with a production of bonded CLT labeled 98% biosourced, and benefiting from the extension of the "Filière Wallonne" label was essential to validate this principle. The wood was chosen for its local character, but also for its low embodied energy, its prefabrication with minimal waste management. The prefabrication and the large size of the elements allow a rapid construction of the building, with a minimized energy impact on the environment as well. Note also the choice of local frames, also labeled biosourced (70%) and the use of re-used facing stones for part of the facades.

Another factor was decisive for the choice of wood, it is the warm and soothing character, which encourages concentration and increases the well-being of the occupants. To increase well-being at work, the architects first thought of their employees and occupants of the tertiary sector.

## Energy

### Energy consumption

Primary energy need : 37,55 kWh<sub>ep</sub>/m<sup>2</sup>.an

Primary energy need for standard building : 60,50 kWh<sub>ep</sub>/m<sup>2</sup>.an

Calculation method : PEB - Wallonie

More information :

not yet a year has passed so no result given

### Real final energy consumption

Real final energy consumption/m<sup>2</sup> : 26,23 kWh<sub>ef</sub>/m<sup>2</sup>.an

Year of the real energy consumption : 2 019

## Envelope performance

### More information :

walls: glued CLT + insulation + facing (either plaster, limestone or brick)

sloping roofs: insulated box 240 mm

flat roofs: CLT 240 + PIR insulation with integrated slope

Air Tightness Value : 1,19

## Renewables & systems

### Systems

#### Heating system :

- Condensing gas boiler
- Heat pump

#### Hot water system :

- Condensing gas boiler
- Individual electric boiler

#### Cooling system :

- Reversible heat pump

#### Ventilation system :

- compensated Air Handling Unit
- Double flow heat exchanger

#### Renewable systems :

- Solar photovoltaic
- No renewable energy systems

#### Other information on HVAC :

The different units operated are managed differently.

The "architects" offices are exposed South, and benefit from a double flow VMC with integrated cooling, as well as a heat pump. Hot water is produced using a boiler.

The offices of the modular space are semi-buried and will be little exposed to the bright sun (North-West), and do not require cooling thanks to its exposure. The offices in the modular space and the accommodation benefit from single-flow ventilation (easy maintenance), an independent wall-mounted town gas boiler for heating and the production of domestic hot water.

The installation of solar panels was planned in phase 2, with 12 solar panels and high-efficiency inverters, ready for smart grids (project attached)

Part of the work has been designed specifically to work with solar panels.

On the one hand, some special techniques can be connected to solar panels, on the other hand, charging stations for electric cars (available to outsiders) are already installed in the car parks of offices and housing.

## Environment

### Biodiversity approach

The land, located in a rural area, has been the subject of particular attention to the level of the trees.

At the back of the building, a beautiful country maple has been deliberately preserved. In addition to its beauty, it contributes to the natural shade of the building, by protecting the ground floor from the sun in summer.

Plantations were planted just after the construction of the building, on the front, a maple, on the sides, blood dogwoods, and at the back, a Mirabellier (replacing another Mirabellier which had to be cut during the works ). The dogwoods and the mirabelle plum have been specifically selected for their abundant flowering and their reputation as bee plants, in order to promote biodiversity. Indeed, these species particularly attract the black bee, a native species, as well as other pollinating insects.

#### Mitigation actions on soil and biodiversity :

The architecture took the decision to work on the length of the land, and not in depth (attenuation of impact on the soil) leaving a large garden, and therefore the possibility of having greenery on the ground (grass and flowers ) and plantations.

The car parks were made with concrete-grass slabs, which allow soil permeability, and let rainwater percolate naturally in the ground.

### Risks

#### Hazards to which the building is exposed :

- Heatwave

#### Risks measures put in place :

The orientation of the land and the architecture with overhangs prevent the building from overheating. The part of the offices towards the garden is at mid-level and is semi-buried, which allows a natural cooling of the structure. Dual-flow ventilation including a cold cycle helps regulate overheating in the architectural office section, facing south.

The orientation allows natural shelter from the heat, with the exception of the apartment on the second level. To overcome this lack, a reserve in the thickness of the wall allows the installation of blinds in a second phase, in order to increase the comfort of the occupants of this single housing unit concerned. In the principles of bioclimatic, an existing tree before the works was kept at the back of the building, so as to create natural shade in summer, protecting the ground floor from possible hot summer days. (at the end of the day, because North-West exposure).

The offices located on the first level on the rear facade have been fitted with pleated sun blinds, completely adjustable in height (down or up). This maximizes brightness while avoiding glare or heat from the sun. The advantage of this choice is to also be able to lower the blinds downwards, since this facade is rather sensitive to the setting sun: the blinds are therefore rather to be used in summer, with the setting and grazing sun.

## Urban environment

The Atmos building is located in a suburban area, in the suburbs of the small town of Marche-en-Famenne. The area is however quite rural, and benefits, on the back, from large agricultural land, nested in some industrial areas.

The direct proximity of a hospital allows the building to benefit from a good public transport service, by bus, connecting the hospital to the Marloie train station, located 5 km away.

## Products

### Product

Local bonded CLT with biosourced label

Stabilame

info@stabilame.be

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

**Product category :** Gros œuvre / Structure, maçonnerie, façade

Stabilame's glued CLT panels are made from local wood for Belgium and the North-East of France. They benefit from the 98% biosourced label and a B-EPD for Belgium and an FDES for France

The architect collaborators and the first tenants were seduced by the wood, but also by the short-circuit aspect (Belgian production with Belgian wood) and the environmental interest that this implies.



Chassis and facades in RICHE wood-aluminum, labeled biosourced

Menuiserie Riche

commercial@chassisriche.be

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

**Product category :** Second œuvre / Menuiseries extérieures

The wood-aluminum frames of Menuiserie Riche are labeled as 70% biosourced products (80 mm thick) and benefit from an ACV. They have a B-EPD which allows them to be in TOTEM in Belgium, and an FDES which allows them to be in INIES in France.

the wood-aluminum frames are very well perceived by the occupants of the building, because in the walls provided with an interior facing, it brings a touch of wood, in recall with the visible walls in wood in the rest of the building.



## Costs

### Construction and exploitation costs

**Total cost of the building :** 800 000 €

## Circular Economy

## Reuse : same function or different function

Batches concerned by reuse :

- Facades

For each batch : Reused Materials / Products / Equipments :

For part of the facade cladding, the use of stones was preferred. A natural material and symbol of the facade facings of the wealthiest villages in the Famenne, stone was an essential material for this project. In order to limit the environmental impact, reclaimed stones were used. Coming from the circular economy, they were recovered from a demolition site, then recut in a quarry located near the site.

Quantity: 70 m<sup>2</sup>

Field of use and material origin :

origin: La Hazotte quarry (cuts re-use stones)

## Environmental assessment

Impacts avoided : water, waste, CO<sub>2</sub> :

The use of re-used stones made it possible to avoid all excavation and major stone cutting activities. In particular water for pruning, and CO<sub>2</sub> for machines (cranes) and embodied energy for pruning.

## Websites

<https://www.hazotte.be/materiaux/facade-paysage/reemploi/moellons/pierre-bleue/belge>

## Reproductibility and Innovation

Reusing stones is completely replicable. This is a sector of the circular economy that is still little known but easily adaptable to other projects

## Health and comfort

### Water management

no data because the building has just been put into operation

### Indoor Air quality

The indoor air is qualitative, since the majority of the structure is equipped with a VMC.

The technical rooms are dressed in tiles and ceramics, neutral materials.

The wooden frames and doors are labeled A+ in indoor air quality.

In the hall of the tertiary spaces, a tree has been planted, so as to transform carbon into oxygen during the night, which purifies the air for the following day. As the premises are unoccupied during the evening and at night, this forms a virtuous circle.

### Comfort

Health & comfort :

The choice of solid wood (natural materials) for the structure and for the closures (wooden-aluminum frame) makes it possible to obtain a healthy and dry environment. The choice to leave solid wood visible in many places stems from the principles of biophilia, which makes it possible to bring well-being naturally, through the visual wood, to the occupants, just like the presence of the tree in the lobby. The increase in concentration, the reduction in stress and the symptoms of excessive cardiovascular tension are inherent in biophilia (in Workplace: wellness + wood = productivity).

The supply of natural light also promotes well-being and concentration. Thus, large windows are included in the architecture, either by fixed or sliding doors, or by curtain walls (glazed facades).

The atmosphere of the Atmos offices is intended to be relaxed: the frame has been planted "naturally", and the addition of a kicker encourages relaxation between two periods of intense work.

The desks and furniture have been specifically designed, also including visible wood, in order to continue this warm atmosphere and increase the beautiful concentration at work.

The frames of La Menuiserie Riche benefit from the A+ label for indoor air quality, which means that frames made of biosourced materials, painted in the factory, have high indoor air quality.

#### Acoustic comfort :

The acoustic comfort is notably managed by the solid wood in CLT, but also by the qualities of certain materials and their implementation and by the architecture.

Two types of acoustic insulation are to be taken into account: vertical insulation and interior insulation.

The vertical, through floor insulation is very good. Use between the apartments is a priori very comfortable (little step back since the building is recent): but walking on the floor of the apartment located on the ground floor +2 cannot be heard at all in the apartment located just below. Both 240mm and 120mm bonded CLTs were used, depending on the spans.

The interior acoustic insulation, which is more a matter of comfort, is very good in use. No echo phenomenon noted, and the use of open-space in offices makes it possible to really express satisfaction with the absorption of noise by wood.

The sound insulation from the street is also managed by the closing elements. The wooden aluminum joinery is equipped with triple strikes, a double acoustic seal. Very good compression, the frames have been tested at the CSTC (Scientific and Technical Center for Construction, in Belgium), with excellent results in AEV and acoustic tests. Like all joinery, the implementation is also essential for the acoustic quality, and the result lives up to expectations: excellent.

The architecture contributes to the success of acoustic comfort. Having established two different entrances for the tertiary units and those for housing, and having composed these two very distinct blocks allows the units to benefit from their own comfort, without suffering the nuisance of the comings and goings of other assignments.

#### Temperature level :

The temperature levels are calculated according to the needs of the seasons and the occupants.

In winter, an average of 19 degrees is recommended, but each unit is independent.

The 'architects' tertiary part benefits from a double flow VMC with cooling in summer (south orientation).

The 'modular space' tertiary part, being located North-West and semi-underground, will never overheat in summer, a simple VMC has been installed, and the heating is independent, produced by an individual gas boiler from city.

Similarly, the accommodations are independent with a simple VPC and an individual town gas boiler for each apartment.

In this context of a multi-functional building, it was important that each structure be independent to optimize the appropriate temperatures because the needs are not identical. According to the orientation of the unit, according to its use during the day (offices) or in the evening (apartments), according to the temperatures desired by the required activity.

#### Humidity control :

VMCs have been installed to extract the humidity produced in wet rooms: kitchens, bathrooms, toilets, etc.

Wood construction does not generate humidity, unlike concrete blocks and cementing. It is a directly exploitable structure, without the need to evacuate the masonry water.

In addition, the choice of solid wood, as well as an adapted wall complex, allows the wood to take up some of the natural humidity of the ambient air.

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#### Visual comfort :

As indicated above, visual comfort was taken into account from the start of the project. On the one hand by choosing to leave partitions with visible wood, to bring well-being and a feeling of comfort, on the part of the material (touch and visual). On the other hand, the choice to increase the light entrances, through large windows, increases visual comfort with great interior clarity.

#### Ergonomic design :

The slope of the land prompted the architects to install the building with mid-levels.

Each unit is spread over a single level, making them easy to use spaces: housing units (apartments) are on a single level, offices and modular spaces are also on a single level. Note that the architects' office has a meeting room for videoconferences in the basement, on the mid-levels, so we can consider that this unit is dispatched over the 2 levels.

The advantage of the mid-level is that each unit (except one) is accessible by a few steps, instead of having units on one level and all the others with two flights of stairs. For the architects' office, access to the open workspace, or to the meeting room, is accessible from the entrance via the mid-levels, which is very comfortable for visitors.

## Quality of life and services

The architecture was designed to both separate and unite. The units are of two types: tertiary and housing.

The separation is a spatial separation, the tertiary spaces being accessible by the left entrance, common to the two tertiary units. It is therefore a passage used mainly during the day. The housing units benefit from a different entrance, this allows them to have a respected privacy, and limited access to their building (no appointments relating to offices in their own structure).

Nevertheless, the units have a common space, it is the garden. Accessible by the modular tertiary space and by the architect tertiary space by the building, it is accessible from the side for the apartments and can be used on weekends. This is really a sharing of common space, respecting everyone's schedules and biodiversity.

Another shared space, which is itself a service, is the car park, designed to accommodate electric cars, with semi-fast charging stations, usable by everyone. (6 terminals in all). At a time when electric cars are increasing but without many terminals being accessible in rural areas, the possibility of quickly recharging your electric car with shared terminals is a very valuable service.

## Carbon

### General infos

The choice of solid wood for the construction makes it possible to affirm that it is a construction which participates in the decarbonation of the construction sector.

The project includes 78.8 m<sup>3</sup> of wood for the structure, not including the frames and finishes. This means, taking into account the calculation of the LCA of the bonded CLT panels, that we can count a sequestration of 59.10 tonnes of CO<sup>2</sup>.

And this without having emitted as so much gray energy as other more polluting materials.

In addition, 6 semi-fast charging stations, open to all users, have been installed in the building's car park. This also contributes to the non-proliferation of GHGs, and allows the use of energies used in the Belgian energy mix.

These terminals are intended to be connected to the solar panels planned in phase 2, in order to be self-sufficient in energy for part of the building (tertiary part) and for the vehicle charging terminals.

### Ic Energy

Ic Energy : 3,79 KgCO<sub>2</sub> /m<sup>2</sup>

### Carbon sink

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### Initiatives promoting low-carbon mobility

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### GHG emissions

GHG in use : 3,79 KgCO<sub>2</sub>/m<sup>2</sup>/an

Methodology used :

PEB

### Life Cycle Analysis

Material impact on GHG emissions :

Les matériaux d'élévations sont en bois massif CLT collé, et ont fait l'objet d'une ACV, avec B-EPD (déclaration environnementale de produit). Tout comme les châssis en bois-aluminium. Leur impact sur les émissions de GES, comme les autres impacts, ont donc été clairement définis et sont disponibles dans la B-EPD (également dans une FDES, pour les 2 matériaux cités). Le parement en pierres, a été réalisé avec des pierres de ré-emploi, issues de l'économie circulaire géré par une structure wallonne (circuits courts). La construction en CLT collé comptabilisant 78 m<sup>3</sup> de bois, on peut conclure à une séquestration CO<sup>2</sup> de 59 tonnes, ce qui épargne autant de GES.

Eco-design material :

The eco-materials used are in the closed wooden shell, which makes up the majority of buildings. Wood: in the form of glued CLT for walls and floors, in roof boxes. The frames are made of solid wood, with an aluminum cover, which has made it possible to integrate spruce, a local wood species with high thermal



performance. Both the glued CLT elements and the wooden aluminum frames benefit from the biosourced label (glued CLT: 98% - Wood-aluminium frame: 70%) and an ACV with B-EPD.

Part of the facings were made with natural stones, from the re-use sector.

## Contest

### Reasons for participating in the competition(s)

The "Immeuble Atmos" project is a medium-sized multifunctional building. It is to be underlined because often these mixed projects are carried out in larger-scale projects.

It falls within the scope of the Green Solutions Awards due to its multifunctionality, but above all due to its biosourced nature, its labels, its architectural research in favor of the climate and the comfort of its occupants.

Thus, the materials used for its elevation (walls, floors, under-roof) and for its exterior joinery, are labeled biosourced and benefit from FDES (INIES base in France) and B-EPD (for the TOTEM program in Belgium). These wood materials participate in the decarbonation of the building, thanks to carbon sequestration, which can be calculated thanks to the LCA carried out.

The architecture also makes it possible to integrate the competition, through its eco-design in scalability for part of the building, its search for anti-overheating solutions, as well as its attention to the well-being of the occupants, through biophilic processes and increase in brightness.



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