


## House of the Environment

by Jean-Baptiste Ferrari / 2023-02-28 10:46:45 / International / 57 / EN

New Construction



Primary energy need :  
**11.4** kWhpe/m<sup>2</sup>.year  
(Calculation method : Other)

**ENERGY CONSUMPTION**

Economical building

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building **A**

**Building Type** : Office building < 28m  
**Construction Year** : 2021  
**Delivery year** :  
**Address 1 - street** : Av. de Valmont 30b 1010 LAUSANNE, Switzerland  
**Climate zone** : [Dfb] Humid Continental Mild Summer, Wet All Year

**Net Floor Area** : 2 512 m<sup>2</sup> Other  
**Construction/refurbishment cost** : 18 330 000 €  
**Cost/m2** : 7296.97 €/m<sup>2</sup>

Certifications :

MINERGIE-ECO® MINERGIE-P®

### General information

En français

The Maison de l'Environnement brings together the offices of the DGE, which were previously scattered over several sites. The result of a competition as a total enterprise, it was able to seduce with a rational form but with an emblematic materiality that echoes the concerns of the DGE. In addition to the requirement to use wood from cantonal forests, the two atriums are highlighted by a raw earth construction. At the heart of the project, they bring the MEV to life both functionally and socially.

See more details about this project

<https://www.ferrari-architectes.ch/portfolio/maison-de-lenvironnement>

BIM approach

The client did not have any requirements in this respect, but on the initiative of all the contractors, in particular the timber engineers/carpenters who model and process the timber structure on the basis of 3D programmes, the project was designed on revit with an exchange of models to facilitate technical and spatial coordination.

## Photo credit

Duccio Malagamba

## Stakeholders

### Contractor

**Name :** DGIP - direction générale des immeubles et du patrimoine

**Contact :** +41 21 316 73 00 / info.dgip[a]vd.ch

<https://www.vd.ch/toutes-les-autorites/departements/cheffe-de-departement/direction-generale-des-immeubles-et-du-patrimoine-dgip>

### Construction Manager

**Name :** Ferrari architectes Lausanne SA

**Contact :** +41 21 311 72 72 / secretariat[at]ferrari-architectes.ch

<https://www.ferrari-architectes.ch/>

### Stakeholders

**Function :** Construction company

JPF entreprise générale SA

+41 26 919 72 72 / secretariat[a]jpf.ch

<https://www.jpf.ch/>

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**Function :** Other consultancy agency

Monod - Piguët + associés

+41 21 613 40 20 / info[a]mpaic.com

<https://mpaic.com/>

Civil engineer - concrete

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**Function :** Other consultancy agency

JPF-Ducret SA

+41 26 919 72 82 / secretariat[a]jpf-ducret.ch

<https://jpf-ducret.ch/>

Civil engineer - wood

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**Function :** Thermal consultancy agency

Weinmann Energies

+41 21 886 20 20 / info[a]weinmann-energies.ch

<https://www.weinmann-energies.ch/>

heating-ventilation-sanitary engineer + MCRG

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**Function :** Other consultancy agency

Marmy-pme sarl

+41 26 552 52 52 / info[a]marmy-pme.ch

<https://www.marmy-pme.ch/presentation.html>

Electricity engineer

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**Function :** Other consultancy agency

Bois Initial

+41 21 802 35 35 / contact[a]bois-initial.ch

<https://bois-initial.ch/>

Fire protection engineer

Function : Others

Paysagestion

+41 21 331 23 23 / info[a]paysagestion.ch

<https://paysagestion.ch/>

Landscaper

Function : Company

Terrabloc

info[a]terrabloc.ch

<https://www.terrabloc.ch>

Study + supply of raw earth bricks

## Contracting method

General Contractor

## Type of market

Realization

## Building users opinion

The building corresponds to the avant-garde but pragmatic image that the Directorate-General for the Environment is trying to project. The soothing character given by the use of raw natural materials and the abundance of natural light is often emphasised. Users feel comfortable in their working environment, as demonstrated by their appropriation of the informal communal spaces, for example by the display of their collections in the contemplative atrium. On the subject of climate management, during the heatwave in the summer of 2022, the efforts made, particularly in terms of night-time cooling, bore fruit, as the indoor temperature was significantly lower than the outdoor temperature.

## Energy

### Energy consumption

Primary energy need : 11,40 kWhpe/m<sup>2</sup>.year

Calculation method : Other

Breakdown for energy consumption :

Sustainability of the construction (grey energy).

With the targeted labels, the indices for the use of non-renewable energy and for CO<sub>2</sub> emissions were evaluated. These indices include all the (grey) energy emissions induced by the construction of the Maison de L'Environnement VD:

- Use of non-renewable energy: 139 MJ/m<sup>2</sup>year
- Greenhouse gas emissions: 10.51 kgCO<sub>2</sub>eq/m<sup>2</sup>year

### Envelope performance

More information :

Energy Reference Area (ERA): 4,331 m<sup>2</sup>

Form factor: 1.05

Limit value 380/1 Qhli: 28.7 kWh/m<sup>2</sup>\*year

Minergie P limit value: 20.1 kWh/m<sup>2</sup>\*year

Heat requirement Qh: 19kWh/m<sup>2</sup>\*year

## Renewables & systems

### Systems

Heating system :

- Geothermal heat pump

- Radiant ceiling

#### Hot water system :

- Heat pump

#### Cooling system :

- Geothermal heat pump

#### Ventilation system :

- Natural ventilation
- Nocturnal ventilation
- Double flow heat exchanger

#### Renewable systems :

- Heat Pump on geothermal probes

#### Other information on HVAC :

The system draws its energy from the ground, through eight 250 m long geothermal probes placed under the building's car park. The energy from the ground is used by a water-to-water heat pump. The latter partly consumes the electrical energy produced by the 67 kW photovoltaic solar system installed on the roof.

The heat is then distributed in the building via a system of radiant panels: panels that look like false ceilings are integrated between the wooden joists. These panels not only act as soundproofing, but also provide heating and cooling in the rooms.

The small amount of domestic hot water is produced by an air-water heat pump, which draws its primary energy from the ambient air of the technical room in which it is located.

The House of the Environment is not air-conditioned, meaning that it does not include a machine to produce cold. If certain actions are necessary on the part of the users - such as opening the windows for natural cooling or appropriate management of the solar protection on the façade glazing - the concept integrates a geocooling system. The geothermal probe field allows for the re-injection of the heat removed from the building. This represents an energy-efficient way of cooling the work spaces, while recharging the land for the next cold season, thus guaranteeing its long-term use.

Double flow ventilation supplies and extracts air from the building mechanically. A heat recovery system limits heat loss.

## Smart Building

#### BMS :

A good visualization of the functioning of the building's technical installations is fundamental to allow an efficient operation and optimizations to reach the targeted performances. The metering and regulation system installed ensures the follow-up of the energy optimisation mandate according to the will of the State of Vaud. Due to its heat production by heat pump, the Maison de l'Environnement consumes only electricity. The first year of operation has shown pleasing performance, which will certainly be further improved in the years to come.

## Environment

### Biodiversity approach

To the south of the site, under an existing high-voltage line that could not be moved, a ditch was created. This allows for the reuse of both the rainwater retained on the roof and the pumped groundwater under pressure. This ditch is connected to the existing biotope to the east of the site and, a little further on, to the Vuachère watercourse. The installation of networks favours the development of amphibians as well as the passage of migratory birds on the site.

The roof is extensively vegetated in accordance with the directives of the city of Lausanne (local species). Specific facilities (floating wooden mounds from Lake Geneva) are created to resemble a natural habitat and thus encourage biodiversity.

Only indigenous species and grassland are used to plant the exterior landscaping.

### Urban environment

The Vennes district offers a very heterogeneous urban landscape that is currently undergoing major changes. While new office buildings are emerging from the ground on this vast wasteland, the outdated buildings of the former croisettes farm are the agricultural remains of the 19th century. The site chosen for the Maison de l'Environnement is located at the interface of these two scales of construction. By its size, the project offers an intermediary scale and makes it possible to link these two entities.

With its compact form, the volume is positioned at the edge of the plot to give pride of place to the surrounding vegetation and allow for future extensions to the north.

User mobility is facilitated by a car-sharing system and the proximity of the metro.

## Resilience

In its quest for passive operation, the Maison de l' Environnement also integrates a natural ventilation system in the atriums. The work spaces are organised around a core made up of two planted atriums. This core is both the spatial heart of the project and the element that regulates the indoor climate. The two "lungs"

of the building provide natural ventilation through a chimney effect, while their thick mud walls contribute to thermal comfort and regulate humidity levels through an inertia effect. Motorised windows have been installed at the top of the atria and on each floor.

and on each floor. In summer, the system will 'play' with these vents - mainly at night - to bring coolness into the building, as one would in a flat. In the morning, users can also manually open the windows to increase cooling.

Land plot area : 70 933,00 m<sup>2</sup>

## Products

### Product

Terrabloc - raw earth building products

Terrabloc

info[a]terrabloc.ch

<https://www.terrabloc.ch/contact-kontakt>

Product category : Structural work / Structure - Masonry - Facade

Compressed clay bricks

This solution, already presented during the competition phase, was received very enthusiastically by the jury and by the users. The idea of being able to reclaim the land from the site, which could not be realised due to weather / planning issues, had a strong emotional impact on the attachment to the project. The development of terrapads with more generous dimensions (15\*30\*80) than the basic modules (12\*25\*6) made it possible to implement modules on a scale more consistent with the size of the atriums. The terrapads were designed so that two workers could lift a pad to implement it. This implementation was first tested on a 1:1 scale prototype made in the workshop. The masons in charge of the installation were trained and monitored by terrabloc in order to optimise the installation, the size and the treatment of the joints.



Heat pump

Meier Tobler

021 943 02 22

<https://www.meiertobler.ch/fr>

Product category : HVAC, électricité / heating, hot water

Heat is produced by a heat pump with a nominal power of 86.7 kw. This heat pump is connected to a geothermal probe field (8x250m). The heat pump is reversible, so it is also possible to produce cold with this machine. However, this option is not relevant for this project.

The solution is well accepted by the users, who have entrusted the CVS engineer with an additional mandate to follow up and monitor the settings for the entire MCRG (measurement, control and regulation) installation.

## Costs

### Construction and exploitation costs

Total cost of the building : 18 725 000 €

## Circular Economy

### Reuse : same function or different function

For each batch : Reused Materials / Products / Equipments :

- 2300 m<sup>3</sup> of which 80.4% concrete from recycling - 90% from the canton of Vaud and 10% from the canton of Fribourg;
- 234 m<sup>3</sup> of soil - recycling of Vaud excavation soil.

Field of use and material origin :

- Concrete for foundation & basement, very fine source accuracy, 100% traceability;
- Earth: atrium walls, very precise sources, 100% traceability;

- Wood: 91% of the wood used for the facades + structure comes from the cantonal forests (Vaud) and was selected and cut according to the needs of the project. An additional 6% comes from Switzerland and the remaining 3% comes from Spain (oak for the structural frames of the atriums).

## Additional information (PDF documents)

### Health and comfort

#### Water management

A rainwater harvesting system ensures the watering of the tree and plants in the two atriums. Unlike a conventional implementation, which involves pumping water from a basin in the basement, the Maison de l'Environnement takes advantage of its height and the roof retention concept to ensure gravity watering. The native species are thus subjected to the weather outside. If it rains outside, we water inside.

#### Indoor Air quality

[Results of the tests on air quality](#)

#### Comfort

##### Humidity control :

The hygroscopic properties of wood are counterbalanced by the use of raw earth which, thanks to the vegetation in the atriums, regulates the humidity level of the ambient air.

##### Acoustic comfort :

The details ensuring optimal acoustic comfort were monitored by a specialist acoustician. Thus, the materials, the composition of the various elements, particularly the partitions, and their connection to the structure have been carefully studied to avoid the transmission of noise between rooms. Perforated panels with sound-absorbing insulation ensure the interior acoustic comfort of each office.

##### Visual comfort :

Numerous windows opening onto the landscape and the surroundings ensure constant contact with the outside. These windows, positioned at the top of the rooms, combined with light-coloured interior paintwork, limit the need for artificial lighting. Adjustable sunshades and dimmable floor-mounted luminaires equipped with presence detectors (one per workstation) make it possible to modulate the intensity of the lighting.

The glass roofs associated with the atriums ensure that natural light penetrates to the heart of the building and the corridors.

This soft but constant luminosity, combined with the natural materiality, generates a soothing atmosphere that is greatly appreciated by users.

##### Ergonomic design :

Although currently very partitioned, the building has been designed to evolve with the working methods and needs of the users. The partitions are laid on top of a screed so that they can be easily removed and spaces can be brought together. Each department can manage the spaces independently: by allocating places by name, by bringing people together in ad hoc work groups, or by generalising desksharing.

#### Quality of life and services

In order to encourage exchanges between the services of the DGE (Directorate-General for the Environment), which were previously dispersed over several different sites, informal spaces are proposed on each floor. Sometimes these are benches overlooking the atriums, sometimes they are corridors that expand to become coffee corners, open archives, consultation areas, etc.

This reflection is continued in a punctual way through the exterior fittings, where large benches allow users to meet in the sun.

### Carbon

#### General infos

The main materials have been traced for transparency and to measure and encourage the reduction of environmental impacts.

#### Carbon sink

To echo the MO's desire to use wood from cantonal forests, this material was maximised throughout the construction, reducing the impact of concrete only in the basement.

Local materials (wood and raw earth) were used in a raw manner, with little processing. In accordance with the Minergie ECO label, the materials selected for the finishing work (floors, paints, etc.) guarantee low pollutant emissions and a healthy indoor climate.

## Initiatives promoting low-carbon mobility

Due to the proximity of the metro (350m), a minimum number of parking spaces is provided by the project (36 in total for 185 employees). In addition, a car sharing system is available for business trips.

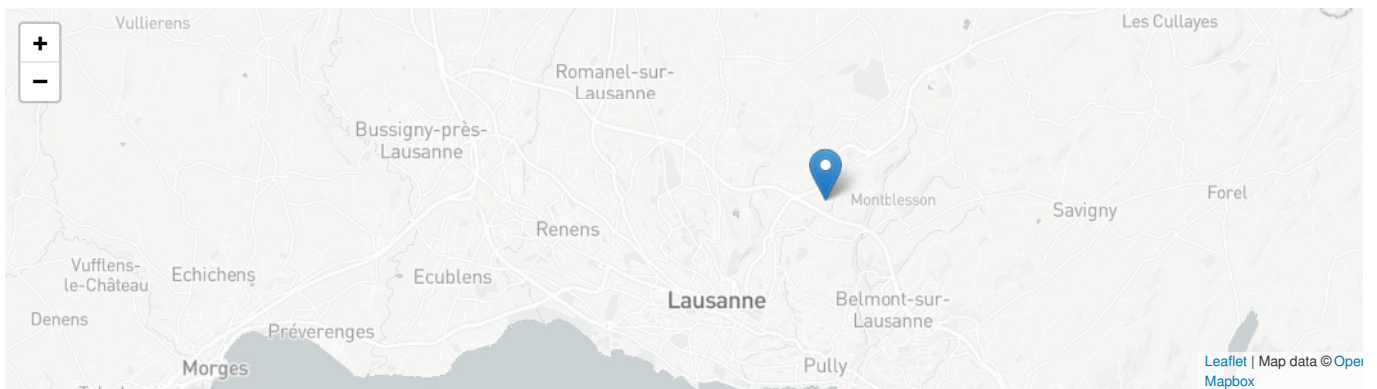
## GHG emissions

GHG in use : 10,51 KgCO<sub>2</sub>/m<sup>2</sup>/year

## Contest

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

Respect for the environment and the implementation of rational, functional but proven techniques have always been at the centre of our concerns during the study and realisation of the House of the Environment. To be able to confront other achievements with the same issues at heart at an international level and to be part of an extensive database is for us a guarantee of learning and a source of discoveries that can be implemented in future projects.



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