

# BIOTOPE project

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**Building Type** : Office building < 28m  
**Construction Year** : 2018  
**Delivery year** : 2019  
**Address 1 - street** : 94 boulevard des Cités Unies 59000 LILLE, France  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 31 723 m<sup>2</sup> SHON RT  
**Construction/refurbishment cost** : 91 000 000 €  
**Number of Work station** : 1 400 Work station  
**Cost/m2** : 2868.58 €/m<sup>2</sup>

## General information

BIOTOPE is an exemplary project, with a very efficient environmental level. This desire to create a sustainable and resilient building has been supported by the award of 5 of the most demanding sustainable certifications: BREEAM Excellent, WELL Gold, BiodiverCity, WiredScore and E + C-.

2 strong axes of the project:

### **Energy**

The low carbon impact and energy performance of the project have been valued by an avant-garde French label foreshadowing the next French thermal regulation: E+C-. The double skin facade of BIOTOPE participates in the bioclimatic design of the building; its connection to the city's heating network, its groundwater geothermal energy for heating and cooling by geocooling contributes to energy excellence. Numerous dynamic thermal simulations have been carried out in order to justify this high performance design. They made it possible to obtain grants from ADEME, the French agency for ecological transition.

### **Biodiversity**

Biodiversity is the strong marker of the BIOTOPE project, the building offers an incredible diversity of habitats and an omnipresent biophilia: 7 roof terraces, 2 green walkways, 30 m<sup>2</sup> of vegetable garden, 3000 m<sup>2</sup> of green spaces, water points, balconies and a green square. The greening of the outdoor spaces is the result of a reflection that was carried out from the design of the building and still is today thanks to a biodiversity management plan over the first 5 years of operation of the building.

## Sustainable development approach of the project owner

First imagined as part of the Lille application to host the European Medicines Agency, BIOTOPE was designed with current best practices to accommodate many employees.

The environmental ambition was high. The project team, made up in particular of Bouygues Bâtiment Nord-Est for its client Linkcity, had this ambition upstream of construction, in order to guarantee quality environmental performance.

Valorization of renewable energies (geothermal energy and heating network), implementation of a passive design, air quality control consisting of a flow rate of 36 m<sup>3</sup> / h / person and taking into account the management of soft transport located nearby: these are the key actions of the project.

Biotope is the culmination of many objectives:

- a connectivity service that stands out for the excellent quality of its wired infrastructure, mitigating the risks of failure of telecom services and improving the resilience of the building.
- energy and carbon performance through its qualities in renewable energies and its heating network. Obtaining the E + C- label has enabled the Biotope to be a true pioneer building, the label foreshadowing the new environmental regulations of 2020.
- quality of use of the building thanks to biomimetic and high ecological quality fittings; and the guarantee of thermal comfort (via an STD), lighting comfort (via an FLJ) and acoustic comfort (via a study of ambient noise and sound insulation).

After 1 year of development and 19 months of work, BIOTOPE is a success being a resilient building, creator of value for its users and the environment.

## Architectural description

New icon of the Lille skyline, BIOTOPE draws a silhouette that is recognized in the urban landscape of Lille. Several architectural choices have contributed to this by making BIOTOPE a new urban signal.

*Volume optimization:*

The volume is cut, twice, to allow an optimized use of daylight in the building. These devices also make it possible to establish a dichotomy in the writing of the facades, thus breaking with the effect of length and the monotony that a traditional office building could inspire. The indentations draw a few curves in the volume, conducive to creating a microclimate and promoting vegetation on the balconies protected from the westerly winds.

*Active roofs:*

The interplay of terraces, at the level of the various roofs of BIOTOPE, gives offices unobstructed views and access to outdoor planted spaces. The project thus develops an urban facade and creates a green facade effect.

*Green continuity:*

The green spaces start from the forecourt up to the various terraces and balconies, passing through the atrium of BIOTOPE. This green continuity offers visitors and employees a direct and unique link to nature, inside and out, unifying the architectural ensemble within a harmonious public space.

*Envelope:*

The facade of the building is a concept of breathable double-walled panels made up of two consecutive window frames. This high-tech product is among the most modern and efficient facade systems today. These advantages are very fast and high precision assembly, and also high thermal performance (an STD has demonstrated an 11% gain in energy consumption thanks to this double skin facade compared to a conventional double glazing). The envelope protects the building from seasonal climatic variations: Protective in summer (sunshade and natural ventilation in the boxes), as in winter (buffer space, solar gain). It contributes to the thermal regulation of the interior of the building.

*Materials:*

All the materials used have an A or A + label indicating a low emission of volatile pollutants into the indoor air of BIOTOPE.

## See more details about this project

<https://www.lillemetropole.fr/votre-metropole/grands-projets/grands-projets-dequipements/biotope-le-siege-de-la-metropole>

Photo credit

Alan Bragado, Martin Sénéchal, BBNE



## Stakeholders

### Contractor

Name : Linkcity  
Contact : William Delmas  
<https://www.linkcity.com/>

### Construction Manager

Name : Henning Larsen  
Contact : Søren Øllgaard  
<https://henninglarsen.com/en>

### Stakeholders

Function : Construction company  
Bouygues Bâtiment Nord Est

Philippe Poustoly

Function : Certification company  
ELAN

Alan Bragado

<https://www.elan-france.com/>

## Energy

### Energy consumption

Primary energy need : 76,10 kWhep/m<sup>2</sup>.an

Primary energy need for standard building : 122,70 kWhep/m<sup>2</sup>.an

Calculation method : RT 2012

Breakdown for energy consumption : Cep heating 17.10 kWhep / m<sup>2</sup> Cep cooled. 8.20 kWhep / m<sup>2</sup> Cep DHW 7.00 kWhep / m<sup>2</sup> Cep lighting 13.60 kWhep / m<sup>2</sup> Auxiliary vine 30.20 kWhep / m<sup>2</sup>

### Envelope performance

## Renewables & systems

### Systems

Heating system :

- Urban network
- Geothermal heat pump
- Radiant ceiling

Hot water system :

- Urban network

Cooling system :

- Water chiller
- Geothermal heat pump
- Radiant ceiling

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Heat pump (geothermal)

### Smart Building

BMS :

BMS and smart meters via a metering plan by use and zone.

Building ready to accommodate any type of connected system thanks to its network architecture optimized under the WiredScore label.

## Environment

### Urban environment

Land plot area : 10 404,00 m<sup>2</sup>

Green space : 3 000,00

BIOTOPE is a new urban signal and enjoys a location giving it a symbolic position with strong markers:

- commercial: in the heart of the 3rd business district in France, Euralille
- history and events: attached to the Grand Palais
- institutional: attached to the Hotel des regions

Perfectly located in the heart of Lille, BIOTOPE promotes soft mobility in the city by being close to TGV stations, the metro and bus lines. Arrangements, such as a xx m<sup>2</sup> bike room on 2 floors, electric charging stations and the creation of a cycle path also promote less carbon-intensive mobility.

## Products

### Product

Prefabricated sanitary ware

Ossabois

<https://www.ossabois.fr/>

Product category : Second œuvre / Plomberie, sanitaire

One of the innovations of the project was the creation of prefabricated sanitary blocks. The 76 sanitary blocks were built off site and arrived with all their finishes (earthenware, washbasins, mirror, hand dryer, etc.) and sanitary equipment. Only the connection was necessary. This site innovation has made it possible to reduce waste, optimize the work schedule and lower the carbon impact.



Very well accepted. Time saving on the site planning.

## Costs

## Health and comfort

### Water management

Consumption from water network : 32 855,00 m<sup>3</sup>

Water Consumption/m<sup>2</sup> : 1.04

Water Consumption/Work station : 23.47

Hydro-economical system set up, with low flow rates

### Indoor Air quality

A set of pollutant measurements was carried out in order to meet the demanding thresholds of the WELL label. All ventilation systems meet current best practices: high heat recovery efficiency, efficient filtration of the outside air and sizing to improve air quality for users with a flow rate of 36 m<sup>3</sup> / h /nobody. Also note: the drafting of an indoor air quality plan, a clean site charter, the use of non-polluting materials (A + label), ban on smoking on terraces, ban on pesticides, no combustion on the site,...

### Comfort

Health & comfort :

The Biotope improves the quality of use of the building thanks to biomimetic and high ecological quality fittings. Several measures have thus been created to make biodiversity a strong axis of the well-being of users: terraces for recharging your batteries or working, fruit tree species, creation of a vegetable garden with the provision of tools, wetlands for the creation of an island of freshness and an educational course on the theme of biodiversity.

Numerous technical studies have also been carried out in order to guarantee users: thermal comfort (via an STD), lighting comfort (via an FLJ) and acoustic comfort (via a study of ambient noise and sound insulation). The building has been optimized following these studies to meet all of these comfort issues.

Calculated indoor CO<sub>2</sub> concentration :

Présence de sondes CO<sub>2</sub> dans les espaces de réunion afin de moduler le débit de ventilation et de conserver un taux de dioxyde de carbone inférieur à 800 ppm.

Calculated thermal comfort : Indices PMV/PPD en accord avec la norme EN 15251:2007, catégorie II

Acoustic comfort : Noise from outside or repetitive noise can be a source of stress, especially in urban areas. Preventing noise from outside and preventing it from entering buildings can help improve occupant well-being and comfort:

- Acoustic studies were carried out from the design phase by an acoustician. Several measurements have been carried out by the IWBI (certification body WELL), in terms of the intrusion of exterior noise. The average sound pressure level caused by the exterior does not exceed 50 dBA.

HVAC systems and occupants are the main sources of indoor noise. As offices and workspaces are increasingly designed to promote employee interaction, acoustic comfort may decrease, especially when different types of users share space:

- Acoustic studies were carried out from the design phase by an acoustician. The sound levels of HVAC equipment were measured by the project acoustician and the IWBI in order to verify the different thresholds of the WELL standard.

Daylight factor : FLJ respecté dans le cadre du BREEAM / Autonomie lumineuse respectée dans le cadre du WELL

## Carbon

### GHG emissions

Methodology used :  
As part of the E+C- label

### Life Cycle Analysis

## Contest

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

The design and implementation of the BIOTOPE project were carried out following a strategy of resilience in the face of climate change, mitigation and adaptation. &nbsp;

#### **Mitigation contributing to the fight against climate change by limiting its carbon emissions:**

&nbsp;

BIOTOPE is a high energy efficiency building limiting its consumption thanks to a bioclimatic design (orientation, double skin facade with a buffer role, sun shade). This virtuous concept is coupled with high-performance energy systems based on renewable energies (groundwater geothermal energy, geocooling, connection to the heating network with an energy mix soon at 50% RE). This entire approach has been enhanced by the E + C- (E2C1) label, foreshadowing the future 2020 environmental regulations.

&nbsp;

Thanks in particular to its pole structure / beams, BIOTOPE was designed as a modular and adaptable building improving its durability. A change in the use of the building would therefore require less work that generates waste and emits carbon. &nbsp;

&nbsp;

Biotope also contributes to limiting the impact of waves of heat by creating an island effect of freshness on the scale of the building but also of the district. The incredible biophilic density of the project will help reduce temperature peaks thanks in particular to the 3000 m<sup>2</sup> of green space, its water points on the terraces and its green balconies.

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#### **An adapted building anticipating the future effects of climate change to be more resilient:**

&nbsp;

BIOTOPE ensures the thermal comfort of these occupants. A dynamic thermal simulation was able to demonstrate this from the design phase and was confirmed by tests carried out by a third party when the building was delivered. In order to guarantee this thermal comfort throughout the life cycle of the building, these simulations carried out took into account a meteorological file of climatic anticipation by 2050. The thermal comfort was thus validated thanks to the indices of the targeted environmental certifications. / div>

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The large vegetated areas of the project, in addition to the benefits already mentioned and the improvement of the building's inertia, makes it possible to facilitate the management of rainwater by limiting it the discharged flows (evaporation in particular).

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The structure of the building has also been designed to best respond to climatic hazards (snow, wind), earthquakes and temperatures extremes.

&nbsp;

BIOTOPE ensures digital resilience thanks to the redundancy and the quality of its connected services, verified by the WiredScore label. &nbsp;

### Building candidate in the category



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