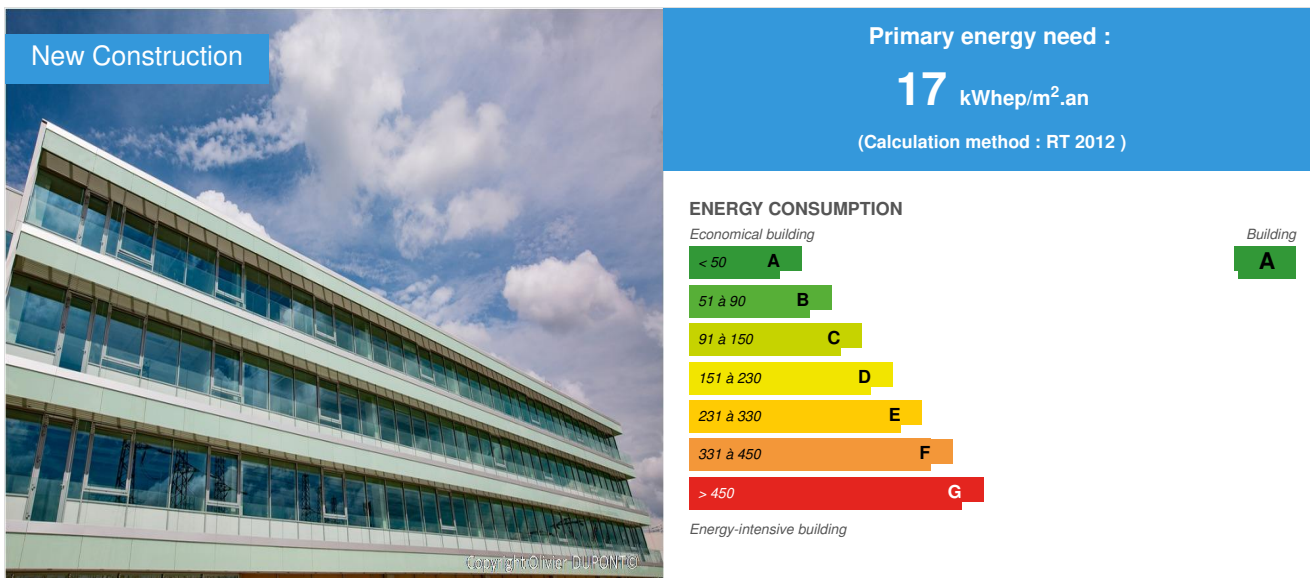


## L6, The Energy and Positive Water Laboratory

by Jérémy GARCIA / © 2018-06-13 20:33:19 / Francia / © 11105 / FR



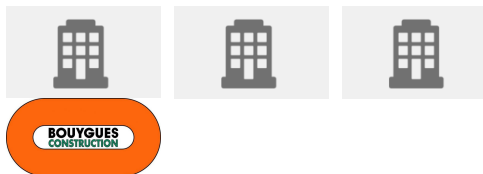
**Building Type :** Office building < 28m  
**Construction Year :** 2018  
**Delivery year :** 2018  
**Address 1 - street :** 188 Rue Paul Hochart 94550 CHEVILLY-LARUE, France  
**Climate zone :** [Dfb] Humid Continental Mild Summer, Wet All Year

**Net Floor Area :** 5 913 m<sup>2</sup>  
**Construction/refurbishment cost :** 20 000 000 €  
**Number of Work station :** 120 Work station  
**Cost/m2 :** 3382.38 €/m<sup>2</sup>

**Certifications :**



**Proposed by :**



### General information

After acquiring 2 hectares of parcels that were formerly composed of scrap yards, the L'OREAL Group's Research & Innovation site is building its new research laboratory, the L6, with a twofold objective: environmental excellence and employee well-being.

Chemists, biochemists or biomechanics will join this new building of 5,000 m<sup>2</sup> spread over three levels. As a model in terms of innovation, integrating digital in all its tools, the building will be flexible and removable, which will stimulate creativity and improve collaboration.

The building has integrated the HQE label, obtaining on the programming and design phases, the maximum rating of "Exceptional". A BEPOS Effnergie approach is also underway (excluding process needs), and the project has just won the ADEME call for projects for the Negative Carbon Positive Energy (E + C-) experiment. The construction, federated around a low nuisance building charter, was based around a BIM model (3D building). It facilitated the organization of the

work of the various trades, but also to better understand the maintenance phases during the operation of the building.

The L6 will produce more energy than it will need for its operation (BEPOS frame, out of process). High-performance passive building, 1,500 m<sup>2</sup> of photovoltaic panels adorn the roof and the outdoor parking. A wind tree about 9 m high will recover energy through small wind blades and will serve to raise awareness of renewable energy. In the continuity of what we have already undertaken on the site, the waters of activity of the building will be purified by a system of basins planted, the rainwater collected in two hydraulic structures of 350m<sup>3</sup> vegetated, and the road water treated by hydrocarbon basins. Rainwater will be used for sanitary water needs, and work is underway to reuse the filtered activity water for the sanitary supplement (winning project France Experimentation). The goal is to meet 80% of these needs.

Biodiversity is not left out, the concept of biophilia settling in the building. All the hydraulic structures are vegetalized thus attracting insects, a "wood edge" established on hill embankment will attract birdlife, and two water spaces will allow odonates and amphibians to settle. At the time of its design, the building had been evaluated by the HQE Performance Biodiversity test with an improvement of the varieties of plant species.

The territorial and social anchoring of the Chevilly-Larue campus is once again being honored. At the level of the green flow, adjoining the building, a wall mural on the theme of sustainable development was produced in collaboration with local stakeholders, and a fence allowing biodiversity to cross has been put in place. Lastly, more than 8,000 hours of social integration were carried out for the construction of the structure.

This L6 project is fully in keeping with the logic of the unifying project, Sharing Beauty With All, which commits the L'OREAL group to reduce its environmental footprint but also in the environmental program of the site monitored as part of its ISO 14001 certification since 2010. The anticipation of environmental works with the construction of the evaluation building, the L5, made it possible to obtain the Environment & Biodiversity Grand Prize for the development of the two projects.

## Sustainable development approach of the project owner

Last building built the L5 in 2014: project choice with less soil waterproofing, BBC certification, certification HQE Exceptional (2nd building more efficient 2015, Certivea)

Objective of the new building the L6: to go even further in environmental excellence! - Choice to go to a building in BIM model to facilitate the articulation of different trades during construction, but also for the future maintenance of the building; - Willingness of energy production, and work on the BEPOS pilot approach - Use and reuse the water as much as possible (rain, treated ...) - Continue our territorial anchoring with the use of the municipal heat network - Integrate the building the environment of the site and the landscaping for biodiversity

## Architectural description

Sober and timeless building in recall with the last built building Flexible laboratory with removable wall to adapt the spaces to the needs of the collaborators Integration of the building in an eco-campus Luminous building with view from the workstations on the landscaped spaces Landscaping imagined by the landscape architect of the site in coherence with the history of the site and the view since the departmental green flow; Structure of slab lightened with air balloons (-1T of concrete, ~ -87T eqCO<sub>2</sub>)

## See more details about this project

<http://www.leparisien.fr/chevilly-larue-94550/chevilly-larue-un-nouveau-batiment-de-recherche-pour-l-oreal-06-07-2016-5946069.php>

<https://www.suez.com/fr/Actualites/Communique-de-presse/SUEZ-et-L'Oreal-concluent-un-accord-sur-la-performance-environnementale-des-sites-du-groupe>

[http://www.hqegbc.org/wp-content/uploads/2016/05/2016\\_Biodiv\\_OperationsTest.pdf](http://www.hqegbc.org/wp-content/uploads/2016/05/2016_Biodiv_OperationsTest.pdf)

## Stakeholders

### Contractor

Name : L'OREAL

Contact : dbouche@rd.loreale.com

<https://sharingbeautywithall.loreale.com/>

### Construction Manager

Name : ATELIER COLSON ARCHITECTE

Contact : archi@baillycolson.com

[http://www.atelier-colson-architecte.com/atelier-colson-architecte/Laboratoires/Pages/2015\\_LOreal\\_L6.html](http://www.atelier-colson-architecte.com/atelier-colson-architecte/Laboratoires/Pages/2015_LOreal_L6.html)

### Stakeholders

Function : Construction Manager

EDEIS

Christophe.Delcourt@edeis.com

<https://www.edeis.com/>

Shared project management between the architecture firm and the engineering design office

Function : Environmental consultancy

Function : Environmental consultancy

PHYTORESTORE

<http://www.phytorestore.com/fr/>

Water treatment activities and management and treatment of rainwater.

## Energy

### Energy consumption

Primary energy need : 17,00 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 128,00 kWh/m<sup>2</sup>.an

Calculation method : RT 2012

Breakdown for energy consumption : Auxil distribution: 7% Auxil ventilation: 26% Lighting: 26% Sanitary hot water: 10% Cooling: 19% Heating: 12%

### Real final energy consumption

Final Energy : 48,00 kWh/m<sup>2</sup>.an

Year of the real energy consumption : 2 019

### Envelope performance

Envelope U-Value : 0,50 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

Insulation from the outside. The glazed walls were studied specifically both their proportion in facade, and the characteristics of the glazings. The characteristics selected are the following:

- Double anti-emissive glazing with argon blade of  $U_g \leq 1.1 \text{ W / m}^2 \cdot \text{K}$
- Low solar factor:  $FS \leq 28\%$
- High light transmission:  $TL \geq 60\%$

Thermal bridges are reduced to a minimum; this will be achieved by continuous insulation of the envelope, interrupted only in a few unavoidable places, in particular the crossings of the envelope by structural elements. Adequate solar protection will optimize the thermal behavior of the building during the summer period.

Indicator : I4

Air Tightness Value : 1,20

Users' control system opinion :

Control of the offices in winter provided by radiant radiators General instructions imposed by GTB, with adjustment to +/- 3 degrees achievable by the collaborator The luminaries implemented in the entire project are LED type performance with modulated lighting depending on the ambient illumination on the two rows closest to the facade; Regulatory programs for CTA systems.

### More information

Unused building (early 2019) (Mutualization with building L4 of cold production)

## Renewables & systems

### Systems

Heating system :

- Urban network
- Canadian well

Hot water system :

- Urban network

Cooling system :

- Water chiller

- Fan coil
- Canadian well

#### Ventilation system :

- Double flow heat exchanger
- Canadian well

#### Renewable systems :

- Solar photovoltaic
- Micro wind
- Other, specify

#### Renewable energy production : 80,00 %

A field of photovoltaic solar panels covers the roof of the project as well as the parking lot. This renewable electricity production aims to offset the consumption of heating, domestic hot water, cooling, auxiliary and lighting stations, in accordance with the requirements of the BEPOS label. The total area of solar panels is around 1,500 m<sup>2</sup>, divided between the roof of the L6 and the coverage of parking spaces.

Use of a Canadian well to pre-cool or pre-heat incoming air;

Recovery of calories extracted by the CTA for reinjection into the building (wheel exchanger with very high energy performance);

Heating ensures by the heat network of the municipality of geothermal origin;

Pooling with building L4 of cold production;

Cold group with water condensation with double compression stage for the valuation of calorie releases towards the Heat Network (donation of colors to the network).

#### Solutions enhancing nature free gains :

inertie bâtiment, protection solaires motorisée

## Smart Building

#### BMS :

Use of a GTB to monitor building consumption and ensure sustainable management

## Environment

### Urban environment

Land plot area : 70 000,00 m<sup>2</sup>

Green space : 25 000,00

This new building is part of an urban renewal project for old scrap yards (2ha, total site 7ha). The first building built in 2014, and the latter, the L6 in 2018, were designed integrating a flourishing biodiversity where landscapers, cosmetic gardens and filter basins came to improve the frame of view of employees. This project was awarded in 2015 by ADEME by the Business & Environment Grand Prize in the Biodiversity category. The construction of this new project was evaluated during the experiment for the HQE Biodiversité in 2015, where an increase of the diversity of the environments and the permeability of the grounds had been welcomed. It is juxtaposed with the departmental green flow and a work was done with the landscape architect to include it by the urban landscape. A partnership with the city of Chevilly-Larue has made it possible to create a fresco for sustainable development in order to sensitize our fellow citizens to this theme of the future. The site and the L6 are accessible via the metro line 7 and the Tram T7 reaching the airport Orly. The site has surrendered part of its land to accommodate this important means of transport for so-called "soft" urban travel. A study of all flows in-house was conducted to better anticipate needs (pedestrians, bicycles, vehicles waste, logistics, waste).

## Products

### Product

Lift with energy production: OTIS REGEN

OTIS

OTIS

<http://www.otisworldwide.com/site/bel-fra/pages/Regen.aspx>

Product category : Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '29'

Innovative system that restores the energy produced by the elevator to the electricity grid.



Treatment of industrial waters by system of filter gardens

Phytorestore

info@phytorestore.com

<http://www.phytorestore.com/fr/les-jardins-filtrants.html>

**Product category :** Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '29'

Biotechnology developed by Phytorestore using wet ecosystems and phytoremediation to clean water and return reusable while creating landscaped areas welcoming biodiversity.



Cellular slab structure COBIAX

COBIAX

COBIAX

[http://www.cobix.com/technologie\\_2](http://www.cobix.com/technologie_2)

**Product category :** Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '6'

Honeycomb slab structure: balls of recycled plastic are placed between the reinforcements before pouring the slab for more lightness: - 380m3 of concrete / traditional slab (avoided 87 tons of CO<sup>2</sup> equivalent)



Refrigerant group with refrigerant gas responsible: HFO R1234ze

CARRIER

<https://www.batirama.com/article/12940-fluides-frigorigenes-carrier-passe-directement-aux-hfo.html>

**Product category :** Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '19'

Its GWP (warming power) is less than 1.

Its ODP (contribution to the destruction of the ozone layer) is zero.

BIM model

BOUYGUES ENERGIE SERVICES / EDEIS

Project piloted with the architect CABINET COLSON + EDEIS + BOUYGUES ENERGIE SERVICES  
Application to BIM D'OR



## Costs

### Construction and exploitation costs

Reference global cost : 29 000 000,00 €

Renewable energy systems cost : 820 000,00 €

Reference global cost/Work station : 29000000

Cost of studies : 2 920 000 €

Total cost of the building : 27 000 000 €

## Health and comfort

### Water management

Consumption from water network : 500,00 m<sup>3</sup>

Consumption of grey water : 400,00 m<sup>3</sup>

Consumption of harvested rainwater : 400,00 m<sup>3</sup>

Water Self Sufficiency Index : 0.62

Water Consumption/m<sup>2</sup> : 0.08

Water Consumption/Work station : 4.17

Unused building but feedback from the building next door built in 2014: 50% of sanitary needs will be provided by rainwater.

New features on this building: injection of process water lost in the sanitary water tank + work with the ARS to reuse treated wastewater in addition and reach 100% of non-potable water for sanitary facilities (experimentation following the PA France Experimentation)

## Indoor Air quality

Air quality provided by:

- efficient ventilation adapted to occupancy and preventing the transfer of air from polluted premises to sensitive premises (30 m<sup>3</sup> / h / person in the majority of occupied spaces);
- control of pollution sources with the implementation of materials compatible with their use, representing qualities in terms of robustness and ease of maintenance, but also in terms of intrinsic health quality of materials and construction products. The choice of these materials (floor coverings, walls, and ceilings) respects the classifications corresponding to the A + labeling characterizing their emissions: TVOC: Class A + (or <1000 µg / m<sup>3</sup>) & Formaldehyde: Class A + (or <10 µg / m<sup>3</sup>).

## Comfort

### Health & comfort :

Visual comfort: in the design of the visual ambiances, the objective was to facilitate and make pleasant the activity of each one, by providing comfortable and controlled environments at the workplace, with:

- Natural lighting: All rooms where natural lighting is required have large windows, with a maximum height under the lintel. As far as functional requirements permit, extended-use spaces provide occupants with visual contact with the outdoors and direct views of the building surroundings. FLJ is greater than 0.7% over the entire area of the first rank zone; light transmittance of glazing: 60%. Particular attention has been paid to direct solar radiation, which can cause glare effects in addition to its thermal effects. Glare due to natural lighting is avoided by the radiation-controlled exterior blinds and the indoor screen blinds.

- Artificial lighting: The luminaires are LED type performance. The color rendering index (CRI) will be greater than 85% and the color temperature of the order of 3500 ° K - 4000 ° K. To avoid glare, the luminaires used are low luminance (UGR less than 19 or 22 depending on the premises). Whenever possible, a combination of soft general mood lighting and accent lighting on the workspace is preferred.

The articulation between natural lighting and artificial lighting is a key to the comfort and environmental economics of the project. To avoid areas of excessive illumination, artificial lighting is flexible depending on the ambient level near the facade, with possibility of servocontrol. Wherever an automatic modulation of lighting is envisaged, the users always have the possibility of intervening to modify the level of the lighting. The lighting is modulated according to the ambient illumination on the two rows closest to the facade.

Sanitary quality of the water: Domestic hot water networks are maintained at 55 ° C minimum. Legionnaire's disease will thus be discarded with storage at 60 ° C. The distribution networks are closed, without any dead arms. The temperature probes on the hot water network will be connected to GTB.

Electromagnetic Exposure Limitation: The main sources of low frequency emissions are transformers and high voltage overhead lines lining the ground to the south. The building's layout respects the regulatory safety distances. All equipment, equipment and other laboratory equipment provided for in the project comply with French and European standards for electromagnetic fields. Grounding of the switchgear meets safety standards.

### Acoustic comfort :

Acoustics worked with acoustic carpet under ceiling as well as acoustic panels between the offices of the collaborators.

## Carbon

### GHG emissions

Building lifetime : 50,00 année(s)

GHG Cradle to Grave : 386,00 KgCO<sub>2</sub> /m<sup>2</sup>

Using Elodie software

## Contest

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

Global project

- Architectural project chosen "compact" to limit soil sealing, and integrating biodiversity
- HQE programming / design Exceptional level
- BEPOS out of process pilot approach (Certivea & Effinergie)
- Experimental approach E + C- (winner call for project ADEME 2018)
- Construction in 3D BIM model
- Consumption monitoring by GTB

Energy / CO<sub>2</sub>

- DHW and Heating by the Heat Network
- Canadian well: Pre-heat or pre-cool outdoor air depending on the season
- Recuperation of calories from CTA air extraction to pre-heat air entering the building
- Cooling unit with HFO R1234ze fluid (very low heating capacity)
- Energy production: 1500m2 photovoltaic panels
- COBIAX dimpled slab structure: recycled plastic balls are placed between the reinforcements before pouring the slab for more lightness (~ 1/3 need concrete, therefore less CO2 emitter)
- Lift with energy recovery

- High performance glazing (argon blade)

#### Water

- Recovery of rainwater for sanitary purposes
- Treatment of activity water by system of filter basins (Phytorestore)
- Reuse of treated waters for supplementary health food (Laureate France Experimentation, exchanges with the Regional Agency for Health)
- Parking water treated by a system of hydrocarbon pool
- Mutualization of two hydraulic structures on the same plot to collect rainwater: creation of a silky canal planted with phragmites, and a landscaped valley of various floristic species (iris, rush, willow ...)

#### biodiversity

- Non-transparent glazing: to limit bird collisions, Refuge LPO site
- Treatment of water by phytoremediation: presence of many plants, and a basin in water: place of reproduction of odonates
- External fence with coarse mesh to allow the passage of micro / macro-mammals in limit of departmental green flow
- Creation of a recirculating water basin, after the treatment of road water: second water point to allow the development of amphibians
- Mustard planting pending the planting of a "wood edge": home of insects and birds
- Choice of hotels with natural insects: pile of wood
- Biophilia concept: view of landscaped areas from workstations and plants inside the building



#### Territorial anchorage

- 8000h of social insertion
- Use Heat Network of the municipality of Chevilly-Larue
- Participation in the financing of the fresco sustainable development on the green flow
- Closing "open" on the outside for biodiversity

#### Mobility

- 60 new spaces including 6 electric covered by photovoltaic shadows
- new bike parking

### Building candidate in the category

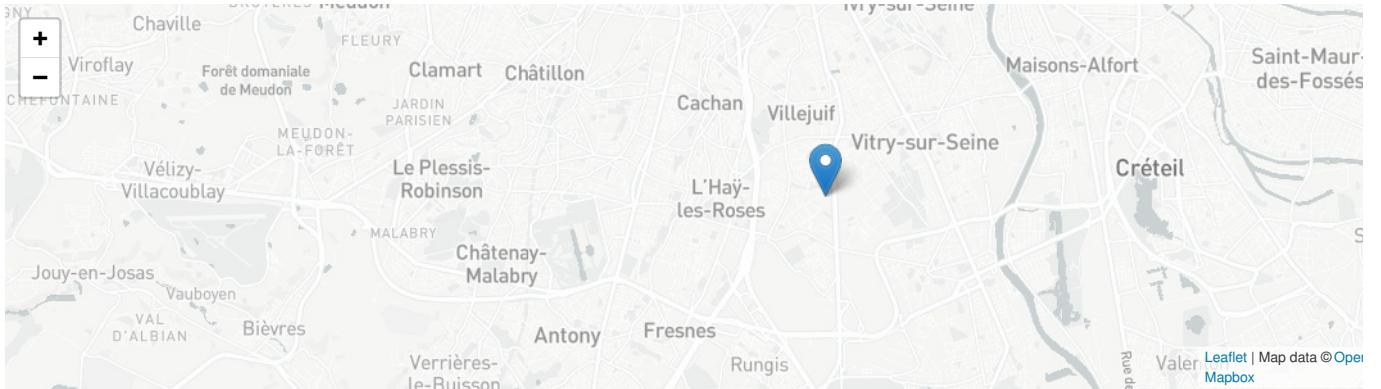
**Energie & Climats Tempérés**



Coup de Cœur des Internautes



Prix des Etudiants



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