


Lucie Aubrac International High School

by Jean-Michel Buron / © 2021-03-25 09:45:57 / France / 6369 / FR



New Construction

Primary energy need :

-3.2 kWhep/m².an

(Calculation method : RT 2012)

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 : School, college, university
Construction Year : 2017
Delivery year : 2018
Address 1 - street : 13 rue de l'Industrie 92400 COURBEVOIE, France
Climate zone : [Cbc] Mild, dry winter, warm and wet summer.

Net Floor Area : 15 340 m² SHON
Construction/refurbishment cost : 30 960 000 €
Cost/m2 : 2018.25 €/m²

Certifications :



General information

The Lycée Lucie Aubrac is located in an urban environment with strong urban constraints (common courtyards, non-aedificandi area, vis-à-vis high-rise buildings), while offering a **striking urban landscape** with the district of La Défense which dominates in the background and the nearby Seine behind a discontinuous front of office buildings.

The constraints of the common courtyards, the permeability between the rue de l'Industrie and the rue Victor Hugo, the presence of trees on the site, a heart of an open block to the southwest, prompted us to want to visually connect the two streets and orient our buildings towards open spaces. The school is designed as a campus located in a park.

We also looked for a location of the buildings that would provide the best possible sunshine while taking advantage of the open space to the southwest. The building is positioned on a South-East / North-West axis. All the teaching premises thus benefit from a south west / north-east orientation.

The main buildings are structured around a large living space: the atrium. This **bioclimatic space**, which generously lets in natural light, is the nerve center of the project. Light plays an important role both in building management (energy saving) and in improving the well-being of users (psychological and physiological). This light is filtered by the glass roof in which photovoltaic cells are incorporated which project a play of shadows on the interior walls.

The atrium is an interior street that offers an atmosphere characterized by sets of stairs, walkways and transparency. It is a place of exchange and meetings.

The official accommodation is independent and is organized along the rue Victor Hugo.

We have sought an **urban language** which dialogues with the surrounding buildings and which composes a harmonious whole through the volumetry, the molding and the choice of materials. This language should also reflect simplicity and durability. We have favored polished concrete, stamped concrete and wood when it is protected. By its brilliance, the polished white concrete reflects and makes the light slide. In the base, the dark-colored stamped concrete gives the building a foundation. As for wood, it brings warmth and preciousness.

Finally, the technical provisions such as the architectural design allow the Lycée Lucie Aubrac to achieve ambitious environmental objectives. The project is **HQE® certified** by Certivéa for the Lycée building ("NF Bâtiment tertiaires - Démarche HQE®", reference of 20/01/12) and labeled **BEPOS Effinergie** , both for housing and for the teaching building .

Sustainable development approach of the project owner

Île-de-France Construction Durable has extensive expertise in the field of environmental quality. All projects are subject to an environmental approach, in particular within the framework of HQE certifications and BBC labels, or with the integration of renewable energies and social clauses.

Architectural description

The design of the building is based on the search for the greatest possible constructive and functional clarity. The hall channels students into the heart of the building and teaching spaces. The functional poles are related to each other by simple and readable links.

The school is organized on 5 levels in three buildings linked by a central bioclimatic space. These buildings are linked by a horizontal structure made up of galleries and walkways at each level. They are also linked by a vertical structure made up of 5 staircases: 4 staircases at the ends and a central staircase.

The building as a whole is designed as a luminous envelope of white concrete resting on a dark forged concrete base.

The southwest facade is partly protected by white lacquered aluminum sunshade slats which reveal a larch wood facade in the background. To protect against excessive sunshine, the facade of the sports hall is punctuated by a succession of vertical slats of white concrete.

Inside the school, the interior passageways of the atrium are entirely lined with wood. Beyond the aesthetic aspect, this choice makes it possible to offer great acoustic comfort to users.

The glass roof of the atrium is pixelated by photovoltaic cells. These cells are integrated into the double glazing. This arrangement makes it possible to create a large shade above the atrium.

All the roofs are green.

See more details about this project

<http://www.epicuria-architectes.com/projets/lycee-lucie-aubrac-a-courbevoie--92->

Photo credit

EPICURIA - Luc BOEGLY

Stakeholders

Contractor

Name : Conseil Régional d'Ile-de-France / Ile-de-France Construction Durable

Contact : Gérard DONATI

<https://www.idf-constructiondurable.fr/accueil>

Construction Manager

Name : EPICURIA Architectes

Contact : Jean-Michel BURON et Lionel BOUSQUET

<http://www.epicuria-architectes.com>

Stakeholders

Function : Other consultancy agency

CET INGÉNIERIE

Clémence LAILLY

<http://cet-ingenierie.fr>

TCE design office: Structure / Fluids: HVAC / Plumbing / VRD / Electricity: CFO / CFA / Descriptive economy

Function : Thermal consultancy agency

BETEM Ile-de-France

Michel LAMOTE et Vincent RASPAUD

<http://www.betem.fr>

Thermal design office / STD Simulation & Design

Function : Designer

EPICURIA Architectes, mandataire / Atelier d'Architecture Malisan, architecte associé

Jean-Michel BURON

<https://www.epicuria-architectes.com>

Associate architect

Function : Others

TCE -Terre Ciel Énergie

Germain GOURANTON

<https://www.terrecielenergies.com/fr/>

Active Envelope Consultant

Function : Contractor

Région Ile-de-France

Jean-Lou PERRIER

<https://www.iledefrance.fr>

Owner

Function : Contractor representative

Ile-de-France Construction Durable

Gérard DONATI

<https://www.idf-constructiondurable.fr/accueil>

Delegated project master

Function : Assistance to the Contracting Authority

EODD Ingénieurs Conseils

Marie GRUNDISCH

<https://www.eodd.fr>

AMO - HQE

Contracting method

Other methods

Energy

Energy consumption

Primary energy need : -3,20 kWh_{ep}/m².an

Primary energy need for standard building : 66,60 kWh_{ep}/m².an

Calculation method : RT 2012

Breakdown for energy consumption : Heating: 11.46 kWh_{ep} / m².an DHW: 3.86 kWh_{ep} / m².an Lighting: 2.95 kWh_{ep} / m².an Auxiliaries: 9.61 kWh_{ep} / m².an
Photovoltaic: -17.28 kWh_{ep} / m².an Cogeneration: -2.98 kWh_{ep} / m².an

Real final energy consumption

Final Energy : 8,00 kWh_{ep}/m².an

Envelope performance

Envelope U-Value : 0,41 W.m⁻².K⁻¹

More information :

- Wall on exterior: 20 cm of glass wool - Wall on interior: 120 cm rock wool - Floor on parking: 21 cm mineral wool flocking - Floor on Exterior: 21 cm Polystyrene - Roof: 17 cm Polyurethane - Carpentry: Uw 1.3 , Solar factor: 0.31

Building Compactness Coefficient : 0,40

Indicator : EN 13829 - q50 » (en m³/h.m³)

Air Tightness Value : 0,98

Renewables & systems

Systems

Heating system :

- Gas boiler
- Combined Heat and Power
- Water radiator
- Low temperature floor heating

Hot water system :

- Condensing gas boiler

Cooling system :

- No cooling system

Ventilation system :

- Natural ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Other, specify

Renewable energy production : 106,00 %

Solutions enhancing nature free gains :

Cogénération gaz-électricité - Photovoltaïque

Smart Building

BMS :

A building management system is in place to manage heating, lighting and ventilation.

Environment

Urban environment

Land plot area : 11 230,00 m²

Built-up area : 47,00 %

The Lycée Lucie Aubrac is set up in an urban environment on the site of a college which has now been demolished. Urban constraints are strong on this land: common courtyards, non-aedificandi zone, vis-à-vis high-rise buildings. The land and its immediate surroundings, however, offer a striking urban landscape with the La Défense district dominating in the background and the nearby Seine behind a discontinuous front of office buildings.

Products

Product

LUXLAME F Establishment SOUCHIER-BOULLET

SOUCHIER-BOULLET

<https://www.souchier-boullet.com/desenfumage-architectural/facade/murs-rideaux/luxlame-f-mr/>

Product category : Second œuvre / Menuiseries extérieures

Pivoting glass slats to regulate the natural ventilation of the interior street.

Excellent grip.



Costs

Construction and exploitation costs

Global cost : 30 960 000,00 €

Reference global cost : 3 099,00 €

Renewable energy systems cost : 1 391 960,00 €

Global cost/Pupil : 20640

Reference global cost/Pupil : 3099

Cost of studies : 3 484 735 €

Total cost of the building : 53 600 000 €

Additional information on costs :

Photovoltaic canopy: € 1,016,743 excl. Tax / Photovoltaic panels on the roof: € 375,212.55 excl.

Health and comfort

Water management

Consumption from water network : 24 000,00 m³

Consumption of harvested rainwater : 320,00 m³

Water Self Sufficiency Index : 0.01

Water Consumption/m² : 1.56

Water Consumption/Pupil : 16

Pressure reducers to limit the withdrawal flow rates if the pressure is greater than 3 bars. Hydro-saving systems ensuring a justified% water saving are installed:

- 3/6 l dual control toilet cisterns
- Washbasins with self-closing taps with a flow rate limited to 3L / min
- Faucets for showers and sinks with a flow rate maintained at 6L / min - Urinals with a flow rate of 2L / flush.

The project provides for a water tank of about 30m³ to store this water for external watering, for flushing the toilet blocks for students on the ground floor and for supplying the tap located in the educational garden (watering the garden and cleaning of the yard and sports field). The calculation of the water needs of the toilets was carried out using the tool developed by Certivéa. The percentage of coverage of non-potable water needs was also assessed using the Certivéa tool.

Indoor Air quality

The ventilation of the building is provided by double flow ventilation. A permanent monitoring of the clogging of the filters of the air handling units with a defect transfer to the building management system is planned. Details of all interventions will be systematically recorded in a maintenance log. Work on the choice of materials and in particular the emissions of pollutants from interior linings has been carried out. It made it possible to recommend low-emissive materials.

Comfort

Health & comfort :

The hygrothermal comfort of all the premises must be optimal whatever the season and the type of premises. To do so, the design of the building implemented the following elements:

- Temperature stability during occupancy is ensured by regulation by zone and according to the type of heating.
- The discomfort due to the cold air current is eliminated thanks to the double flow ventilation system guaranteeing supply at neutral temperature (20 ° C) and in the selection of the supply grilles ensuring a limitation of the residual speeds at the occupants level .
- Sun protection, preventing the phenomenon of overheating of the glazing has been planned
- The architectural project relied heavily on insulation from the outside and the inertia of the building.

All the teaching rooms and offices have access to natural light.

The classrooms, the CDI, the circulation areas, also benefit from second-day lighting through transoms or glazed frames to provide better visual comfort while ensuring safety and energy savings. Preference has been given to the principle of fluorescent luminaires type T5. The luminaires are equipped with high frequency electronic ballasts. The lighting levels comply with the regulations.

The olfactory comfort is treated by the configuration of the premises and the use of materials with the least possible release of odors and a quality ventilation system.

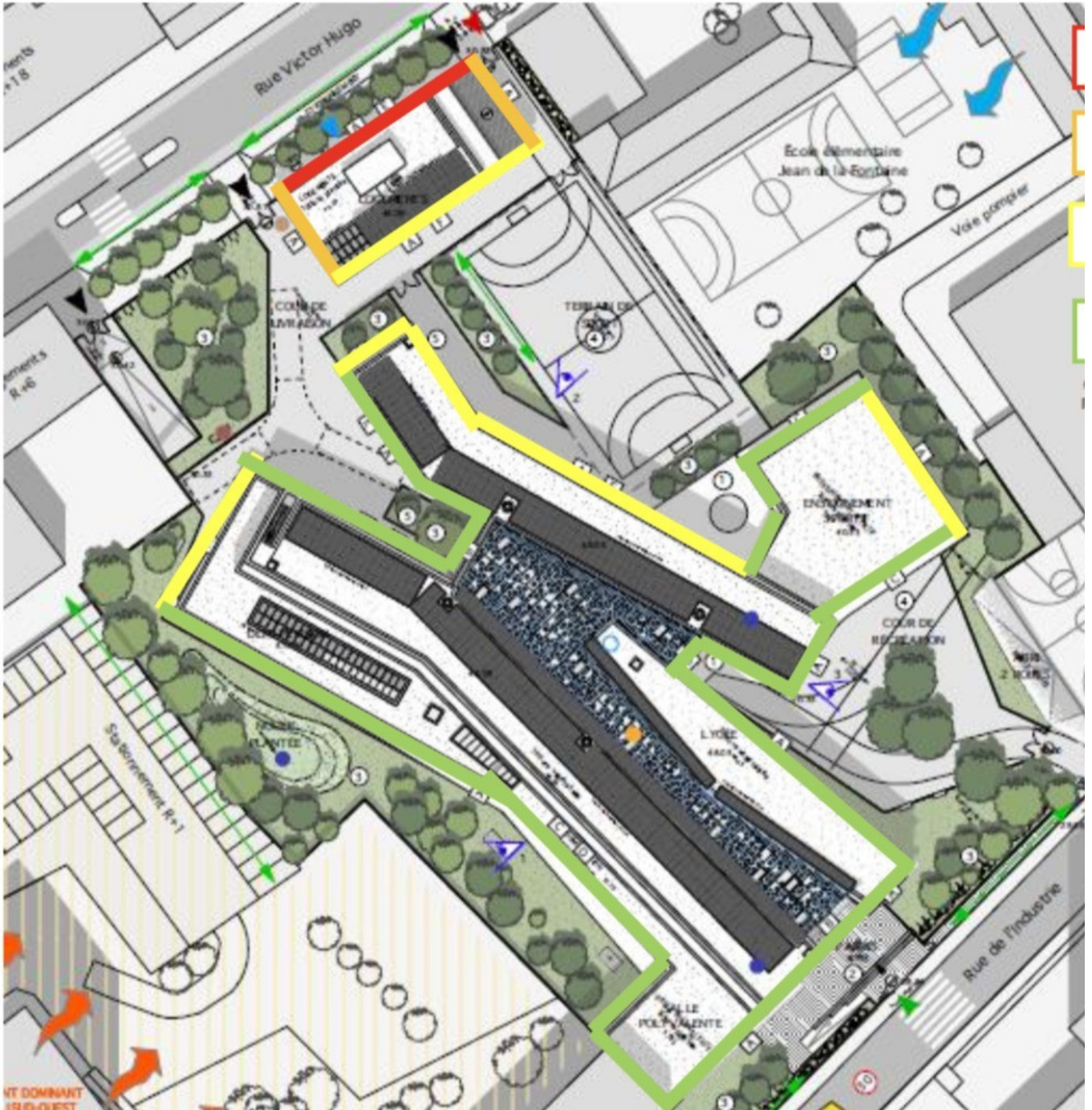
Measured indoor CO₂ concentration :

Des capteurs de CO₂ sont reliés à la régulation des CTA

Calculated thermal comfort : Le bâtiment présente très peu d'inconfort. En effet, la seule zone identifiée comme présentant une température opérative dépassant 28°C en occupation (inconfort) est la salle informatique. Cet inconfort se limite à 7h par an, soit environ 0.5% du temps d'

Acoustic comfort :

Acoustic constraints of the site:



Interior street comfort study:

Daylight factor : L'étude de Facteur de Lumière du Jour (FLJ) montre que le bâtiment respecte le niveau Performant de la préoccupation 10.1.3 « Disposer d'un éclairage naturel minimal ».

Carbon

GHG emissions

GHG in use : 5,00 KgCO₂/m²/an

Contest

Reasons for participating in the competition(s)

BEPOS / Effinergie / Bioclimatic space / Air quality / Natural ventilation of the interior street / Significant thermal inertia /

Sustainable building / NF HQE "Tertiary building" certification / Acoustic comfort / Visual comfort / Optimal management of natural light and solar contributions studied for each facade and photovoltaic glass roof / Heat recovery on AHUs / Gas-electricity cogeneration / Management of dual-flow air and heating for all premises centralized on GTB and connected to sensors /

Materials of natural origin / Recovery of rainwater for sanitary facilities / Management of rainwater by vegetated valleys / Protection against local noise pollution / Protection against prevailing winds /

Power plant based on photovoltaic cells / Conservation of existing trees on site and strengthening of the arboreal heritage / All green roofs contributing to biodiversity, thermal inertia, regulation of EP

Building candidate in the category



Santé & Confort



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