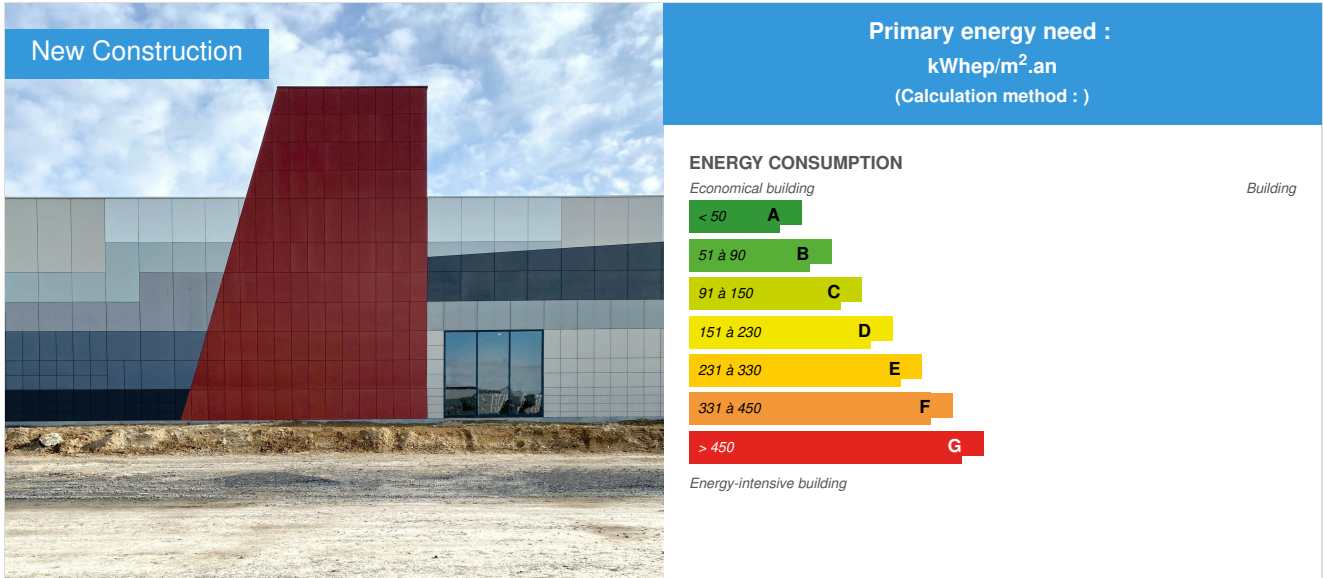


Valorization unit

by [Amandine Martin](#) / 2023-03-13 00:00:00 / France / 1622 / FR



Building Type : Factories
Construction Year :
Delivery year : 2023
Address 1 - street : 2 rue du Cardo 62073 BAILLEUL-SIR-BERTHOULT, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 1 435 m²
Construction/refurbishment cost : 2 800 000 €
Number of Installed Kw : 3 Installed Kw
Cost/m² : 1951.22 €/m²

General information

The LFB (French Fractionation and Biotechnology Laboratory) is building a “new generation” plant in the Actiparc area near Arras to produce plasma-based medicines in France for the whole world, used as treatments for many diseases.

As part of the construction of the site, LFB wanted to dedicate a building dedicated to the management of its waste and other by-products from production. The recovery unit makes it possible to transform an infectious by-product from the production building into a source of recycled raw materials made up of unmarked plastic flakes.

In order to extend its circular economy approach beyond the actual function of the building, LFB wanted to design a building with low environmental impact, under the prism of the circular economy.

Environmental approach: matter and energy

The project pays particular attention to the construction materials considered. It promotes biosourced materials, from recycling, reuse and local channels:

- The structure of the building is entirely in Douglas wood frame from national sectors;
- The envelope is made up of wooden frame walls with straw filling;
- The facades are made up of Eternit panels from the end of stocks intended for the recycling centre;
- The waterproofing of the light-coloured cover to prevent overheating is made of recycled and recyclable materials;
- The concrete slab is made up of 50% recycled aggregates from a demolition site less than 40km away;

- The insulation of the partitions is made of métisse manufactured less than 40km

With a view to saving material in the short and medium term, all the construction materials are carefully implemented so as to remain raw: quartz concrete paving, exposed breeze block walls for the storage rooms, raw Fermacell panel on the interior facade walls, etc.

In order to reduce the energy necessary for its operation, the project uses the resources available on the site, resulting from the activity of the factory. Heating needs are recovered from the heat generated by the recovery process within the building. The supply of the machines necessary for the recovery process uses the compressed air network produced on site.

Bioclimatic approach

The design of the building promotes bioclimatic systems by invoking natural and passive resources to meet thermal, hygrometric and air renewal needs.

Located on the plains of Artois largely exposed to the winds, the building benefits from a natural ventilation system allowing natural sweeping of the process, a source of heat. The grids of ventilation located in the lower part of the South-West facade, exposed to the prevailing winds, allow the air to circulate in the heart of the building up to the chimney which, under the draft effect, evacuates the hot air in the upper part. Mechanical ventilation is provided in addition in case of high temperatures.

The ventilation system is regulated via interior temperature sensors and a weather station on the roof.

Like industrial sheds, the volume of the chimney also allows a supply of zenithal light on the North side to avoid overheating.

Rainwater collected from the roofs is stored in a tank to be used for building maintenance and washing the bins that transported the by-products.

Volumetric principles

The building is composed of a compact primary envelope hosting the by-product recovery process. Its French glued laminated Douglas wood frame structure gives it large spans to make room for a large open volume. In order to limit energy expenditure and improve user comfort, the building envelope is fully insulated by wooden frame walls with straw filling.

A second volume wraps around this envelope to form a canopy, necessary for the protection of storage and deliveries.

Principles of facades

The cladding envisaged for the facade was the subject of a partnership with the supplier Eternit to identify and recover end-of-series stocks, taken out of the market and intended for the waste disposal center in the near future.

The design of the facades was therefore done in the opposite way to the customs of the prescribers that we are, in the sense that the composition of the colors and the layout was thought out from the available stocks. The layout of the facades favors small modules at the foot of the building to facilitate their replacement in the event of damage over time.

Building users opinion

This building is efficient, scalable and a concrete action of the company's CSR approach.

If you had to do it again?

For the building, we did not succeed in using poplar construction wood in the local sector, despite discussions with suppliers upstream of the consultation of companies, no official reservation of stocks has been initiated by the Control of work which feared the additional cost during the call for tenders. Finally, the cost was not higher than the French Douglas sector (New Aquitaine region), but the delivery time announced by the supplier caused a delay on the site of 6 months. The construction wood therefore comes from the New Aquitaine region.

Photo credit

BLAU

Stakeholders

Contractor

Name : LFB

Contact : Olivier DUBRULLE, [dubrulle\[a\]lfb.fr](mailto:dubrulle[a]lfb.fr)

<https://www.groupe-lfb.com/actualites/lfb-ouvre-portes-de-future-usine-darras/>

Construction Manager

Name : BLAU

Contact : Amandine MARTIN, [am\[a\]bl-au.com](mailto:am[a]bl-au.com)

<http://www.bl-au.com/#actualite>

Stakeholders

Function : Assistance to the Contracting Authority
NEO ECO

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AMO circular economy

Function :
INGEBOIS

Laurent LEPAUL, laurent.lepaul[a]ingebois.com

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Studies of wooden structure and wooden facades

Function :
MBA Structure

Omar SEYDI, omar.seydi[a]mbastructure.fr

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Concrete structure studies

Function : Thermal consultancy agency
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<https://www.tw-ingenierie.fr/>
Fluid studies, plumbing, thermal

Function : Other consultancy agency
PROJET

Laurent Versalie

Electrical studies

Function : Company
SATELEC

Richard Dendauw

Electrical studies

Function : Company
SNPC

Florimond LEPOUTRE

Road studies, networks

Contracting method

Lump-sum turnkey

Type of market

Not applicable

Allocation of works contracts

Separate batches

Energy

Energy consumption

Breakdown for energy consumption :

Industrial building not subject to thermal regulations

Envelope performance

More information :

Facade in wooden boxes filled with straw 36cm. Coverage by waterproofing, white membrane implemented to prevent overheating in summer.

More information

No feedback yet, building not currently in operation. The industrial process machines will only be installed in 2024.

Renewables & systems

Systems

Heating system :

- Electric radiator

Hot water system :

- Other hot water system

Cooling system :

- No cooling system

Ventilation system :

- Natural ventilation

Renewable systems :

- No renewable energy systems

Other information on HVAC :

The space in the hall hosting the industrial process has no means of heating. The process releasing heat, it will heat the hall in winter while in summer the space will be cooled by a natural ventilation system. Indeed, air intake grilles in the lower part of the facade exposed to the prevailing winds allow the air to circulate in the hall until it is extracted via grilles positioned in the chimney (the shed). Only staff premises are heated by electric heaters (office, break room, changing rooms). The need for domestic hot water production and ventilation for the changing rooms and the break room is provided by a thermodynamic tank.

Rainwater harvesting

Environment

Urban environment

Insertion in an industrial site within an Activity Zone in creation, no existing context.

Products

Product

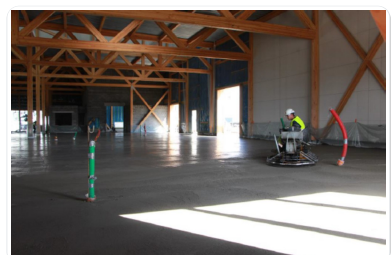
Low carbon concrete slab

GCC / PLACEO / EQIOM

Product category : Finishing work / flooring

GCC produced with PLACEO as a subcontractor the interior paving composed of 50% recycled aggregates and the exterior paving composed of 30% recycled aggregates.

The formulations have been developed in partnership with EQIOM and have been certified by the control office. In particular, durability tests were carried out.



Costs

Construction and exploitation costs

Cost of studies : 300 000 €

Total cost of the building : 2 800 000 €

Subsidies : 360 000 €

Circular Economy

Circular economy strategy

Phase in which reuse has been integrated : Preliminary design studies

Type of circular economy strategy implemented :

- Maximization of quantities on targeted products

Type of circular economy strategy implemented :

We have created a partnership with Equitone to recover end-of-series cladding panels withdrawn from the market and sent to recycling channels.

Integration of reuse into the written contract documents : Integration of the reuse specifically in the special technical specifications of the concerned batches

Validation protocol for reused materials : Yes

Validation protocol for reused materials :

Stock constituted and reserved with the supplier, obligation of the company to go through this supplier and this specific stock.

Deposit validation form : No

Reuse : same function or different function

Batches concerned by reuse :

- Facades

For each batch : Reused Materials / Products / Equipments :

Equitone cladding:

- 2,300 m²
- End of series of Equitone supplier not marketed
- Reuse in facade cladding

Reused materials rate :

The end-of-series stocks constituted a database which required design work contrary to usual: we designed the layout and the colorimetry of the facade according to the existing deposit. The implementation on site remains classic, identical to the products marketed.

Logistics

Rehabilitation and reconditioning operations (if project concerned by a cleaning/demolition stage) : No

Storage of materials from external supply :

- No problem of storage, supply correlated to the progress of the works

Insurance

Consultation of the technical controller : Yes

Specific mission given to the technical controller :

No specific mission. We discussed with him during the study phase, the material having not been laid beforehand on another operation, its implementation did not require any specific process.

Insurance broker on the project : No

Consultation of the broker : No

Insurer : SWISS

Consultation insurer : Yes

Discussion with the insurer :

Yes, on the reuse of the cladding panels as well as on the integration of recycled aggregates up to 50% in the concrete of the interior slab and 30% for the exterior slab. The choice of straw insulation was also discussed, particularly with regard to the fire constraints linked to the building to respect the REI60 on part of the facades. Insurers were more favorable to the use of straw rather than wood fibre, as straw gives off less smoke in the event of a fire. A Fermacell partition under PV was implemented on the interior facade walls in order to comply with fire constraints.

Environmental assessment

Impacts avoided : water, waste, CO2 :

The use of end-of-line cladding made it possible to avoid recycling 2,202 m² of cladding. The carbon gain from installing the siding in slow moving is 36,973.782 kg CO2 eq. (see detailed excel table in attachment + in pdf format in additional information)

<https://www.construction21.org/france/data/sources/users/20121/20230420155116-gain-carbone-bardage.xlsx>

Economic assessment

Total cost of reuse : 203 000 €

Reuse quantified in the companies' offers? : Yes

Purchasing process for reused materials :

- Others

Purchasing process for reused materials :

Materials reserved during studies with supplier but not purchased. Direct purchase with the construction company.

More details on the economic balance :

A comparative economic study was carried out in the PRO phase to measure the financial gap between the construction of a low-carbon industrial building and a "standard" building in industry (replacement of the wooden frame with a metal frame, replacement of the floors wood with concrete floors, replacement of wood / straw / Equitone facades with metal facades with mineral insulation, removal of bay windows with compensation for artificial lighting and removal of rainwater recovery). The difference measured is 29.72%. However, the return on investment has not been calculated.

New business model and financial balance :

The cost of end-of-series panels was lower than the cost of conventional panels on the market. The price had been negotiated and blocked with the supplier during the studies. The price for the supply of reused panels, excluding installation, had been negotiated with the supplier at approximately €35/m².

Communication

Communication on the process : Yes

If so, please specify :

Presentations at conferences (Presentation at the Arras Academy of Architecture during an intervention by La Frugalité Heureuse et Créative Hauts-de-France;

Presentation at a Building Lab round table: Presentation at the 8th meetings of Straw Wood Construction, etc.).

Project visit : Yes

Circular design

Responsible consumption :

The choice of construction materials and their implementation have been studied to remain raw and avoid the addition of finishing materials. This approach aims to limit the consumption of materials, both from the construction stage but also over a longer period of time with regard to maintenance and renewal of finishes.

Industrial and territorial economy :

- Use of energy produced for the entire LFB site (example: use of compressed air produced for the entire site for our building);
- Industrial process recovering infectious risk waste from LFB production which, until now, was sent to a treatment center;
- Use of natural resources to meet the energy needs of the building (natural ventilation, recovery of rainwater for the industrial process, favoring the contribution of natural light, no heating for the main hall which will be naturally heated by the energy released by the machines, etc.);
- Pooling of living bases to all buildings under construction on the LFB site.

Eco-design :

The building provides sufficient space to double the industrial process in the future. Expectations for adiabatic ventilation devices are provided to respond to greater overheating thereafter.

Recycling :

- Recyclable clear waterproofing membrane;
- Use of recycled cotton insulation for the interior walls (Metisse);
- Concrete composed of recycled aggregates (50% for the interior slab and 30% for the exterior slab). Tests were carried out by test specimen during studies by Neo Eco in partnership with Eqiom in order to develop the formula of the concretes used.

Additional information (PDF documents)

Contest

Reasons for participating in the competition(s)

Nous concourons aux concours Green Solutions Awards 2022-2023 et aux Trophées Bâtiments Circulaires car ils véhiculent en tous points les actions que nous avons menées sur l'unité de valorisation auprès du LFB.

La conception du bâtiment a suivi la démarche vertueuse du Maître d'ouvrage de créer un bâtiment valorisant les déchets issus de sa production, c'est donc naturellement que les choix de conception se sont portés sur les principes de l'économie circulaire et de l'architecture bioclimatique. Le bâtiment a été conçu pour consommer peu (exemple d'une enveloppe performante isolée en paille) et l'énergie nécessaire à son fonctionnement est principalement issue des ressources naturelles (vent, pluie, soleil). Les choix de matériaux se sont orientés vers des filières de recyclage, du réemploi ou du biosourcé, ils sont au maximum de provenance locale. L'aspect réglementaire feu (certaines façades extérieures doivent respecter une tenue REI60) a été étudié pour permettre l'emploi de la paille en façade. La volonté de l'équipe de Maîtrise d'ouvrage et de Maîtrise d'œuvre s'est portée sur un bâtiment industriel bas carbone démonstrateur, qui participe au développement des filières locales et qui constitue un retour d'expérience pour d'autres industriels qui souhaiteraient adopter la même démarche. Par ailleurs, la Maîtrise d'ouvrage souhaite organiser des visites régulières du bâtiment en fonctionnement afin de sensibiliser le grand public, les industriels et les spécialistes du bâtiment.



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