Hangar Zero

by Frederic Denise / 2022-04-11 00:00:00 / France / 2471 / FR

Renovation

Primary energy need :
kWhep/m².an
(Calculation method : Other)

ENERGY CONSUMPTION

Economical building *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 Type : Logistics warehouse
Construction Year : 1920
Delivery year : 2022
Address 1 - street : 37 quai de la Saône 76600 LE HAVRE, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 2 450 m² Autre type de surface nette
Construction/refurbishment cost : 1 078 000 €
Cost/m2 : 440 €/m²

General information

Hangar 0 - read "zero", for zero waste, zero embodied energy, zero carbon, zero exclusion - is **a project to convert a wasteland port in Le Havre into a citizen laboratory for ecological transition.**

This project, winner of Réinventer la Seine, consists of the redevelopment of a former coffee dock, on the edge of a river basin to accommodate activities centered on the circular economy and urban agriculture. A shop, a restaurant and two workshops and offices have already been delivered. Eventually, this third place will also include an aquaponic greenhouse, shared workshops, a *Fablab* , coworking spaces, shared vegetable gardens and a permaculture garden.

Its primary purpose is to **mobilize innovative solutions to improve the resilience of the territory of the city of Le Havre** . These solutions make it possible to raise residents' awareness of responsible consumption by bringing them closer to circular economy players who experiment, produce and transmit within the very heart of Hangar 0.

This third place revolves around several pillars of the circular economy, mainly reuse, eco-design, extending the duration of use and the management of waste as resources. Hangar Zéro has therefore set itself the objective of **reusing 90% of the construction materials used for the development of the 2500m² site** .

Building users opinion

The occupants participate in the design and construction of the place. Their opinion can vary greatly depending on their degree of involvement.

What emerges most often is the feeling of tremendous civic energy, but also that everything takes too long! Former future occupants, less involved in the

realization of the project, have given up to join faster projects!

If you had to do it again?

Based on our experience, we would move towards a higher re-employment rate. We have a feeling of failure when, lacking reused wood resources, or steel, we were forced to buy a new part, so as not to delay the work.

See more details about this project

https://www.lehangar-zero.org
https://www.facebook.com/lehangarzero
https://www.instagram.com/lehangar.zero

Photo credit

ARCHIPELAGO ZERO

Stakeholders

Contractor

Name : SCIC LE HANGAR ZERO
Contact : Emilie Lemay, Présidente
https://lehangarzero.fr/

Construction Manager

Name : Frédéric Denise - Archipel Zéro
Contact : Frédéric DENISE
http://www.archipelzero.fr

Stakeholders

Function : Other consultancy agency

PERMAC

Brice Canaud et Steven Lemercier

https://www.linkedin.com/company/73221312/admin
BET Reuse

Function : Company

Lefebvre Industrie

Willy Lefebvre

https://lefebvre-industrie.fr
Masonry and structural work

Function : Company

French-Line Cabine

Francois-Xavier Guyomard

Transformation of shipping containers

Function : Company

Duchesne

Harold Duchesne

Exterior wood furnishings

Function : Company

Abbei

https://abbei.org/
Interior insulation

Function : Company

EMMA

Matthieu Le Marchand

Metalwork

Function : Others

La chaîne du Liège

Yves Sauce

https://www.facebook.com/La-Cha%C3%AEne-du-Li%C3%A8ge-188106371292400/
recycled cork supplier

Contracting method

Other methods

Energy

Energy consumption

Primary energy need for standard building : 157,00 kWhep/m^2.an

Calculation method : Other

Breakdown for energy consumption : Eventually, the heated premises of Hangar 0 will be heated by a water-water heat pump, using water from the river basin, and heat transfer from a 200 m² greenhouse. In the meantime, the spaces delivered are heated by means of closed fireplaces and inserts, with wood scraps from the construction site.

Envelope performance

More information :
The design of the layout of Hangar 0 aims to combine sobriety, thanks to high-performance thermal insulation, with passive bioclimatic principles.

The roof, the main source of loss, is insulated with 25 cm of polyurethane foam (we regret the use of this non-biosourced material, but it was imposed on us by the admissible load on the existing roof).

The peripheral walls are insulated by expanded cork panels 15 cm thick, covered with a raw earth plaster.

The containers hosting heated workshops will also be insulated from the outside, in a lighter way since they are in the temperate atmosphere of the hangar, in particular thanks to the superposition of false ceiling tiles in compressed mineral wool.

More information

The actual consumption of the building is unknown to date. As the building has a large part of unheated buffer spaces, the RT 2012 calculation is unsuitable.

Renewables & systems

Systems

Heating system :
- Heat pump

Hot water system :
- Heat pump

Cooling system :
- Others
- Others

Ventilation system :
- Free-cooling
- Single flow

Renewable systems :
- Solar photovoltaic

- Heat pump

Other information on HVAC :
Hangar 0, on the edge of the river basin, will draw its thermal energy there thanks to a water-water heat pump. The glycol water collection network located under the pontoon will bring the heated water back to the heat pump which will distribute the heating network to the offices, restaurants, shop and training areas.

Solutions enhancing nature free gains :
Les apports solaires sont recherchés, par de grands percements en façade sud, qui respectent toutefois l'architecture du pignon en s'inscrivant dans le dessin des modénatures de briques.

Environment

Urban environment

Land plot area : 2 200,00 m^2

Built-up area : 39,00 %

Green space : 1 300,00

Hangar Zero is located at the interface between the City and the Port. It is also the figurehead of the ZAC Dumont-d'Urville, a new district in the making, of which it is the southern facade facing the river basin.

Hangar Zero is connected to its environment with 3 entrances : the main entrance to the south facing the dock, the entrance on the garden side to the west and the eastern entrance to the ZAC Dumont d'Urville. Completely through, the Hangar Zéro is designed as a hall, bringing together on the ground floor the functions open to the public: restaurant, shop, shared workshops, intended primarily for the inhabitants of the district.

The Hangar Zero garden is open to the public and connected to the river promenade. It includes shared vegetable gardens for the inhabitants of the district, and a transgenerational garden, common to the vocational high school and the Senior Residence located nearby.

Products

Product

La chaîne du liège

lachaineduliege[a]gmail.com

https://www.facebook.com/profile.php?id=100064801025861

Product category : Second œuvre / Cloisons, isolation

Costs

Construction and exploitation costs

Renewable energy systems cost : 50 000,00 €

Cost of studies : 30 000 €

Total cost of the building : 1 078 000 €

Subsidies : 500 000 €

Additional information on costs :
The project is super low-cost due to the construction in participatory self-construction, with local and free materials

Circular Economy

Reuse : same function or different function

Batches concerned by reuse :
- Structural works
- Structural framework
- Locksmithing-Metalwork
- Indoor joineries

- Outdoor joineries
- Floorings
- Partitions
- Isulation
- Suspended ceilings
- Electricity
- Heating ventilation air conditioning
- Plumbing
- Landscaping
- others...

For each batch : Reused Materials / Products / Equipments :

Outdoor Facilities :

- 1,200 reused sandstone cobblestones for the low wall on the periphery of the land (these are the old cobblestones that covered the quays)

Structure:

- 8 reformed shipping containers of 20 feet
- 1 isothermal container of 40 feet

Frame:

- 10.44 m3 of reused wooden joists
- 120.8 m² of structural floor

Partitions:

- Bricks: 3,200 m²
- Hessian bags: 94,400 m²
- Earth: 2.6 m3 (only for coatings)
- Box: 0.400 m3
- Marble powder: 0.190 m3
- Hair: 0.065 m3
- Sawdust: 1.560 m3
- Parchment of coffee: 0.390 m3

Interior joinery:

- Glazing: 8.82 m²
- Glued laminated worktops: 9.3 ml

Insulation:

- Suspended ceiling tiles: 158.7 m²
- 60 mm thick polystyrene panels: approx. 39.7 m²

Field of use and material origin :

Outdoor Facilities :

Reused sandstone pavers. They come from the surroundings of Hangar Zero, whose loading docks they covered, and date back more than a century! They were used for the masonry of the fence walls on the periphery of the land. 4,000 paving stones stored outside will eventually cover the driveway and the site car park (not counted in this study).

Structure :

Shipping containers are the real bricks of Hangar Zero. They all come from the "Grand Port Maritime du Havre", bought through the company French Line Cabine from various shipping companies which are getting rid of their old, reformed or “last voyage” containers.

These containers are used as supporting elements. They are stacked on top of each other, and support timber frame floors and partitions. They rest directly on the Hangar Zero platform, without the need for foundations, apart from steel plates under the most loaded containers, in order to distribute the load on the asphalt platform.

Frame:

- Structural floor (source: Linex 76)
- Reused joists (source: Garage 3R and Actis)

Partitions:

Installation of hessian bags soaked in slip (reuse of bags that carried coffee) as a support for the body plaster composed of sawdust, coffee parchment, excavated soil, hair. Then laying the finishing coat, made up of earth (source: excavation soil, Le Havre), crushed cardboard (source: Hangar Zero waste), hair (source: the neighborhood hairdresser!).

Interior joinery:

Glazed wall in the window of the shop composed of a sill made of reused bricks (source: Le Hangar Zero), reused wood (source: Actis – Reims) and earth (source: excavation earth, Le Havre) supporting the glazing for reuse (from: Lycée du Golf, Dieppe).

Insulation:

Insulation of the south wall with reused polystyrene (source: Katoen Nati – Port Jérôme) and reuse of false ceiling tiles in compressed mineral wool (source: former Technical Center for Waste in Le Havre + EHPAD in Rouelles - Le Havre).

Environmental assessment

Impacts avoided : water, waste, CO2 :

Many avoided impacts are not quantifiable. Indeed, Hangar Zero also has an educational purpose, the objective is to raise public awareness of ecological and circular economy issues through awareness-raising workshops, participatory construction sites, site visits, etc.

Hangar Zero has a 40 m3 water retention tank that collects rainwater and stores water that will then be used for :

- water the green spaces, such as the greenhouse ;
- cleaning ;
- the realization coats earth ;
- toilet flushes.

All waste from Hangar Zero is sorted, there is a glass dumpster, a steel dumpster… The goal being that the majority of waste from the Hangar is recycled. This goes hand in hand with the recycling/resourcing project. For example, during construction, cardboard packaging (site waste) was reused in the production of the finishing coat. In the long term, the same logic is kept, the waste from the restaurant will be recovered by Le Havre de Vers in order to make vermicomposting.

With regard to CO2, the impact avoided concerns the gray energy savings that have been made thanks to the use of reused materials. For example, the containers reused in the project are made of steel, being 10-15 year old containers called “last trips”. They were at the end of their life and would therefore have been recycled, therefore remelted, which consumes a lot of embodied energy compared to simple reuse. According to the FDES of a steel beam, the steel production phase would emit around 1.4 tonnes of CO2 per tonne of steel produced. By reusing these containers, we avoid remelting them, limiting the CO2 emissions that would be linked to their recycling. Knowing that 6 containers of 20 feet of 2 T each and 1 container of 40 feet of 3.4 T were reused, the emission of more than 21 T of CO2 is avoided.

Catégories	CO2 évité (kg)	Consommation Eau évité (m3)	Déchets évités (kg)
Aménagements extérieurs	371,34	3,41	2 289,26
Aménagements extérieurs / Serrurerie - Métallerie	0,00	0,00	0,00
Charpente	37 404,44	213,53	2 154,58
Cloisons	889,67	21,38	484,92
Couverture	0,00	0,00	0,00
Couverture / Aménagements extérieurs	0,00	0,00	0,00
Eclairages	1 624,11	13,12	1 998,68
Eclairages sécurité	27,08	1,79	48,11
Equipements de génie climatique	4,98	0,03	4,57
Equipements électriques	782,82	328,17	692,35
Façades	25 117,24	311,90	12 473,31
Faux plafonds	735,07	7,53	1 307,50
Faux planchers	0,00	0,00	0,00
Faux-plafonds	0,00	0,00	0,00
Gros-œuvre	2 445,17	27,29	1 221,66
Installations sanitaires	344,26	3,93	248,75
Isolation	241,48	4,97	144,23
Menuiserie ext	1 233,69	11,57	938,60
Menuiseries intérieures	1 135,04	412,41	2 604,78
Mobilier	2 785,86	2 530,58	1 291,30
Peinture	0,00	0,00	0,00
Plomberie	0,00	0,00	0,00
Revêtements de sols	396,34	84,66	817,25
Revêtements de sols ou muraux	0,00	0,00	0,00
Revêtements muraux	35,13	7,79	75,19
Sécurité du bâtiment	0,00	0,00	0,00
Serrurerie - métallerie	1 114,31	7,74	547,71
VRD	0,00	0,00	0,00

	CO2 évité (kg)	Consommation Eau évité (m3)	Déchets évités (kg)
TOTAL	76 688,04	3 991,82	29 342,75

	Km en petite voiture	Nb de Baignoires rectangulaires	Nb d'années de déchets ménagers d'un français
Equivalent	613504	26612	59

Equivalent trajet Paris- Nice	697

L'opération de réemploi a économisé l'équivalent de 613504 kilomètres parcourus par une petite voiture, soit 697 trajets Paris-Nice, 26612 baignoires rectangulaires remplies d'eau et 59 années de déchets ménagers d'un français

Social economy

Social economy and professional integration :

The synergy of the place does not simply consist in organizing the good neighborliness of the tenants. One of the major foundations of the project consists in promoting by all means social inclusion, professional integration, cooperation, pooling and mutual assistance between all the actors of the ecosystem in order to create synergies conducive to the collective intelligence, the deployment of new projects, creativity and the invention of new forms of meaningful entrepreneurship.

Contest

Reasons for participating in the competition(s)

Hangar Zero is a place dedicated to the circular economy. The work is carried out as much as possible with reused materials to serve as a pilot project. To reuse materials, we combine recycled materials (corks, paper, cardboard, plastic, etc.) and locally sourced and minimally processed organic/geo materials such as wood, straw and raw earth. We seek innovation in the use of these materials, in order to disseminate new low-tech practices.

Today, Hangar Zero opened a first phase of work, which will be followed by other phases, which will be delivered at the end of 2022 and all at the end of 2023.

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