


The Aurore tower

by Rafael Simoes / © 2022-05-20 00:00:00 / France / 1307 / FR

Extension + refurbishment



Primary energy need :

74.38 kWh_{ep}/m².an

(Calculation method : RT existant)

ENERGY CONSUMPTION

Consumption Range (kWh _{ep} /m ² .an)	Grade	Category
< 50	A	Economical building
51 à 90	B	Building
91 à 150	C	
151 à 230	D	
231 à 330	E	
331 à 450	F	
> 450	G	

Building Type : High office tower > 28m
Construction Year : 1970
Delivery year : 2022
Address 1 - street : 18-19 Pl. des Reflets 92400 COURBEVOIE, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 38 950 m² SHON
Construction/refurbishment cost : 99 984 650 €
Cost/m2 : 2567 €/m²

Certifications :



General information

Built in 1970, the Aurore tower is **one of the first towers built in La Défense**. Abandoned for years, a time destined for demolition, Aurore was **finally heavily restructured for a new life** :

- A 6-level rise increased the number of superstructure floors from 27 to 33 levels
- The 5 levels of infrastructure and the hall level have been radically redesigned (change of destination, modification of the stairs, etc.)
- The interior of the central core has also been completely redesigned to adapt to changes in elevators, technical trades and new ways of occupying offices.

Aging in the 90s, Aurore was emptied in 1998 to be asbestos removed, its abandonment lasted 10 years. The works permit for the demolition of Aurore and the construction of a new 202metres tower, Air2 is deposited and a demolition permit is displayed on the entrance door of Aurore. The economic crisis of 2008 and the appeals of the residents, will mark in 2017 the abandonment of this demolition / reconstruction, and the entry of a new investor for the realization of a new project more respectful of the existing tower.

See more details about this project

<https://www.viguiet.com/fr/projets/tour-aurore-courbevoie>

<https://parisladefense.com/fr/decouvrir/projets/aurore>

<https://www.tpi.setec.fr/realisations/tour-aurore-defense>

Photo credit

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Stakeholders

Contractor

Name : SNC AER 2 – AMO ORFEO DEVELOPPEMENT

Construction Manager

Name : Maîtres d'œuvre principaux : Agences Viguiet et Sisto Studios - Setec tpi MOE structure - AtyS MOE fluides - Artelia MOEX – AE75 Economiste

Stakeholders

Function : Contractor

SNC AER 2

Function : Assistance to the Contracting Authority

ORFEO DEVELOPPEMENT

Morgane Koenig

Function : Assistance to the Contracting Authority

G-ON (étude carbone)

Function : Designer

Agence Viguiet

Laure Barthelot, Thomas Poletti

Function : Designer

Sisto Studios

Function : Construction Manager

Artelia Bâtiment Ile-de-France

Function : Structures calculist

setec tpi

François Lebrun

Function : Other consultancy agency

AtyS Engineering

Function : Other consultancy agency

Bollinger Grohmann

Function : Others

AE75 (économiste)

Function : Others

SOCOTEC (Bureau de contrôle)

Function : Others

Energy

Energy consumption

Primary energy need : 74,38 kWhEP/m².an

Primary energy need for standard building : 149,68 kWhEP/m².an

Calculation method : RT existant

Breakdown for energy consumption : 71 kWhEP/m²/year. Heating and DHW are produced via connection to the Enertherm heating network, air conditioning by connection to the cooling network of the same name and the rest of the uses consume electricity. In addition to these consumptions on the regulatory uses of energy, other electricity consumptions should be taken into account (office automation, servers, elevators, common areas, etc.). These consumptions are estimated at approximately 31 kWhEF/m²/year thanks to the ratios of the E+C- method.

Initial consumption : 157,59 kWhEP/m².an

Renewables & systems

Systems

Heating system :

- Urban network

Hot water system :

- Urban network

Cooling system :

- Urban network

Ventilation system :

- Double flow

Other information on HVAC :

Heating and DHW are produced via connection to the Enertherm heating network, air conditioning by connection to the cooling network of the same name and the rest of the uses consume electricity.

Environment

Urban environment

The Aurore complex is located in the town of Courbevoie, west of Paris, in the Hauts-de-Seine department, in the Gambetta district. It takes place in a dense urban fabric, made up of towers, on the edge of the slab, and adjoins the city of Courbevoie and the circular boulevard. The set proposes a complete redevelopment of the site thanks to its new influence and the deconstruction of slabs and buildings in its immediate environment. Thus, it frees up public spaces at the foot of the Tower, at the level of the slab of La Défense and Courbevoie. It actively participates in the opening up of commercial sectors in the immediate vicinity through the removal of portions of slabs. It promotes access from the circular boulevard, which will benefit the whole district, simplifying its service. And finally, the stairs built around the project reconnect the city of Courbevoie and the different pedestrian levels of La Défense.

Products

Product

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

Product category : Génie climatique, électricité / Chauffage, eau chaude

Costs

Construction and exploitation costs

Total cost of the building : 99 984 650 €

Additional information on costs :

The restructuring of the Aurore tower allowed a cost reduction of 30 to 40% compared to a new reconstruction.

The site was completed more quickly and therefore the promoter was able to rent his tower more quickly, which represents a significant saving.

Circular Economy

Reuse : same function or different function

Batches concerned by reuse :

- Structural works

For each batch : Reused Materials / Products / Equipments :

Batch affected by reuse: structural work

The **concrete volume preserved** thanks to the extension of the life of the existing tower is estimated at approximately **15,310 m³**. A quantification of the materials of the structure was carried out by crossing data from the plans of the project, the plans of the existing (DOE of 1967) and the digital model.

Environmental assessment

Impacts avoided : water, waste, CO₂ :

Given the specificity of this project (conservation of a concrete structure but no reuse/reuse in situ or external sourcing of materials), the tool for calculating avoided impacts was not suitable and was therefore not used.

An environmental study conducted by G-ON quantified the benefit of preserving the structure instead of demolishing it. When only the CO₂ emissions from the Environmental and Health Declaration Sheets of the materials making up the structure of the Tour Aurore are counted, the difference between the project and its variant (which consists of demolishing the structure to rebuild a news). The difference between the two variants includes the following steps:

1. Demolition of the structure and disposal or recycling of materials;
2. Construction of a new structure.

The environmental data used are those of the FDES when a sheet has been selected from the INIES database. For certain categories of concrete not appearing in the INIES database, the BETIE software was used to generate a specific FDES. The quantification of the environmental impact was a driving force in the choice of preservation.

The life cycle GHG emissions of the Aurore tower structure correspond to **5,621 tonnes of CO₂ equivalent**. These emissions emitted during construction had a considerable impact on the environment, hence the importance of its preservation. Impacts on the climate, to which the material impact should have been added: the management of approximately **42,400 tonnes of waste** generated by the demolition (approximately 1,500 semi-trailers), as well as significant nuisances on the environment near the tower during of the construction site.

Contest

Reasons for participating in the competition(s)

We draw attention to two subjects:

- **Non-demolition**, and the engineering necessary to maintain structures that would have been easier to demolish.
- **The carbon impact avoided** for the construction of a new tower.

Circularity

The hierarchy of waste treatment methods indicates as a priority: prevention of waste generation, then preparation for reuse, then recycling and disposal. The strategy developed for the rehabilitation of the Aurore tower allows significant waste avoidance. The implementation of a structural diagnosis and high-tech strategies made it possible to overcome the obstacles which, for the majority of the works, would have led to demolition. The conservation objective having been achieved, thousands of tons of rubble were avoided thanks to the non-demolition as well as the pouring of a large quantity of concrete for the construction of a new tower.

The rehabilitation of the Aurore tower offers another reading of the circular economy and reversibility. Reversibility is materialized here by the maintenance of existing structures which are doomed, without technical expertise, to demolition. The preservation of existing structures and the material that composes them sometimes requires high technicality to ensure the durability and safety of the structures, and thus extend their lifespan.

Reproducibility

To extend the life of a structure, the auscultation and diagnostic phase made it possible to measure the state of the existing structure, and to identify the margin of

action in order to take advantage of it during the elevation project. This phase must make it possible to issue an opinion on the quality of the initial design, to characterize the materials used, as well as to retrace the maintenance and operation of the structure during its first life cycle. This is an essential step to ensure the conformity of the existing structure and authorize the elevation. The very good knowledge of the existing (plans found, numerous reconnaissance campaigns) and the good condition of the structure were decisive.

Innovation

From the outset, the renovation project was imagined by all its designers to be as virtuous as possible in environmental terms. The desire to minimize the reinforcement of the existing structure led to a design of the elevation by means of a mixed light structure compatible with the IGH constraints (steel/concrete with collaborating floor). The number of floors added has been adjusted according to the capacity of the existing structures and by limiting the reinforcements to the raft.

In response to the in-depth diagnosis carried out, the rehabilitation project for the existing structure is carried out by choosing an appropriate solution. The increase in stresses by adding additional floors requires reflection on the exact need: by raising what is necessary and what can be compared to the existing one so as not to generate renovation work, too much reinforcement. The reinforcement solution must be reasonably established so as not to have a high environmental cost in relation to what is preserved. This is why the elevation was limited to 6 floors.

In the same way, the pavilion was designed to respect the existing structures of the car park as much as possible and to avoid inappropriate reinforcement.

