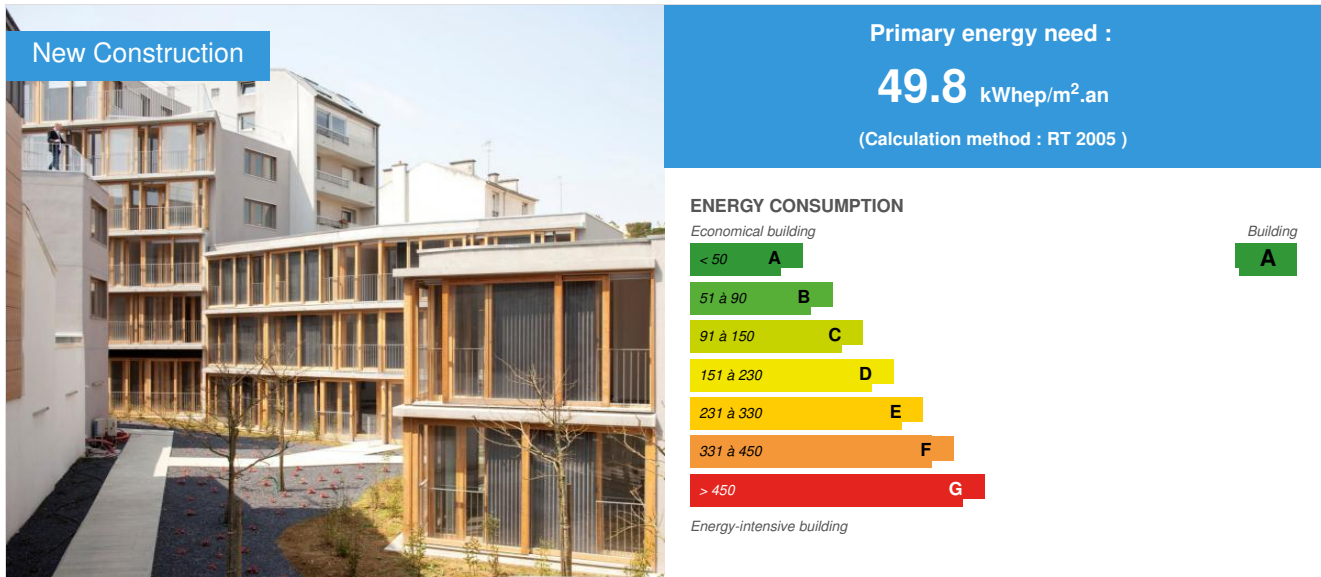


Bioclimatic building of social housing in Paris

by APC Fabrice FOURIAUX / 2013-11-28 11:53:45 / France / 29311 / FR



Building Type : Collective housing < 50m
Construction Year : 2012
Delivery year : 2013
Address 1 - street : 17-19 rue des Orteaux 75020 PARIS, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 1 785 m² SHON RT
Construction/refurbishment cost : 3 750 000 €
Cost/m2 : 2100.84 €/m²

Certifications :



General information

This social housing building, led by the SIEMP, offers 20 apartments in the 20th arrondissement of Paris. This building program was awarded with a distinction during the "Equerre d'Argent" 2013 Architecture Award.

This realization in accordance with the Paris Climate Protection Plan demonstrates how important it is to integrate bioclimatic architecture principles to the site (orientation of the bays, inertia...) and to the technical elements of the building (single-flow ventilation preheated by a collector wall, bays exposed to high solar transmission, highly reflective blinds).

The collector wall is highlighted by this case study. Its principle relies on the use of passive solar energy. Once absorbed and stored within the collector wall, that same energy offers free kWh and great thermal comfort. That way, the wall heats the air flowing in its surroundings before getting inside the rooms to renew the air inside. This preheating process saves all the energy normally needed to warm up the outside air entering the rooms in the winter.

(c) photos Clément Guillaume

Sustainable development approach of the project owner

This social housing building with twenty apartments was ordered by SIEMP (City of Paris Real Estate Public-Private Joint Venture). The building is located 17-19 rue des Orteaux in the 20th arrondissement of Paris. It received a distinction during the "Equerre d'Argent 2013" Architecture Award, powered by Le Moniteur (french construction magazine).

Created by Boidot-Robin architecture agency, the building was delivered in June 2013. It integrates a bioclimatic 'double skin' equipped with collector walls, which allows a very high energy performance and ensures an increased comfort for the tenants no matter the the season.

Replacing an insalubrious building, this housing is implanted in the Ecoquartier Frequel Fontarrabie who received one of the first national labels "Ecoquartier". (Eco-city)

Architectural description

Coming soon

Stakeholders

Stakeholders

Function : Contractor
SIEMP

l.mure@siemp.fr

<http://www.siemp.fr/>

Function : Designer
Armand Nouvet (BNR architectes)

Armand Nouvet armand.nouvet@anau.fr et Julien Boidot contact@boidotrobin.fr

<http://armandnouvet.wordpress.com/>

Function : Thermal consultancy agency
SNC Lavalin

<http://www.snclavalin.com/index.php?lang=fr>

Function : Other consultancy agency
RFR Éléments

Benjamin Cimerman info@rfr-elements.com

<http://www.rfr-elements.com/>

Function : Company
Francilia

<http://francilia.fr/>

Function : Others
BTP Consultants

Contrôleur technique

<http://www.btp-consultants.fr/>

Function : Others
GTIF

<http://www.gtif.fr/>

Function : Environmental consultancy

Energy

Energy consumption

Primary energy need : 49,80 kWh/m².an

Primary energy need for standard building : 91,50 kWh/m².an

Calculation method : RT 2005

Breakdown for energy consumption : 24.2 HeatingLighting 2.1VMC 1.40.7 AncillaryECS 14.8TOTAL 43.2

Real final energy consumption

Final Energy : 43,20 kWh/m².an

Envelope performance

Envelope U-Value : 0,56 W.m⁻².K⁻¹

More information :

It is important to remember that in parallel to research on solar energy capture (double glass façade, collector wall), the project also seeks to retain this energy, hence a substantial wall insulation. Also, when possible, the insulation is placed on the outside, in order to limit thermal bridges ($R \geq 5 \text{ Km}^2 / \text{W}$). When the constructive processes don't allow any insulation on the outside, a insulation on the inside is chosen ($R \geq 5.3 \text{ Km}^2 / \text{W}$), coupled with thermal bridge breakers at the slab ($\Psi \leq 0.25 \text{ W/ml.K}$). On the roof, insulation is also external ($R \geq 5 \text{ Km}^2 / \text{W}$); on ground level floor, parking floors re insulated on the underside ($R \geq 6 \text{ Km}^2 / \text{W}$), with a vertical drop of insulation of at least 50 cm - the floors on terreplein are also insulated on the underside ($R \geq 5 \text{ Km}^2 / \text{W}$, cellular glass type "foamglass" or equivalent)

More information

On the façade, the glass double skin is thickened fore the living-room to become an actual sunroom and a micro-greenhouse. It lets sunrays through to reach to the collector walls. Those are great black prefabricated concrete elements. In the winter, the air those collector walls and the sunroom preheat is distributed by humidity sensitive air handling unit (Hygro B) into the rooms. In the summer, highly reflective blinds act as blockers for the collector walls, which prevents any undesired overheating. The physical principle of collector walls is based on 5 properties: color (solar absorption), the shape (profile), the thickness, the material and roughness. The double skin frontage includes glass bays with maximum transparency it is a glazed maximum transparency ($T_e \geq 90\%$ "extra light" type) of a heavy dark collector wall, then comes the insulating material (thermal resistance $R 3.75 \text{ k.m}^2 / \text{W}$).

Renewables & systems

Systems

Heating system :

- Condensing gas boiler
- Water radiator

Hot water system :

- Condensing gas boiler
- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Humidity sensitive Air Handling Unit (Hygro B)

<https://www.construction21.org/france/data/sources/users/2242/docs/chaudiere-rue-des-orteaux.docx>

Renewable systems :

- Solar Thermal

Renewable energy production : 45,00 %

Environment

Urban environment

In the early 2000s, the rehabilitation of the Reunion district, in Paris 20th arrondissement coming to an end. Only the renovation of the "Fréquel Fontarabie" neighborhood remains. This block is recognizable for its disparate and often degraded housing: modern buildings and picturesque buildings of parisian faubourg architecture are mixed around large empty spaces. The housing stock is particularly dilapidated.

The project:

Deepened concertations with participatory workshops were conducted in the area. Dialogue between residents, associations, developers and technical services for the City allowed the project to be born as it is presented today. The goal is to reduce insalubrity by creating housing following the standards of modern comfort. The existing school sees its courtyard extended and renovated while the area adopts new proximity equipments (Medical Center for Children and a childcare center) and local activities. The land at the center of block is now transformed into a public green space and pedestrian areas. New buildings now coexist with rehabilitated ones. Their studied proportions and volumes allow to recreate a continuous fabric directly inherited from the spirit of traditional suburbs around the central space. Finally, high demands on sustainable development are emphasized and the new block becomes an exemplary eco-city. The site has been noticed during the eco-cities competition in 2009 for its energy savings.

Costs

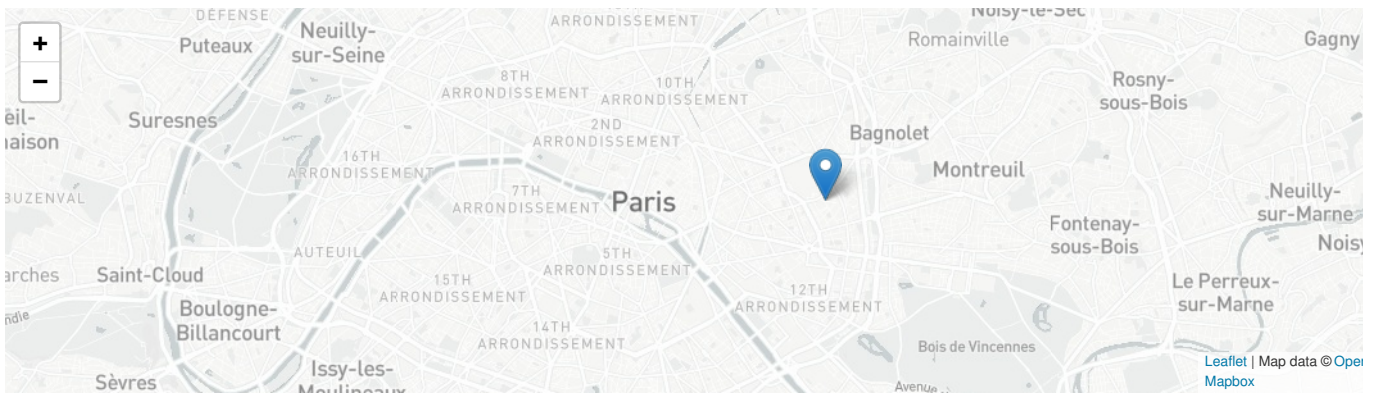
Construction and exploitation costs

Global cost : 3 750 000,00 €

Carbon

GHG emissions

GHG in use : 10,00 KgCO₂/m²/an



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