Vil·la Urània: complex of public facilities

by jordi pagès serra / 2017-06-13 19:52:45 / Espagne / 18207 / ES

Primary energy need :

34.52 kWhpe/m².year

(Calculation method :)

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 : Other building
Construction Year : 2017
Delivery year : 2017
Address 1 - street : 08006 BARCELONA, España
Climate zone : [Csb] Coastal Mediterranean - Mild with cool, dry summer.

Net Floor Area : 2 686 m²
Construction/refurbishment cost : 5 291 259 €
Number of none : 1 none
Cost/m2 : 1969.94 €/m²

Certifications :

Proposed by :

BIM/SA
Barcelona d'Infraestructures Municipals

General information

Vil·la Urània is a small residence of the late nineteenth century that was home to the renowned astronomer Josep Comas i Solà, in the district of Sarrià-Sant Gervasi in Barcelona. The re-densification of the neighborhood left the building and the small surrounding garden encased between two large dividing walls. The new complex of facilities assumes the challenge of giving a new life to the existing building and gardens by incorporating them into a new building with low environmental impact and reduced energy consumption. The new equipment, with more than 3200m2, stands out for the use of intermediate spaces, naturally heated, closed by a large facade formed by several overlapping filters that adapt to the external conditions, providing a vegetal facade that accompanies the users in all their activities.

See more details about this project

http://www.sumo-arquitectes.com/catv3/projectes/complex-equipaments-urania/
http://onsiteurania.tumblr.com/
http://hicarquitectura.com/2014/01/sumo-arquitectes-yolanda-olmo-1r-premio-concurso-vil%c2%b7la-urania/

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Designer

UTE SUMO arquitectes SLP (jordi pagès, Marc Camallonga, Pasqual Bendicho) + Yolanda Olmo

Sumo Arquitectes. Barcelona

http://www.sumo-arquitectes.com/catv3/projectes/
First prize in public competition, Project and Management of works

Function : Construction Manager

UTE Dragados-Acsa Sorigué

Function : Structures calculist

Manuel Arguijo i Asociados

Function : Construction company

AIA Instal·lacions arquitectóniques

Function : Thermal consultancy agency

Dekra

Function : Other consultancy agency

Q estudi. Presupueto y mediciones

Function : Facility manager

Viading

Function : Developer

BIMSA

Function : Others

Aitor Estèvez. Fotografia

http://www.aitorestevez.com/

Contracting method

General Contractor

Owner approach of sustainability

The promoter of the building is the Barcelona City Council. Bimsa is the municipal company in charge of the management and supervision of the projects. The terms of the tender and the specifications laid down the need to introduce sustainable and energy efficiency parameters, aiming to achieve almost null consumption buildings nZEB.

Architectural description

Vil·la Urània is a small residence of the late nineteenth century that was home to the renowned astronomer Josep Comas i Solà, in the district of Sarrià-Sant Gervasi in Barcelona. The re-densification of the neighborhood left the building and the small surrounding garden encased between two large medianeras. The new complex of equipment assumes the challenge of giving a new life to the existing building and gardens by incorporating it into a new building of low environmental impact and reduced energy consumption. The extension is conceived as a tall and narrow building, oriented to South-east with a large gallery, a semi-detached greenhouse, which passively air-conditions the meeting areas and informal activities as well as the circulation of the building. This intermediate space functions as a winter greenhouse and as a shade in summer, and acts as a thermal mattress by separating the heated areas from the outside, reducing the energy demand of the building. The facade adapts automatically to outdoor conditions. Indoor temperature sensors act on the glass facade, opening it completely when necessary. Outside probes measure solar radiation by acting on the folding shutters in summer. The inner plantation formed by different species provides a

pleasant sensation of freshness in summer, while in winter reduces its volume to allow to capture the solar radiation. The building envelope has been designed to achieve low thermal transmittance, minimize thermal bridges and a high level of tightness.

Energy

Energy consumption

Primary energy need : 34,52 kWhpe/m^2.year

Primary energy need for standard building : 195,93 kWhpe/m^2.year

Calculation method :

Final Energy : 17,67 kWhfe/m^2.year

Breakdown for energy consumption :
Heating: 3,26kWhFE / m2year
Cooling: 5,29kWhFE / m2year
ACS: 1.75kWhFE / m2year
Lighting: 7,37kWhFE / m2year

Initial consumption : 1,00 kWhpe/m^2.year

Envelope performance

Envelope U-Value : 0,26 $W.m^{-2}.K^{-1}$

More information :
Cover U: 0.23 W / m2K
U Facade: 0.26-0.31 W / m2K
Walls buried U: 0.26 W / m2K
Solera U: 0.44 W / m2K.
The glazings have been selected depending on their specific location:
- Glazing between interior and exterior: Ug: 1,3 W / m2K TL: 70% g: 0,41
- Glazing between interior and exterior space: Ug: 1,5 W / m2K TL: 78% g: 0 , 65
- Intermediate and Exterior Glazing: Ug: 5.4 W / m2K TL: 80% g: 0.82
Wood carpentry U: 2W / m2K

Building Compactness Coefficient : 0,29

Indicator :

Users' control system opinion : The control system has been designed with a friendly and intuitive interface. The elements that affect the comfort and usability of the building are also controlled by manual controls. Automated blinds are automatically controlled, but switches in the gap allow them to be operated in separate blocks manually. The manual operation has a predetermined duration (configurable) and then goes back to automatic mode.

Renewables & systems

Systems

Heating system :
- Geothermal heat pump
- Others

Hot water system :
- Heat pump

Cooling system :
- Geothermal heat pump
- Chilled Beam

Ventilation system :
- Natural ventilation
- Nocturnal ventilation
- Free-cooling
- Double flow

Renewable systems :
- Solar photovoltaic
- Heat Pump on geothermal probes

Renewable energy production : 37,54 %

En la aportacion de renovables no se ha contabilizado la fraccin renovable de la Geotermia

Other information on HVAC :
High efficient active systems have been chosen, so the building has a 200kW geothermal heat pump with 11 wells 100m deep (100kW) combined with a 160kW remote evaporator for peak times and for when the outside temperature is more favorable for the exchange. The rooms have inductors (cold cars) and a primary air system provided by high efficiency heat recovery units with frequency inverter and possibility of freecooling, controlled in each room by presence sensors and CO2 to perform the air renovation alone When necessary. The lighting is LED and the building has photovoltaic production with 19kWpic installed.

In the contribution of renewables (37.54% of PE), the renewable fraction provided by geothermal energy has not been counted (if we include geothermal energy, the percentage is 63%)

Solutions enhancing nature free gains :
The intermediate space is naturally air-conditioned. The dynamic facade controls its configuration at all times

Smart Building

BMS :
The dynamic facade adapts automatically to what happens outside and inside. The large glazed façade opens automatically in 12 independent zones, and each zone is controlled by an interior temperature sensor.

Smartgrid :
The building has a complete monitoring system. A custom interface has been designed so that part of the data (electricity consumption, photovoltaic production, temperatures etc.) is available on indoor monitors.

Users' opinion on the Smart Building functions : The building has a control system, whose interface has been carefully designed. Some functions can be controlled manually without having to access the control console, to promote interoperability with users. The manual mode has a preset duration (configurable) and then returns to automatic mode. The opinions of the first users are favorable, once they overcome the fear of a complex system, they find it intuitive and logical.

Environment

GHG emissions

GHG in use : 3,65 $KgCO_2/m^2/year$

Methodology used :
Method of calculation: energy certification; heating, cooling, ventilation and auxiliary, ACS and lighting

Water management

Consumption from water network : 146,70 m^3

Consumption of harvested rainwater : 57,70 m^3

Water Self Sufficiency Index : 0.28
Water Consumption/m2 : 0.05
Water Consumption/none : 146.7
For irrigation, a buried deposit of 20,000L has been designed. The irrigation system is by dripping to achieve an efficient use of water. The irrigation of the interior plantation is done with a closed circuit with fertiirrigación adjusting the quantity of water to the time of the year. The deposit also covers the irrigation of the garden of the plot. Whenever possible, autochthonous plants with low water consumption have been selected. The irrigation system was designed to cover 100% of irrigation needs with rainwater.

Indoor Air quality

During construction, materials and construction systems with very low VOC content have been selected. Priority has been given to natural materials of low elavoration and with little treatment, leaving them exposed. Thus, wood and concrete are the predominant materials in the interior. To achieve the best air quality and at the same time reduce energy consumption, air renovation has been arranged according to the needs of each room. All rooms in the building have presence sensors and CO2 so that mechanical ventilation is activated only when necessary. The intermediate space (20% of the building) is ventilated naturally, with different intensities depending on the time of year. In summer the facade is totally open and the inner courtyard collaborates in generating a good cross ventilation.

Comfort

Health & comfort : In order to favor a healthy work environment, natural low-VOC materials and non-static electricity storage were prioritized. All the rooms of the building have natural light. On the other hand the large areas corresponding to the garden gallery favor the relationship between the occupants, a natural air conditioning and the contact with the outside (the intermediate space helps the users to become aware of the changes of season, and the building is in constant evolution).

Calculated thermal comfort : El edificio se ha dividido en tres áreas con diferentes niveles de confort, atendiendo a las actividades que se van a desarrollar; ESPACIO EXTERIOR: Escalera, patio, terrazas etc sin ningún acondicionamiento. ESPACIO INTERIOR: Climatizado. 21ºC-26ºC. ES

Products

Product

Swegon heat recuperator

swegon

Swegon S.A.U C/ Lope de Vega 2, 2ª planta. 28231 Las Rozas, Madrid.

http://www.swegon.com/

Product category :

High efficiency heat recovery units

Silent and compact. Acceptance by all parties has been very good

Halton Rex chilled beams

Halton

C/ Jerez de los Caballeros, 2 (BBC) 28042 Madrid España Tel. +34 913 058 503 Fax + 34 917 467 006

https://www.halton.com/es_ES/halton/products

Product category :

Ceiling induction elements. Active chilled beams that provide heating and cooling by incorporating treated renewal air from the heat registers

Easy maintenance, no fans or filters. They are "exposed", facilitating access to controls and drives

Costs

Construction and exploitation costs

Total cost of the building : 5 691 259 €

Urban environment

The building is located in a very consolidated area of the city center of Barcelona with different options of public transport. Vil·la Urània was surrounded by large dividing walls of the adjoining buildings. The high and narrow building was designed to avoid the demolition of the preexisting vil·la and with its little occupation to liberate an interior garden.

Land plot area

Land plot area : 1 119,00 m^2

Built-up area

Built-up area : 551,75 %

Green space

Green space : 567,25

Building Environnemental Quality

Building Environmental Quality

- indoor air quality and health
- consultation - cooperation
- acoustics
- comfort (visual, olfactive, thermal)
- water management

- energy efficiency
- renewable energies
- products and materials

Contest

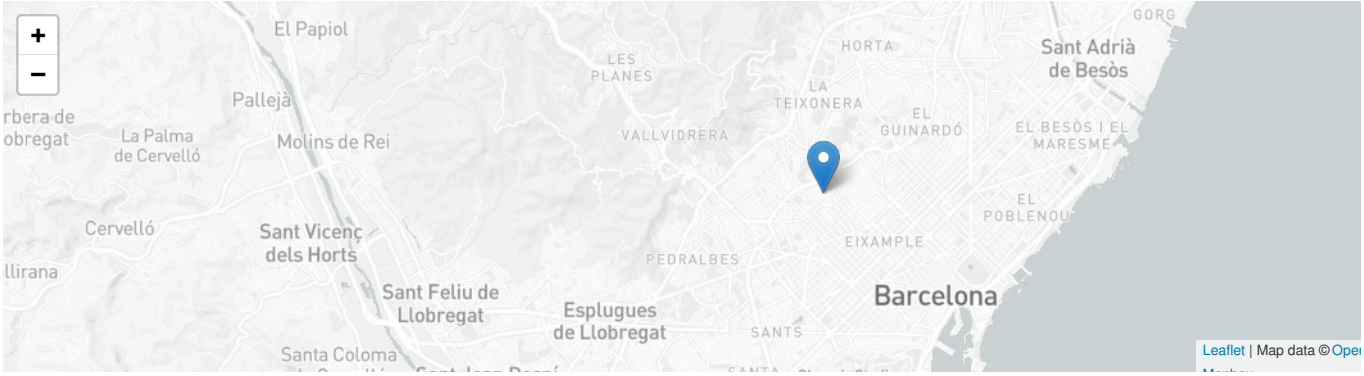
Building candidate in the category

Energía & Climas Templerados

Salud & Comodidad

Edificio Inteligente

Premio de los Usuarios



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