Technology Center LEITAT

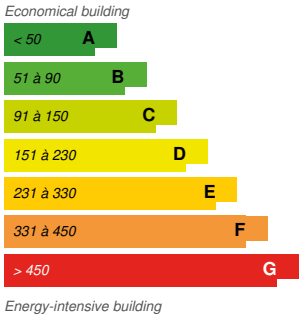
by Pau Casaldaliga / 2014-11-20 16:25:50 / España / 17003 / ES

Primary energy need :

1304460 kWhpe/m^2.year

(Calculation method : RD: 47/2007)

ENERGY CONSUMPTION



Building Type : Other building
Construction Year : 2014
Delivery year : 2014
Address 1 - street : 08005 BARCELONA, España
Climate zone : [Csb] Coastal Mediterranean - Mild with cool, dry summer.

Net Floor Area : 3 545 m^2 Other
Construction/refurbishment cost : 5 239 883 €
Cost/m2 : 1478.11 €/m^2

Certifications :

4 hojas VERDE 3,5 - 4,5

General information

The building is intended to applied research in the fields of Biotech, Nanotech and new technologies. In one approach to the place where the building is located, the interest is found to activate the center of the block, linking it to the open space of the street and providing passage through the building, to convert the existing pubic space in a meeting point. The presence of the building intended to link, but not figuratively, with the existing built front, proposing, abstractly, a continuity in the skin texture of the traditional city. We propose a building conceived from separate components that can be produced industrially and with similarities with the place, in order to get a body built very flexible for its subsequent uses, including its deconstruction. The architecture has been designed to act as an interface or balancing factor between the climate conditions outside and inside, not a watertight barrier but as a membrane that filters and exchanges with the surrounding conditions. The facade has an efficient envelope that responds to all the physical requirements of the building - structure, screening, natural light, insulation and services.

See more details about this project

http://www.picharchitects.com/portfolio-item/centro-tecnologico-leitat/

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Developer

Fundación LEITAT

C/ de la Innovació, 2 - 08225 Terrassa (Barcelona)

http://fundacionleitat.org

Function : Designer

Pich-Aguilera Arquitectes

Àvila 138. 4º 1ª. 08018 Barcelona, Tel.: 93 301 64 57 Fax: 93 412 52 23, e-mail: info@picharchitects.com

http://www.picharchitects.com/

Function :

Bomainpasa, S.A

Avila 138 3ªplanta 08018 Barcelona, Tel. +34 934 144 762, Fax +34 932 020 412, e-mail: bcn@bomainpasa.com

http://www.bomainpasa.com/

Function : Construction company

PGI Grup

C/ Llull, 329 - 2ª Planta 08019 - Barcelona, Tel: +34 933 633 009, FAX: +34 902 006 731, email: pgibcn@pgigrup.com

http://www.pgiengineering.com/

Contracting method

Lump-sum turnkey

Owner approach of sustainability

The LEITAT FOUNDATION, under the collaboration agreement with the Leitat Technology Center, needs appropriate facilities to implement in the 22"arroba" sector Barcelona of a building for applied research, with the aim of consolidating service delivery to companies providing them an industrial sector of high technological value, taking the projected location in this neighborhood, the intention to create new activities coordinated with companies located in the district of innovation and social partners in the Biotech, Nanotech areas, and new technologies.

Architectural description

The construction of a new building is proposed to house the Leitat technology center to act as a new way to link to existing networks. The main objective of the proposal is to enable the center of the island and link it to the open space of the street. The objective is to project and execute a unique building of 2,390 m2 above ground that will try to combine the highest standards in energy efficiency management and home automation, with the aim that the building itself happens to be a technological project. The initial design is projected for about 120 people, but the flexibility in facilities will adapt to ongoing projects and will make this figure can vary significantly. The main volume on the street facade Pallars has a maximum height of 22 meters to put it in relation to the height of the volume of existing office building and the maximum height of the consolidated front.

Energy

Energy consumption

Primary energy need : 1 304 460,00 kWhpe/m^2.year

Primary energy need for standard building : 8 958 550,00 kWhpe/m^2.year

Calculation method : RD: 47/2007

CEEB : 1.4607

Final Energy : 579 976,00 kWhfe/m^2.year

Breakdown for energy consumption :

Lighting kWh electricity 190852.4 1243.0 kWh electricity Refrigerating pumps and auxiliary-power 10478.1 300068.7 kWh electricity Fans-Heating-electricity 138.8 kWh; natural gas 1060.4 76134.8 ACS-natural gas

Envelope performance

Envelope U-Value : 0,32 $W.m^{-2}.K^{-1}$

More information :

CubiertaComo of the tall building generally cover a roof garden water deposit INTEMPER type, or similar. Trafficable areas will be resolved with a cistern system with insulation boards, porous concrete like Filtrón or similar is proposed. It is composed as follows: The flat roof Intemper type cistern or equivalent system: - Layer mortar leveling- Feltemper type geotextile sheet or Rhenofol CG equivaliendo- type pan or equivalently Feltemper type geotextile sheet or height-adjustable feet equivalent- PVC-walk areas: Double layer slab Filtron type R-7 or equivalent, 60x60cm placed discontinoulsy composed of a layer of extruded polystyrene insulation 4cm to the base, and a layer of porous concrete 3cm.- Areas impassable: geotextile and soil with plants 7cm blade. As implementation of supplementary finishing superimposed concrete slabs photovoltaic panels is proposed. The volume of ground floor and two north of the building with a flat roof just TFDE Intemper or equivalent type, which composa with waterproofing and insulation composades slabs and porous concrete Filtrón type. It is composed as follows when: The flat roof Intemper cistern type or equivalent system: - Layer mortar leveling- Feltemper type geotextile sheet or Rhenofol CG equivalent- type pan or equivalently Feltemper type geotextile sheet or equivalently layer slab type Filtron R-7 or equivalent, 60x60cm discontinously placed above a thermal insulation layer extruded polystyrene. External closures. will cure the closures may dampen outside noises and encourage minimize energy consumption, increase comfort and minimize mantenimiento. This envelope is composed of a first outer layer lames concrete aggregates composed of granitic vibro-pressed, opacity of a 40/60% or 25/75% according to user requirements, which diffract sunlight to produce a non-directional inner light and simultaneously avoid overheating.- plates wind-Screen types Breincobluefuture or equivalent formed 900x300x35mm prefabricated concrete slabs, according to UNE EN 1339, composed of granitic aggregates vibro-pressed stone-like mass-colored, waterproofed and pigmented with inorganic iron oxides high resistance to weather and solar radiation with minimal content in recycled aggregate 15% and equivalent photocatalytic properties, decontaminating, biocides and self-cleaning, Airclean types of Breinco or mounted on structure of tubular steel profile 50x30x4 cold galvanized, attached to the metal structure of the building by anchors and fasteners then there galvanized. A steel ventilated air cavity. In this same chamber are arranged in proper cadence, all vertical paths necessary facilities so that only the connection to horizontal interior layout of the building, which can be flexible in each case must be provided. All plots facilities in this area will have to be seen what is the isolation needed and always finish in silver colour. Next there is an integrated layer continues to the structure composed of a horizontal sill sandwich panels by continuous format metal with rockwool silver finish outside arranged horizontally fixed to a tubular galvanized metal substructure. Distribution according to plans. Following the same plan continues there is a horizontal strip of sliding windows. Thermal transmittance glass Uno= 2.8 (5 + 12 + 4 + 4).

Building Compactness Coefficient : 0,29

Indicator : HE1 BD

Air Tightness Value : 2,00

Real final energy consumption

Real final energy consumption/m2 : 126,30 $kWhfe/m^2.year$

Renewables & systems

Systems

Heating system :

- Urban network
- Low temperature floor heating

Hot water system :

- Urban network
- Solar Thermal

Cooling system :

- Urban network
- VAV Syst. (Variable Air Volume system)

Ventilation system :

- Natural ventilation
- humidity sensitive Air Handling Unit (hygro A

Renewable systems :

- Solar photovoltaic
- Solar Thermal

Renewable energy production : 90,00 %

Other information on HVAC :

The system consists of a central unit Air Treatment (UTA) located on the roof of the building and has the corresponding fan modules, filters, heating coil and heat recovery, as well as the corresponding admissions and withdrawals air Exterior. Air conditioning ducts descend from the facilities placed on deck facade.

According to the specific project of solar thermal justification, the building does not require system thermal solar collector to have a connection to the network of "District Heating" "Cooling" (Districlima) For the calculation and design of solar gain has been consider the following features: · Location and location of the building · Situation of solar collectors · the occupation of the building is planned for 150 people and use agrees with the aforementioned activity in chapter 2.1.Un

photovoltaic system connection network, is one that harnesses the sun's energy to transform it into electrical energy that is transferred in the conventional network because it can be consumed by any user connected to it. The large-scale extension of these applications has necessitated the development of a specific engineering that allows, on the one hand, optimize design and operation and, on the other, assess the impact on the entire electrical system, having always cure systems integration and respecting the architectural and ambiental environment. The high reliability and long life of photovoltaic systems must be highlighted. On the other hand, its almost maintenance-free and have a great simplicity and ease of installation. Also, the great modulation of these facilities can propose projects in stages and adapt to the needs of each user, either according to their needs or economic resources . The PV array format by a series of connected modules together, is responsible for transforming the sun's energy into electricity. This energy, but is in the form of direct current and has to be transformed by the inverter into alternating current for coupling to the conventional network. So for photovoltaic modules continues to generate a current proportional to the solar irradiance impinging upon them. This will bring the inverter is running, and using power technology, makes alternating current at the same frequency as the electrical network and thus is available for any power generated user. And measured by a corresponding counter, will sell the distribution company as stated above Royal Decree. In an installation they can be used several inversors, each with its photovoltaic generator independently. This gives a great modulation system both for future extensions to perform maintenance, etc. INVERSORS The power of the proposed facility in running 7.84 kW AC is above the minimum marking of regulations. The 7,27kW photovoltaic generator will be installed to cover as indicated by the high plateau, trying to get the best integration architectural therein, with minimal loss of performance of the system. As shown, the high plateau will integrate with the same slab, since the characteristics of this permit: insulating and draining fotovoltaïcs modules (BIPV) for covered , protection of waterproofing protection of the waterproofing membrane waterproofing membrane protection against intemperie. The conventional network connection will be implemented in phase with investors feeding each fases. On the other hand, it is necessary to include to install an energy meter input to the photovoltaic system in order to deduct from the energy generated, of which this will be able to consume from the conventional net. The basic network installation components are: 1 slab FILTRÓN SOLAR photovoltaic Intemper SLAB Y-40 model R10 (196 modules) 2 Inverter SMA model SB3300.3 support structure 196 bidireccional5 módulos4 energy meter installation Kit: wiring, junction box, etc.

Solutions enhancing nature free gains :
Active alveolar plates that provide natural ventilation most of the rooms of the building

Smart Building

BMS :
For the power level, and to make good energy management, a network analyzers has been installed at 3 main tables (one for each type of power supply), is to say, the Table General Normal, Table General Emerg

Smartgrid :
Energy production is local and renewable.

Environment

GHG emissions

GHG in use : 50,00 $KgCO_2/m^2$/year

Methodology used :
energy software

GHG before use : 56 050,20 $KgCO_2$ /m^2

Building lifetime : 50,00 year(s)

, ie xx in use years : 1121

GHG Cradle to Grave : 2 518,00 $KgCO_2$ /m^2

The calculation of CO2 emissions of each of the materials has been calculated TCQ program, a program that is supplied with the database BEDEC, the ITEC.

Life Cycle Analysis

Material impact on energy consumption : 788 867,00 kWhEP

Eco-design material : Adopt constructive solutions to optimize the performance and costs. We can generally say that a constructive level, aims to solve the most basic problems of a building of these characteristics, with simple and clear solutions, also providing reflection on new materials and sustainability criteria wherever they may actually be an improvement.

Water management

20.29 m3 tank capacity rainwater

Indoor Air quality

CO2 concentration in the indoor air in parts per million by volume (ppm) concentration above outer dela: 648.20

Products

Product

Surround System Dry photocatalytic

Breinco

Tel. (+34) 938 460 951, E-mail: breinco@breinco.com

http://www.breincobluefuture.com/es/airclean

Product category :

Surround system based dry cement pieces pressed fiber without metal reinforcement; with the inclusion in the mass of nanoparticles to refract light, incorporating a luminescent effect and photo-catalytic acquiring (NO2 absorption) properties.

By the actors and workers is an excellent material because it is characterized by its quick and easy assembly, apart from the ecological advantages photocatalysis getting cleaner air.

Filtron slab to cover cistern

DANOSA SA

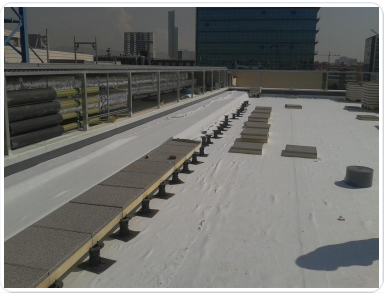
Tel.: +34 949 888 210, E-mail: info@danosa.com

http://portal.danosa.com/danosa/CMSServlet?node=T33&lng=1&site=1

Product category :

Indoor storage tank for rainwater, based on maintaining a natural substrate wetted by capillarity.

By the actors it was readily accepted by the advantages of saving in irrigation of vegetation cover by storing water through the slabs allow filtering this.



Vegetable blanket for cover cistern

SEMPERGREEN

Tel.: +34 930130066, E-mail: order@sempergreen.com

https://www.sempergreen.com/es/productos/alfombras-de-vegetacia-sup3-n

Product category :

Sedum blanket, produced 100% biodegradable coconut on a blanket, a mixture of substrate and 8-11 Sempergreen varieties of sedum. Suitable for covering roofs of buildings and extensive landscaped areas with low maintenance.

Quick and easy assembly, durable and with native plants

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prefabricated hollow core slabs

SUBEROLITA SA

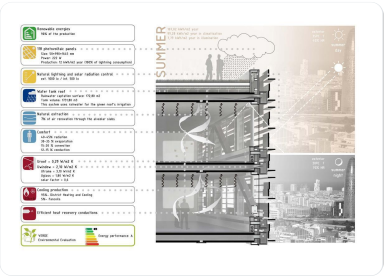
Tel. 935 053 600, E-mail: info@suberolita.cat

http://www.suberolita.cat/?p=59&lang=ca

Product category :

Prefabricated concrete hollow core slabs which through them extract and renew the air inside

Quick assembly and consequently we reduce CO2 emissions. In addition, radiation bring into stays all the inertia of the material, heat or cool the interior is stored on the plates and radiates inwards along night, getting temper and maintain the temperature, reducing demand building energy.



Costs

Construction and exploitation costs

Total cost of the building : 5 239 833 €

Energy bill

Forecasted energy bill/year : 20 202,20 €

Real energy cost/m2 : 5.7

Real energy cost/none : 4040.44

Urban environment

The building in the neighborhood Understanding 22 "arroba" as an overlay network that energize the pole of the city, you need to think in a building that acts as a new way to link to existing networks and also helps to generate value in this shared system. In the neighborhood several specific networks converge generically could identify how; network of companies that generate knowledge and economic value, MOBILITY network in terms of communication and transport, energy network linked to the distribution of different production systems and finally centralized network services to boost activity in the neighborhood. The building / the place A further approximation to the place where the building has to be located, we appreciate the need to activate a center island, until now residual, linking the open space of the street and simultaneously promoting the passage of pedestrians through it, to turn this empty space in a home for people meeting the very middle of the city. The arrangement on the ground floor of the center bar, closely linked to the public space, reinforces this intention. In this regard, we propose a massing that is itself a great porch that serves as shelter for uses related to this meeting place, and at the same time to open the maximum visual center line to the street island. The presence of the building intended to link to, but not figuratively, with the existing built front abstractly proposing a continuity in the skin texture of the traditional city. FLEXIBLE BUILDING, FUNCTION, SURROUNDING Our project proposes a very flexible built body, to the extent that has an efficient envolvent that responds to all the physical requirements of the building - structure, screening of natural light, insulation and provides services - so that indoor plants are completely diaphanous and suitable for any functional adaptation.

Land plot area

Land plot area : 646,58 m^2

Built-up area

Built-up area : 81,50 %

Green space

Green space : 202,86

Parking spaces

Floor -2: 445.8 m2; -3 Floor: 400.74 will be available 26 car spaces with dimensions of 2.2x4.5, one of 2x4.5, two of 2.85x4.5 and one of 4.15x 4.5. Therefore the total number of parking lots its for 30 vehicles. The number ofnecessary lots for motorcycles 3, the project includes 7 motorcycles lots all of 1x2m. The required number of places of bikes 24. A number of 26 bikes 0.8x2m for every two lots are provided. The ramps will have a width of 3 meters and a maximum gradient of 20%. There will be a parking access with a width of 3 meters. The slope will be 4% of 4.5 meters. With the application of Article 6 of Decree (loading and unloading of goods) a reserve of 1 square intended for urban freight distribution (1 space per 2,000 m2 of roof dedicated to administrative equipment, equated offices) was made. We will have to signal this square on the street, before the PITCH.

Building Environnemental Quality

Building Environmental Quality

- indoor air quality and health
- biodiversity
- acoustics
- comfort (visual, olfactive, thermal)
- waste management (related to activity)
- energy efficiency
- renewable energies
- maintenance
- products and materials

Contest

Reasons for participating in the competition(s)

1.CONSUMO FINAL DE LA ENERGÍA EN USO

Hace apenas unos meses que el edificio fue recibido por el cliente y ocupado. El consumo de energía teórico calculado para el edificio es de 49.682 kWh / año, que corresponde a 25.37 kWh / m2 año. Las emisiones de CO2 correspondientes son de 22.635 Kg CO2 año.
El resultado de la certificación energética esde categoría A, lo que significa que el edificio es energéticamente muy eficiente.
Calor: 28.978 kWh / año
Frío: 20.704 kWh /año

2. INSTALACIONES

El edificio tiene dos principales fuentes deenergía:

a)Energía que proviene de una Red de Calor y Frío (DHC)

· Calor: (Calefacción y ACS)

El edificiorecibe de DHC liquido caliente a 90 - 95ºC y lo devuelve a 60 - 65ªC.

Potenciacontratada de 300 kW.

- Electricidad – 0.5 %
- Gas Natural - 3 %
- Biomasa – 96.5 %

· Frío: (Climatizador)

El edificiorecibe de DHC liquido frio a 5.5 – 7ºC y lo devuelve a 12 – 14ºC.

Potenciacontratada de 330 kW.

- Electricidad – 7.4 %
- Biomasa – 92.6 %

El total deenergía que procede de la red de Calor y Frío es más de un 90% de fuentesrenovables.

b) Energía que produce el propio edificio

El edificioestá dotado con un sistema de 118 captadores fotovoltaicos, que producen untotal de 24719,4 kWh/año, que corresponde al 49 % del consumo teórico deledificio.

3.1Climatizadores

El edificiodispone de dos climatizadores, uno alimenta a las salas y espacios con fachadaal lado norte y la otra las estancias situadas en la zona sur del edificio.
CL-NORD: 18.100m3/h, 83 kW frio, 91 kW calor, 16.5 kW potencia eléctrica y con un recuperadorde calor de un rendimiento 73.5%.
CL-SUD: 13.855m3/h, 77 kW frio, 69 kW calor, 11.5 kW potencia eléctrica y con un recuperadorde calor de un rendimiento 70.8%.

3.2 ACS

Se hainstalado un depósito de 1000 l que sealimenta del agua caliente de districlima

3.3 Unidadesfancoils

Estas unidadesestán conectadas directamente a la red eléctrica, no ha districlima. En totalhay 4 unidades de fancoils con unos EER de: 3.74, 3.7, 3.1, 3.1.

3. TRANSMITANCIA TÉRMICA DE LA ENVOLVENTE

Fachada de panel sándwich: U=0,28 W/m2 K

Fachada de U-glass: U=1,29 W/m2 K

Cubierta: U=0,29 W/m2 K

Huecos: U=2,10 W/m2 K

Vidrio: U=1,80 W/m2 K; solar factor=0,6

Carpintería: U=3,10 W/m2 K

4. INFORMACIÓN ADICIONAL DE LA ENVOLVENTE

La fachada opaca está compuesta por:

Tipología 1:

5cm de panel sándwich

5cm de aislamiento de lana de roca

38,5cm de cámara de aire

1,5cm de trasdosado de cartón yeso

Tipología 2:

2cm de chapa minionda perforada

4cm de cámara de aire

5cm de U-glass

Las ventanas están compuestas por un doblevidrio con cámara de aire 5-10-4+4mm

La cubierta aljibe está formada por:

4cm de tierra vegetal

Losa filtrón:

3cm de hormigónporoso

4+4cm deaislamiento XPS

12cm de cámara de aire (dónde se sitúan los pies que aguantan la cubiertaaljibe)

Geotextil

Lámina impermeable

2cm de hormigón de nivelación

45cm de losa de hormigónarmado

5. ESTANQUEIDAD AL AIRE + INDICATOR UTILIZADO

La permeabilidad al aire se mide por el flujo (m3 / h) de aire que pasa a través de los huecos a diferentes presiones y se clasifica por clases. En este edificio, encontramos dos tipos de rendimiento: clase 3 y clase 4.

Clase	Permeabilidad al aire 100 Pa (46 km/h)	Presión máxima del ensayo Pa
3	≤ 9 m3/h·m2	600 (113 km/h)
4	≤ 3 m3/h·m2	600 (113 km/h)

Descripcióndel ensayo UNE EN 12207:2000:

– Se abren y cierran los elementos móviles de las ventanas antes deinmovilizarlas en su posición definitiva.

– Se aplican 3 pulsaciones de presión, bien un 10% de la presión máxima ala cual queremos ser clasificados o bien a 500 Pa si se elige el valor máselevado.

– El tiempo que tiene la máquina para originar esta presión es de 1s y debemantenerse durante al menos 3s.

– Después se aplican escalones de presión de 50 Pa hasta 300 Pa, a partirdel cual los escalones pasan a ser de 150 Pa.

– No existe un tiempo determinado en cada uno de los escalones, este tiempoestá limitado con la estabilidad de la presión en la máquina y la toma de datosde fuga de aire.

– Una vez obtenidos los resultados, la ventana se clasifica respecto a lasuperficie y longitud de junta. Si ambas dan la misma clase, se clasifica en una sola. Dos clasesadyacentes, se clasifica en la más favorable. Una diferencia de dos clases, seclasifica en la clase media. Una diferencia de más de dos clases, la ventana nose clasifica.

6. EMISIONES DE GASES DE EFECTOINVERNADERO

Teniendo encuenta los resultados de la simulación del edificio, éste emite 50,37 kgCo2/m2. Este número corresponde al 37% del volumen de CO2 que emitiría unedificio convencional de uso equivalente.

7. PRODUCTOS/SOLUCIONES QUE CONTRIBUYEN ALA EFICIENCIA ENERGÉTICA DEL EDIFICIO

- Cubierta aljibe:

Superficie de captación de agua de lluvia: 172,80 m2 Capacidad del depósito: 17318 m3Este sistema reutiliza el agua de la lluvia para el riego de la cubierta vegetal.

- Recogida de aguaspluviales:

El agua de lluvia se utiliza para el depósito de prevención de incendios.- Superficie ajardinada con plantas autóctonas: 172,80 m2

- Sistema de placasfotovoltaicas
- Lamas de protecciónsolar (vent-screen) que tamizan la luz y la radiación del sol
- Monitorización:

El edificio dispone de un sistema de telegestión energética que evalúa el consumo y el confort en las diferentes zonas del edificio. Este sistema permite regular el coste y las horas de consumo. - Luminaria LED con sensores de presencia y luminicos. En total se apaga el 50% de la luz artificacial.- Equipos con recuperación de calor (70 – 73 %)- Renovación de aire a través de losas alveolares- el 83.22% de los puestos de trabajo tienen iluminación natural

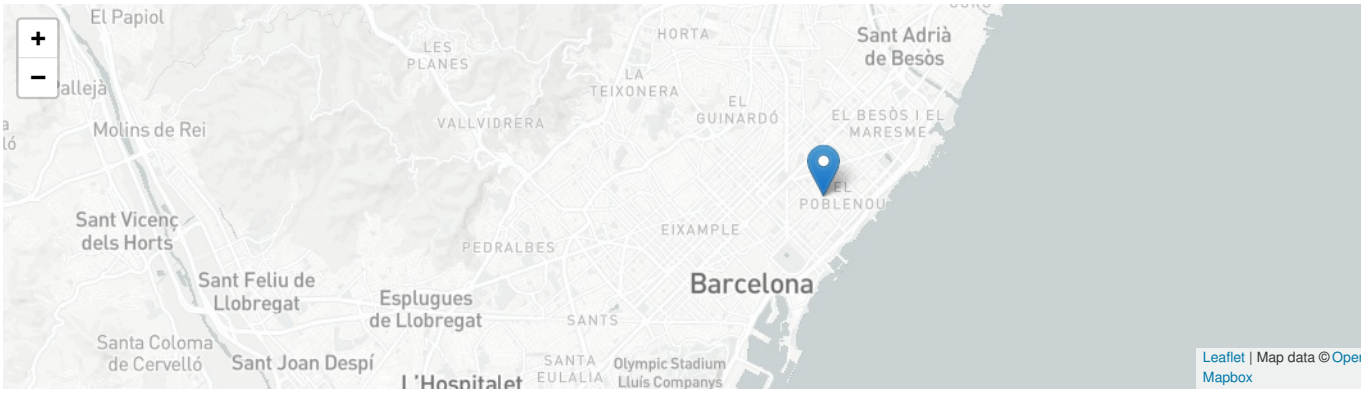
8. CERTIFICACIÓN AMBIETAL VERDE

Calificación: 4 hojas

Building candidate in the category

Energía y Climas Templados

Green Building Solutions Awards 2016 powered by Construction21.org



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