


ShowPass

by [Michel Wassouf](#) / 2023-02-27 00:00:00 / International / 71 / EN



Primary energy need :

4 kWhpe/m².year

(Calculation method : RD: 47/2007)

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 : Terraced Individual housing
Construction Year : 1900
Delivery year : 2022
Address 1 - street : Pasaje General Bassols 19 08005 BARCELONA, Spain
Climate zone : [Csb] Coastal Mediterranean - Mild with cool, dry summer.

Net Floor Area : 167 m² Other
Construction/refurbishment cost : 169 300 €
Cost/m2 : 1013.77 €/m²

Certifications :



General information

ShowPass is an EnerPhit-Step-by-Step precertified building from beginning of 20th century.

It is also certified as a CO2-neutral building (Ecoómetro), combining highest energy efficiency measures with low carbon impact materials.

ShowPass is both an apartment building and a showroom, open to the public to convince project developers of the advantages of Passive Houses, based on construction materials that are respectful with the limited resources of our environment.

The building harmonizes with the urban situation. The street facade is renovated with traditional lime. To preserve the original aesthetics of the urban space, the insulation is laid inwards. Mineral calcium silicate insulation is used, especially resilient against humidity.

A detailed monitoring of comfort and energy data is ongoing since beginning of 2021. These data are analyzed to continuously demonstrate feasibility of CO2-neutral buildings in the Mediterranean. A detailed economic life cycle cost calculation is showing that ShowPass is recovering additional costs in few years.

ShowPass has also included water consumption sensors to raise user awareness, and also installed shower heat recovery units, to reduce energy consumption regarding domestic hot water.

See more details about this project

<https://showpass.energiehaus.es/>

https://passivehouse-database.org/index.php?lang=en#d_6736

Photo credit

Energiehaus

Stakeholders

Contractor

Name : Energiehaus

Contact : Angelika Rutzmoser, Pasaje General Bassols 19, 08005 Barcelona, Spain, info[a]energiehaus.es tel. 0034931280955

Construction Manager

Name : Energiehaus

Contact : Micheel Wassouf, architect, C/Pamplona 88, 3-2, 08018 Barcelona, Spain, wassouf[a]energiehaus.es

<https://www.energiehaus.es/>

Contracting method

General Contractor

Type of market

Realization

If you had to do it again?

It would make sense to make a trade-wise assignment of the different works, instead of having a general contractor.

Energy

Energy consumption

Primary energy need : 4,00 kWhpe/m².year

Calculation method : RD: 47/2007

Breakdown for energy consumption :

The PE consumption is following the Spanish EEC-calculation method, taking into account the PV production. The following values are taken from PHPP calculation, including all electric consumptions (without PV):

- Heating: 22%
- Cooling: 21%
- DHW: 21%
- Electricity (PH-procedure): 35%

Initial consumption : 102,00 kWhpe/m².year

Envelope performance

Envelope U-Value : 0,60 W.m⁻².K⁻¹

More information :

Building has been certified following EnerPhit-component methodology.

Building Compactness Coefficient : 0,51

Indicator : n50

Air Tightness Value : 0,93

More information

The certified calculated primary energy (non-renewable) following the EnerPhit-certification is 64 kWh_{ep}/m²a (PHPP). The official energy labeling, following RD47/2007 takes into consideration the PV-generation. Therefore, this value is very low: only 4 kWh_{ep}/m²a. The step-by-step retrofit is done for the first phase of works: renovation of ground floor and first floor, and partially 2. floor. This 2. floor is going to be renovated in the future. Considering that this 2. floor is going to be retrofitted with the same energy efficiency standard as the realized one, the building is obtaining EnerPhit-Plus standard. Due to the limited roof surface (center town building), the PV installation is limited.

Renewables & systems

Systems

Heating system :

- Heat pump

Hot water system :

- Heat pump

Cooling system :

- VRV Syst. (Variable refrigerant Volume)

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Energy recovery from waste
- Heat pump

Renewable energy production : 34,00 %

Other information on HVAC :

A Passive House certified compact unit has been installed, that combines mechanical ventilation, recirculation, heating and cooling.

The aérothermal heat pump for DHW production works with an external passive, solar-thermal evaporator, so no need for electric connection of this unit, and also no noise for the neighborhood.

Smart Building

BMS :

Loxone system has been designed specifically for the building, so remote control of all energy relevant components are possible, and energy optimized actions regarding comfort are directly controllable by all users. The system is connected to the weather forecast services, so energy management is also considered for a robust weekly heating and cooling functioning of the building.

Smartgrid :

Two different PV solutions have been installed. On one hand, a mono-crystalline PV system, oriented to the south-west, with 1.6kWp, and on the other hand, a CIGS technology system is mounted directly on top of the existing roof, oriented to the south-east, with 1.0 kWp. This system has the advantage of a very easy installation on existing roofs, so no sub-structure is needed. The PV system has a limited power capacity, due to lack of space on the existing roof. We are dealing with an inner town building, in a high density neighborhood.

Users' opinion on the Smart Building functions :

A smart control system has been installed (Loxone-Modbus system), which optimizes energy consumption of the DHW, heating and cooling, depending on the solar contribution of the PV system. Also sun protection and other energy saving measures are controlled by this system, meanwhile the user can always decide directly on behalf of comfort issues.

Environment

Biodiversity approach

The existing patio of the building is upgraded with new planting, and the solid flooring has been upgraded with a permeable wooden floor (thermo-treated).

Mitigation actions on soil and biodiversity :

An aviary for swifts has been installed on top of the roof, to preserve the natural habitat of these birds, which are typical of the district.

Urban environment

In stead of an external insulation (etix), we prioritized the rehabilitation of the street facade with traditional lime based technics, so to preserve the original esthetic of the urban environment.

Land plot area : 107,00 m²

Built-up area : 78,00 %

Green space : 5,00

Products

Product

Midsummer SLIM

<https://midsummer.se/en/midsummer-slim/>

Product category : Finishing work / Electrical systems - Low and high current

Midsummer SLIM is the smart combination of thin solar panels and a classic folded metal roof, where the result is a discreet solar cell roof.

The product is sold as a complete roof renovation. The sheet metal has the same width as the solar panel in order to maximize the installed efficiency without compromising on the discrete design. Combining a roof renovation and installation of solar panels is both smooth, safe and cost-effective.



Costs

Construction and exploitation costs

Renewable energy systems cost : 5 141,00 €

Total cost of the building : 169 300 €

Additional information on costs :

costs excluding VAT (21% in Spain)

Energy bill

Forecasted energy bill/year : 630,00 €

Real energy cost/m² : 3.77

Real energy cost/Dwelling : 315

Circular Economy

Reuse : same function or different function

Batches concerned by reuse :

- Isulation
- Suspended ceilings
- others...

For each batch : Reused Materials / Products / Equipments :

- Gypsum board with a high recycling percentage. Fabricant does not quantify the percentatge. Maximum 10%.
- Insulation based on textile products, natural sheep-wool, wooden fiber: 100% coming from recycled materials, including glue-elements.
- Furniture cabinet made using the old, existing wooden door and window-elements: 95% recycled. 5%: new metal structure.

Reused materials rate :

See above.

Field of use and material origin :

- Gypsum board: certified by the manufacturer, with a high recycling percentage
- Textile insulation/sheep wool/wooden fibre/mineral wool: based on recycled raw material
- Furniture: original old wooden window frames of the building has been partially reused for the construction of a closet.

Communication

Project visit : Yes

Circular design

Responsible consumption :

The fact of having retrofitted the building instead of new building contributes to the reduction of environmental impact of the construction activity. The CO2 neutral certification of the retrofitting contributed to more than 90% of CO2-emission savings (50 years of LCA, certified by Ecometro ONG).

Eco-design :

Both energy efficiency measures as well as reduction of environmental impact by low-carbon materials has been implemented reaching maximum certification levels in Europe: EnerPhit certification and CO2 neutral certification, reducing overall emissions up to 90%. The remaining 10% of CO2 emissions (51 To-CO2eq.) has been compensated by the acquisition of CO2-certificates. <https://showpass.energiehaus.es/>

Recycling :

see "reused batch". Most of insulation materials are coming from recycling technologies: textile insulation, cotton insulation, wood fibre insulation.

Additional information (PDF documents)

Websites

<https://showpass.energiehaus.es/>

Health and comfort

Life Cycle Analysis

A detailed LCA has been carried out, following the Ecometro methodology.

Water management

We installed in both bath-rooms digital lecture system to quantify the hot water consumption of the users. This is to sensitize the user to save water consumption. The installed system is: Defcon8 smart water flow monitor. The consumption values are currently registered for future analysis.

Indoor Air quality

IAQ sensors are continuously registering health and comfort agents inside of the building (MICA from Inbiot firm) <https://www.inbiot.es/productos/dispositivos-mica/mica>

All measured pollutants are fulfilling the recommendation of the German Federal Environmental Agency: below 220 ppm of TVOC.

Comfort

Temperature level :

The Loxone-smart system is currently managing the temperature level of the dwelling. We are defining comfort temperature at 20.5°C and in absence mode 19°C. For summer time, the comfort temperature is at 26°C and the absence mode at 27°C.

Humidity control :

The HVAC system also controls humidity level by cooling temperature down. There is no additional dehumidifier. The Passive House Institute is currently testing the certified compact unit (clima+ventilation) under real conditions: Mediterranean.

In our first summer living in the dwelling, no discomfort issues have been registered. A detailed monitoring is undergoing.

Acoustic comfort :

Due to high airtightness, the building is very silent.

Visual comfort :

Removable sun-shading systems guarantee perfect natural lighting and visual access to the exterior. <https://showpass.energiehaus.es/el-proyecto/>

Carbon

General infos

Life Cycle impact calculated for 50 years are 51 To-CO2eq. This emissions have been compensated via CO2-certificates.

Ic Energy

Ic Energy : 170,00 KgCO₂ /m²

Ic Construction

Ic Construction : 167,00 KgCO₂ /m²

Carbon sink

No oil based insulation materials: most of the insulations used are based on recycling technologies:

- NITA Wool (RMT)
- Cotton insulation (RMT)
- Wood fibre insulation (Gutex)
- Mineral wool insulation (Knauf, Rockwool)

GHG emissions

GHG in use : 3,62 KgCO₂/m²/year

Methodology used :

Ecometro certification

GHG before use : 3,34 KgCO₂ /m²

Building lifetime : 50,00 year(s)

, ie xx in use years : 0.92

End of life impact has not been calculated, as we consider that the methodology is not mature enough. Too hypothetical to estimate technologies in 2073.

Contest

Reasons for participating in the competition(s)

ShowPass is a certified CO₂-neutral retrofit of a typical Mediterranean residential housing, with a high replicability effect. The building is located in Barcelona, a city that declared climate emergency in 2020. The building is open to the public, showing real solutions to contribute against climate change. A detailed monitoring program is undergoing, to verify the feasibility of the taken solutions and to spread energy efficiency and healthy building technics to a wide audience.

