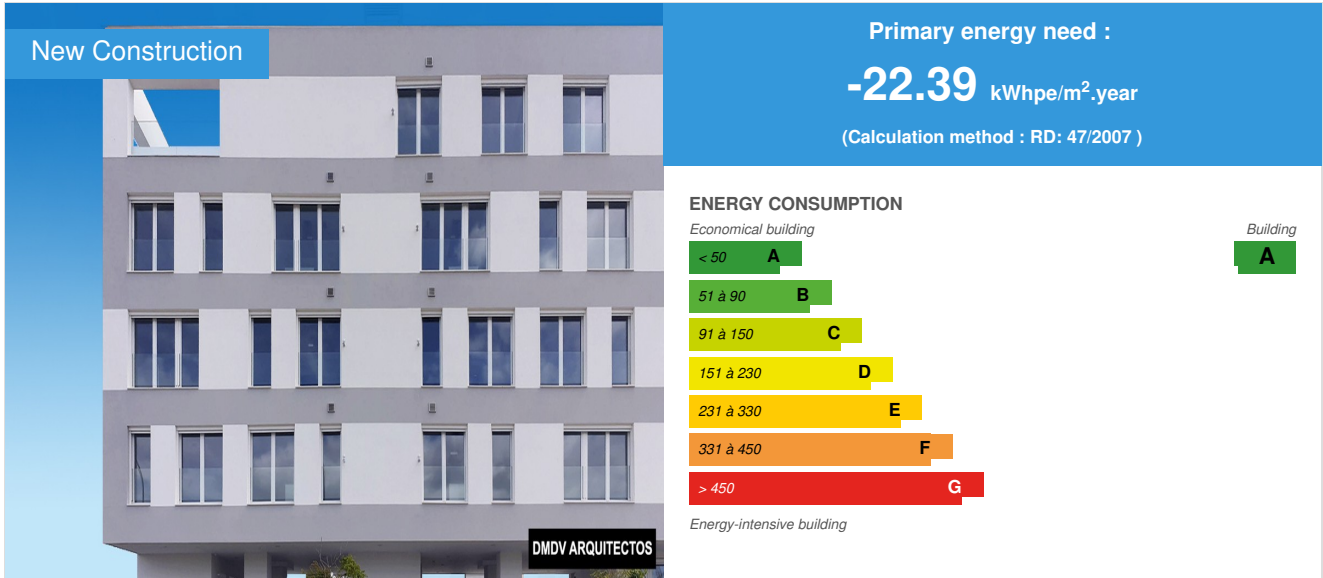


ArroyoFresno nZEB Passive House Plus

by Daniel Diedrich / 2021-03-24 18:46:05 / España / 11340 / ES



Building Type : Collective housing < 50m
Construction Year : 2020
Delivery year : 2020
Address 1 - street : Gloria Fuertes 144 28035 MADRID, España
Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 1 530 m² Other
Construction/refurbishment cost : 2 755 170 €
Cost/m2 : 1800.76 €/m²

Certifications :



General information

This building was awarded the Energy & Temperate Climates Prize at the national level of the Green Solutions Awards 2020-21; and received a mention for the same category at the international level.

Arroyo Fresno Passivhaus is the first nZEB collective residential building in Spain to obtain Passivhaus Plus certification. It is a project by Daniel Diedrich and Talia Dombriz of [DMDV Arquitectos](#).

Located in the PAU of Arroyo Fresno in Madrid, it is configured with a simple prismatic volume containing 14 dwellings distributed over four floors above ground and resting on a porticoed ground floor and another floor below ground level. The floor plan is limited by the urban planning regulations establishing the limits of three of the visible facades. The remaining, smaller façade is adjacent to the neighboring building. Formally the building is conceived as a prism with great compactness, where the facade has the same finish in continuity only altered by the use of color, forming a zigzag band that runs between the order of window openings on each floor, seeking a formally clear singularity without altering the simplicity of the concept.

The building is passive in all its living areas, between the first and fourth floors, while the first floor opens to the outside with a porch access to the two portals. On this floor the space belonging to the thermal envelope is the one that closes a community room for coworking of the users of the apartments.

Each apartment has air conditioning by individual aérothermal pump and emitters through underfloor heating / cooling, and an individual mechanical ventilation system with double flow with heat recovery.

In addition, the building has a photovoltaic installation for electricity generation.

Domestic hot water is generated by a centralized system with an air/water aérothermal pump, a distribution circuit and accumulation and production tanks that become energy storage when there is a surplus of electricity production in the self-consumption valleys.

The elevators, with low energy consumption, are equipped with an electric power generation system during braking.

The proposed building "Arroyo Fresno Passivhaus Plus" is a Passivhaus Plus certified nZEB building with a very high level of construction rigor, and a refined design for the requirements of high-rise housing use, based on the exhaustive study of bioclimatic implementation in the plot by the constraints of the applicable urban regulations.

The building envelope has been optimized with the maximum criteria of the Passivhaus Institute (facades, floors and roofs, carpentry and glazing as well as solar protection) which reduces the building's heating demand to 14.40 kWh/(m²y) and cooling demand to 8.60 kWh/(m²y). The air infiltration test has been passed by Blower Door Test per housing unit and ground floor coworking space with a result of 0.58 1/h (n50), guaranteeing the airtightness of the volumes.

In addition, the air conditioning systems have been optimized with Daikin Alterma 3 aérothermal underfloor heating and cooling per dwelling unit (Heating capacity=4.6 kW. COOP=3.8) and a centralized domestic hot water system has been developed in the building consisting of a Mitsubishi Heavy Industries Q-Ton pump (heating capacity=30 kW. COOP=4.3) with two 3,000 liter DHW storage tanks. Furthermore, the ventilation system has been realized individually per living unit and coworking area, using Zehnder mechanical ventilation with heat recovery with an efficiency of 82%.

The renewable energy generation system is based on a rooftop photovoltaic system consisting of 61 Canadian Solar panels and Fronius DC/AC inverters with a total output of 32.97 kW/year.

The rigorous study of the optimization of the envelope and systems means that the high-rise housing and the first floor coworking space meet the optimum conditions to guarantee the success of a passive self-consumption building, with maximum indoor air quality and comfort in its spaces.

See more details about this project

https://passivehouse-database.org/index.php?lang=de#d_6306

<https://www.construible.es/comunicaciones/ficha-proyecto-edificio-residencial-arroyofresno-ecn-passivhaus>

<https://www.idealista.com/news/inmobiliario/vivienda/2020/08/10/786581-arroyo-del-fresno-madrid-estrena-el-primer-residencial-passivhaus-plus-de-espana>

<https://www.buildup.eu/en/practicas/cases/viviendas-arroyofresno-plus-energy-apartment-house-madrid>

<https://www.kommerling.es/profesionales/proyectos/edificio-de-14-viviendas-arroyofresno>

Data reliability

3rd part certified

Photo credit

Daniel Diedrich + Talia Dombritz. Estudio DMDV Arquitectos SLP

Stakeholders

Contractor

Name : Landevel S.L.

Contact : Edificio Tribeca, Avda. de Leganés, 54 – Oficina 50 28923 Alcorcón (Madrid)

<https://landevel.es/>

Construction Manager

Name : Construcciones Amenabar S.A.

Contact : Paseo Miramon 185, 20014, San Sebastián (Gipuzkoa)

<https://www.amenabarconstrucciones.com>

Stakeholders

Function : Designer

Daniel Diedrich + Talia Dombritz Arquitectos. Estudio DMDV Arquitectos SLP

Edificio ASTIGY c/ San Romualdo 1D 28037 Madrid. info[a]dmdva.com

<http://www.dmdva.com>

Project, Construction Management, Passivhaus certification management

Function : Thermal consultancy agency

Daniel Diedrich. Arquitecto. Certified Passivhaus Designer

Edificio ASTIGY c/ San Romualdo 1D 28037 Madrid. cenergetica[a]cenergetica.es

<https://www.cenergetica.es>

Passivhaus technical advice

Function : Certification company

Micheel Wassouf. Energiehaus arquitectos SLP

C/Pamplona 88, 3º2ª 08018 Barcelona. info[a]energiehaus.es

www.energiehaus.es

Passivhaus Certify

Function : Others

Contracting method

General Contractor

Owner approach of sustainability

Promote buildings under the Passivhaus standard with the aim of obtaining and marketing buildings with a really low energy demand and reducing CO2 emissions.

Architectural description

With a useful area of 2,475.54 m2 (including garage in the basement) on a plot of 1,287.85 m2. The plant is limited by urban regulations establishing the limits of three of the facades. The remaining facade, the minor one, is a dividing line with the neighboring building.

Formally, the building is conceived as a prism with **great compactness**, where the facade presents the same finish in continuity only altered by the use of color, forming a zig-zag band that runs between the order of window openings on each floor, looking for a formally clear singularity without altering the simplicity of the concept.

The building is **passive in all its habitable areas**, containing houses on the first and fourth floors, while the ground floor opens to the outside with a porch covered by a large cantilevered access to the two portals. The space of the community room or **coworking room** for the users of the homes is located on this floor, to facilitate work at home or telework.

The free space outside the plot is landscaped and **urban gardens** associated with each of the houses are projected.

If you had to do it again?

The installation of the sealing and hermetic systems of each house had to be repeated to give values lower than 0.6 ren / h. In similar cases, double sealing must be performed at each meeting or joint.

Building users opinion

Delivered in September 2020. It is not fully occupied. We lack the user experience.

Energy

Energy consumption

Primary energy need : -22,39 kWhpe/m².year

Primary energy need for standard building : 62,00 kWhpe/m².year

Calculation method : RD: 47/2007

Final Energy : -2,42 kWhfe/m².year

Breakdown for energy consumption :

Heating 6.55 kWh / m².year

Cooling 8.49 kWh / m².year

DHW 5.48 kWh / m².year

Envelope performance

Envelope U-Value : 0,20 W.m⁻².K⁻¹

Building Compactness Coefficient : 0,40

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,58

Renewables & systems

Systems

Heating system :

- Heat pump
- Low temperature floor heating

Hot water system :

- Heat pump

Cooling system :

- Reversible heat pump
- Radiant ceiling

Ventilation system :

- Natural ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Other, specify
- Heat pump

Renewable energy production : 100,00 %

Costs

Construction and exploitation costs

Global cost : 4 100 000,00 €

Reference global cost : 6 200,00 €

Renewable energy systems cost : 324 612,00 €

Global cost/Dwelling : 292857,14

Reference global cost/Dwelling : 6200

Cost of studies : 152 000 €

Total cost of the building : 3 446 000 €

Additional information on costs :

Cost of the building = Contract price without VAT

Reference of the global cost to the average price of the area

Cost of the renewable energy system includes aérothermal air conditioning, aérothermal, DHW and Photovoltaic installations.

Annual invoice cost does not include connection rights or fixed fees for being connected.

Urban environment

Urban Action Plan for Arroyo Fresno in Madrid capital. It is characterized by the fact that all the plots are of new execution and of homogeneous characteristics with majority residential use.

The plot is located within a block of the APE.08.16 "Arroyo del Fresno" of the current General Plan of Urban Planning of Madrid, a newly created urban development in the North of Madrid that belongs to the Mirasierra neighborhood. It is bordered to the north by the M40 ring road, to the east by the Monte Carmelo neighborhood, to the south by the Peñagrande neighborhood and to the west by the Portillera del Fresno golf course that separates it from Monte del Pardo.

As it is a newly developed area, the existing building is for the most part in execution, although it will be homogeneous by sharing development regulations. In general, the urban environment is of quality, in a quiet residential area with little traffic and a high socioeconomic level, with good urban services and easy road

communication.

Land plot area

Land plot area : 2 475,00 m²

Built-up area

Built-up area : 20,00 %

Green space

Green space : 765,00

Parking spaces

In the basement, it has 30 car seats and 2 motorcycles. With electric charge for every two seats. On this floor there are also 14 storage rooms associated with each of the houses.

Building Environmental Quality

Building Environmental Quality

- Building flexibility
- indoor air quality and health
- works (including waste management)
- acoustics
- comfort (visual, olfactive, thermal)
- waste management (related to activity)
- water management
- energy efficiency
- renewable energies
- maintenance
- integration in the land
- mobility
- building process
- products and materials

Contest

Reasons for participating in the competition(s)

Edificio certificado Passivhaus PLUS tiene una envolvente térmica conforme a los criterios del Passivhaus Institute (fachadas, forjados y cubiertas, carpinterías y vidrios así como protecciones solares) lo que reduce la demanda del edificio de calefacción a 14,40 kWh/(m²y) y la demanda de refrigeración a 8,60 kWh/(m²y).

Se ha superado el ensayo de infiltraciones de aire mediante ensayo Blower Door Test por unidad de vivienda y espacio de coworking de planta baja con un resultado de 0,58 l/h (n50), garantizando la hermeticidad de los volúmenes. Cada vivienda tiene sistema de ventilación mecánica de doble flujo con recuperador de calor Zehnder.

Como sistemas de energías renovables usa bombas de aerotermia individual por vivienda para la climatización DAIKIN Altherma 3 y centralizada para el ACS Mitsubishi HI Q-ton, además de una instalación fotovoltaica de 61 paneles solares Canadian Solar e inversores Fronius de 32,97 kW/a

Building candidate in the category



Energy & Temperate Climates



Health & Comfort



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