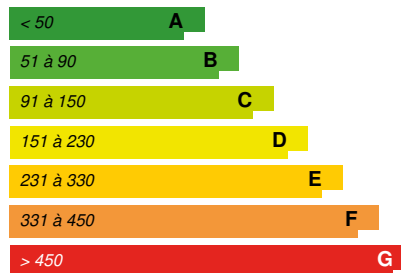


3 terraced houses with low environmental impact (BIM)

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Building Type : Isolated or semi-detached house
Construction Year : 2000
Delivery year : 2004
Address 1 - street : Costa del Azahar nº 7,9 y 11 47010 VALLADOLID, España
Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 526 m² Other
Construction/refurbishment cost : 476 051 €
Number of Dwelling : 3 Dwelling
Cost/m2 : 905.04 €/m²

General information

These three houses, built in the urban center of Valladolid more than a decade ago, constituted in an environmental test site by including diverse sustainable architecture criteria, some of them unpublished at that time: bioclimatic design, thermal solar energy (then non-existent in regulations), photovoltaic energy (amorphous silicon panels), rigorous analysis of the energy incorporated in the materials, treatment of water and vegetation, etc.

Over time, it has also provided valuable experience in other fields: it has been concluded that the design and technique are successful. It has served as a model for research and has received several awards. Leaving aside the technological success, it is worth noting that since 2004, the role played by administrations and institutions to protect and support an environmentally conscious construction has been almost inexistent.

See more details about this project

<http://www.mjg.es/blog.php?p=8>

Data reliability

Self-declared

Stakeholders

Contractor

Name : Torre de Comares Arquitectos sl

Contact : María Jesús González Díaz

<http://www.mjg.es>

Construction Manager

Name : Constructora Castellana Industrial sa

Stakeholders

Function : Developer

Casas para el Nuevo Siglo sl

B. González

Promotion

Function : Contractor

Owner approach of sustainability

The promotion started from the initiative of a group of women who decided to form a society dedicated to the construction of buildings with these characteristics of respect for the environment and ecological awareness. A comprehensive performance was intended.

Architectural description

This building, from more than a decade ago, shows how ecological awareness has been created in the building, and the way in which the first initiatives that tried to apply the knowledge to the field of sustainable architecture developed. It is a very valid testimony of this process of the last decades, and very significant to draw conclusions. It also served as a starting point for much research on sustainable architecture.

The architecture was adjusted to a design that would physically adapt to the characteristics of the place where the site was located, both physically and from a sociological point of view: a site with strong unevenness, certain regulations for urban space, and a type of newly created and accepted housing (semi-detached house) in a newly expanded area. A bioclimatic home was sought, focusing on orientation, selection of materials and high thermal inertia as a strategy against a hot and dry summer.

Characteristics:

- Bioclimatic architecture, in the design, orientation and shape of buildings, aimed at minimum energy consumption and maximum use of the sun
- Solar thermal energy for the production of hot water
- Photovoltaic solar energy, with a grid connection system, the first used in homes in Valladolid. Depending on the characteristics, dimensions and layout of the site, the placement of this type of energy, connected to the grid, can be perfectly amortized over a period of five years, under the current conditions of regional subsidies. (This is how it was thought in 2002)
- Passive solar energy, with the inclusion of trombe-type collector walls, and greenhouses.
- Important use of vegetation, which contributes to passive cooling and shading systems in summer, cross ventilation, etc.
- Use of low temperature condensing boilers with low NOx content.
- Pre-installation of home automation, which will consist of the provision of openings on site, to house the future home automation central and the corresponding pipes.
- Use of a careful selection of materials with low environmental impact. Total elimination of toxic materials or of great impact and energy consumption, and promotion of recycled or recyclable materials.
- Use of more natural materials with less creation of pollution and CO2, such as wood in structure, cork as thermal insulation, natural varnishes, etc.
- Use of wiring and electronic components with low halogen content, less environmental impact and risk reduction in cases of fire, etc.
- Spaces for differentiated recycling within the property and recovery of rainwater.

In the Memory of the Execution Project (2002) it is cited:

In the selection of the materials to be used in the construction of the building, the environmental preference system has been used, with reference to the texts of the "Green Building handbook", from 1997, republished in 1999, by "E & FN SPON", "The green construction handbook", from "JT Design Build Publication"; "Environmental Comparison of building elements", edited by the New Zealand Institute of Architects; and the "Bioconstruction Guide", by Mandala ediciones.

If you had to do it again?

I would not do it.

The experience revealed, throughout this elapsed time (from 2002 to now) the dramatic effects of the errors made by the Government in terms of energy policy with renewable energies. On the other hand, the risk of undertaking innovative initiatives had other aspects of a social nature that were not correctly valued.

Building users opinion

Great interior comfort, especially in summer.

Energy

Energy consumption

Primary energy need : 98,00 kWhpe/m².year

Primary energy need for standard building : 200,00 kWhpe/m².year

Calculation method : Other

CEEB : 0.0002

Final Energy : 98,00 kWhfe/m².year

Breakdown for energy consumption :

primary energy consumption:

heating 88.51 kWh / m². year

domestic hot water 5.39 kWh / m². year

More information :

Calculation method performed with C3X (building prior to CTE)

Envelope performance

Envelope U-Value : 0,57 W.m⁻².K⁻¹

More information :

Covers K = 0.37 kcal / h °Km²

Load-bearing and enclosure walls K = 0.65 kcal / h °Km²

Thrombe wall K = 1.10 kcal / h °Km²

Windows (wood) K = 2.80 kcal / h °Km²

Building Compactness Coefficient : 1,00

Real final energy consumption

Year of the real energy consumption : 2 003

Renewables & systems

Systems

Heating system :

- Condensing gas boiler
- Low temperature floor heating

Hot water system :

- Condensing gas boiler
- Solar Thermal

Cooling system :

- Others

Ventilation system :

- Natural ventilation

Renewable systems :

- Solar photovoltaic
- Solar Thermal

Renewable energy production : 40,00 %

Other information on HVAC :

Bioclimaticism and inertial systems (trömbe wall)

-Solar thermal energy: despite not being required according to regulations, three equipment for the production of sanitary hot water using solar thermal energy have been installed. A total of six approved Kaysan high performance flat solar collectors, measuring 1.9 m² each, have been installed. In total, 11.40 m² of collector area. The teams are complemented by three 300-liter Sunbag tanks.

-Photovoltaic solar energy: photovoltaic metal solar panels of thin-film amorphous silicon cells have been integrated, which offers excellent performance in diffuse light conditions, for connection to the grid. In total, Unisolar SSR metal panels have been used, with a peak power of 4.6 kWp, with a nominal inverter power of 3.3 kW, the total surface area occupied by the panels being 96.24 m². The panels are fully integrated as one more constructive element of the roof.

Environment

GHG emissions

GHG in use : 7,00 KgCO₂/m²/year

Methodology used :

CE3X

GHG before use : 196,00 KgCO₂ /m²

Building lifetime : 150,00 year(s)

, ie xx in use years : 28

GHG Cradle to Grave : 196,00 KgCO₂ /m²

- "RESEARCH ON RENEWABLE ENERGIES" AWARD, Obra Social, Caja España de Inversiones, Caja de Ahorros y Monte de Piedad, call for applications in 2003, "Evaluation of the reduction of CO2 emissions in construction through the selection of materials

Life Cycle Analysis

Water management

-Rainwater collection system: Each of the houses has a separate rainwater system and a rainwater collection system for later reuse. Each house collects rainwater in individual downspouts in an independent 500-liter polyester tank, with a double-pass ball valve that allows the possibility of reuse and overflow to the drainage network. In total, three tanks of 500 liters each have been placed.

-Minimisers of consumption: Each house has other systems to minimize consumption, such as toilets with double flush cistern, and water sprayers in all taps.

-Xero-landscaping: Xero-landscaping has been used in the gardens, with native plants with low irrigation intensity, such as thyme, rosemary, medium-sized trees such as mulberry and golden rain, amphielosys, hedera helix and carpet ivy.

-Irrigation system: An economizing drip irrigation system has been used, and the use of water recovered from rain is foreseen for this purpose.

Products

Product

Locally made brick factory load-bearing walls.

Product category : Obras estructurales / Estructura - Albañilería - Fachada

Well, when you are dealing with a system and product of great local roots.

- laminated wood QLH-Dm Rettenmeier, Zunfttholz,.

Product category : Obras estructurales / Estructura - Albañilería - Fachada

Structure of house floors with perforated brick load-bearing walls and pillars, beams and joists of high-quality pine laminated wood, from the house Zunfttholz, and board.

Serious acceptance problems by insurance companies and OCTs, who considered that the wooden structure was not a "conventional element". These actors raised major objections to the mandatory Ten-Year Insurance, which led to serious delays in the work and a surcharge.

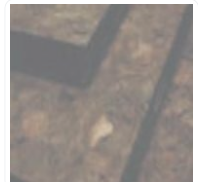
Natural cork insulation

Adesa

Product category : Acabados / Acabado, aislamiento

Thermal insulation in interior floors, exterior walls and covered with natural black agglomerated cork, cork oak, of the Adesa brand, of 0.037 W / mk

Very good behavior.



DIETRICH INNOVATION CONDENSATION BOILER

DE DIETRICH

Product category : Climatización / Calefacción, agua caliente

Very good result.

Costs

Construction and exploitation costs

Renewable energy systems cost :90,00 €

Cost of studies : 12 €

Total cost of the building :728 €

Subsidies : 18 €

Additional information on costs :

-GARCÍA NAVARRO, J.; GONZÁLEZ DÍAZ, M. J. "Examination to the additional costs for the construction of low environmental impact houses: a real case of study." SB04 Regional and Eastern European Conference on Sustainable Building. Varsovia, 27-29 de Octubre de 2004. Editor: Building Research Institute & Warsaw University of Technology, 2004. ISBN 83-7413-460-7.

Urban environment

Newly created urban environment.

Land plot area

Land plot area : 546,00 m²

Built-up area

Built-up area : 32,00 %

Parking spaces

space for parking and facilities, water collection, etc., in the basement, total 189 m2

Building Environnemental Quality

Building Environmental Quality

- indoor air quality and health
- biodiversity
- comfort (visual, olfactive, thermal)

Contest

Reasons for participating in the competition(s)