ENERGY REHABILITATION AND BUILDING ACCESSIBILITY IN ZARAMAGA, VITORIA-GASTEIZ

by Ramón Ruiz-Cuevas Peña / 2016-07-07 10:00:25 / España / 18519 / ES

Renovation

Primary energy need :

25 kWhpe/m^2.year

(Calculation method : Other)

ENERGY CONSUMPTION

Economical building — *Building*: **A**

< 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 : Collective housing > 50m
Construction Year : 2014
Delivery year : 2015
Address 1 - street : 01013 VITORIA-GASTEIZ, España
Climate zone : [Dfb] Humid Continental Mild Summer, Wet All Year

Net Floor Area : 1 833 m^2 Other
Construction/refurbishment cost : 1 058 056 €
Number of Dwelling : 30 Dwelling
Cost/m2 : 577.23 €/m^2

General information

The purpose of the project has pursued the overall performance in the building, to give it Energy Efficiency and accessibility from the street level to the floors of wich it was lacking. A thermal coating envelope of the entire building was added to lessen energy consumption and CO2 emissions, in addition to the elimination of thermal bridges. To verify the operation and effectiveness of the measures taken, a system that allows tele-reading has been temporarily installed, collecting and studying data, consumption and environmental conditions of the housing. This was performed remotely by the Department of Housing, Public Works and transport of the Basque Government.

See more details about this project

http://www.luzyespacio.com/es/ficha.php?ficha=129
http://www.construction21.org/espana/articles/es/espana-galardonada-con-el-gran-premio-en-rehabilitacion-sostenible-en-los-green-building--city-solutions-awards.html

Data reliability

Self-declared

Stakeholders

Stakeholders

Function : Designer

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ARCHITECT

Function : Others

VRGINIA MENCHACA QUINTANA

TECHNICAL ARCHITECT

Function : Others

LEIRE URIZAR CAMPOS

TECHNICAL ARCHITECT

Function : Others

CÉSAR MARTINEZ LOSADA

TECHNICAL ARCHITECT

Function : Others

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ARCHITECT (technical director)

Contracting method

General Contractor

Owner approach of sustainability

The purpose of this project is the concrete and comprehensive definition of the proposed energy rehabilitation and accessibility. Today, the building has energy and accessibility shortages that are intended to overcome, achieving a very high level of quality not only in formal or material issues, but also in the interior renovation of facilities. The purpose of the project seeks global action in the building, acting only in common elements and from the outside of the housing, preventing moving of the people living in them and attending at all times to the social and personal conditions of the population. The thermal coating of the entire building envelope is proposed to lessen energy consumption and CO2 emissions, ensuring proper disposal of thermal bridges. In this way and with proper ventilation detected condensations can be avoided. The closure of existing facade consists of one pole face brick from Palencia 25 cm., Air chamber, brick and plaster wall. Total 34 cm. It is not believed to have intermediate thermal insulation. The facade terrace areas will be solved through the SATE system with thermal insulation consisting of Alpharock rock wool or similar with a 120 mm thickness and a density of 155 kg / m3. The rest of the existing facade will be fixed by ceramic ventilated facade finishes with thermal insulation consisting of rockwool Ventirock 120 mm, thickness and density 100 kg / m3. The new pitched roofs will consist of: - forged existing concrete, - thermal insulation consisting of rockwool Alpharock or similar 120 mm in thickness and density 70 kg / m3, - panel sandwich plate lacquered gray with polyurethane insulation 8 cm. The new exterior carpentry will be of aluminum with thermal break: The glazing is double, with thicknesses 4/12/6; glasses located in areas with risk of impact will be security type 3 + 3. Currently there is no elevator, preventing accessibility from the street to each of the homes without having to use steps. Having 2 apartments per floor, the only possibility of inclusion of an elevator is on the outside, next to rear facade. To verify the operation and effectiveness of the measures adopted, a system enabling tele-reading, collection and study of data, consumption and environmental conditions of housing was performed remotely by the Department of Housing, Public Works and Transport of the Basque Government.

Architectural description

The draft ENERGETIC REHABILITATION AND ACCESSIBILITY block of flats located in Cuadrilla of Laguardia nº 2, 4 and 6, of Vitoria-Gasteiz was intended to act globally in a building that had huge energy shortages and accessibility that have now been corrected, achieving a very high level of quality not only in formal or material issues, but also in the interior renovation of facilities. The project tackled the thermal coating of the entire building envelope, both facades, roof and sanitary chamber of the ground floor to lessen energy consumption and CO2 emissions, ensuring proper disposal of thermal bridges. In this way and with proper ventilation, detected condensations are avoided. After the reform, the restored building has an adequate envelope to the limitation of energy demand needed to achieve thermal comfort depending on the weather, the intended use and the regime of summer and winter, with low economic cost of ownership. The characteristics of insulation and inertia, control of air permeability and exposure to solar radiation are regulated, and individual housing ventilation double flow with heat recovery offer high energy efficiency, resulting in the energy class "A".

Energy

Energy consumption

Primary energy need : 25,00 kWhpe/m^2.year

Primary energy need for standard building : 32,00 kWhpe/m^2.year

Calculation method : Other

Final Energy : 36,00 kWhfe/m^2.year

Initial consumption : 36,00 kWhpe/m^2.year

Envelope performance

Envelope U-Value : 0,25 W.m^{-2}.K^{-1}

More information :

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Energy Rehabilitation is basically to reduce CO2 emissions. There are other social, economic and urban objectives related to health and comfort. To reduce energy consumption or emissions (E) a simple equation is used: E = D / Ri
In the numerator we must reduce the demand (D) and the denominator tends to increase the performance of the facilities. Monitoring and intelligent controls relate both factors regulating them. If demand is very small it is much easier to meet it with renewable energy; with the medium-term objective of reaching the nZEB nearly zero energy building.

Demand is reduced primarily by acting on the envelope; the building is lined with a dress of continuous insulation, especially focusing on the gaps to reduce infiltrations. The continuity of this complex skin is essential to reduce thermal bridges. Depending on the part of the envelope, their status and guidance will act with different strategies. Uptake or sunscreen requires a desing component and mobile elements that can also be regulated intelligently. In our case several insulation systems (ventilated facade, SATE, EPS sandwich panel and blown into the floor slab) and new woodwork with low emissivity films and argon gas in the glasses are used. In the vast western façade slats adjustable sunscreen are installed, in order to minimize overheating of the facade in the warmer months. As the building's envelope is improved uptake or sunscreen becomes more important.

Faced with the problem of the choice of materials of a new global envelope for the building of Zaramaga we took into account several factors:
- Reduction of demand -Price-placement problems -Aesthetic of surrounding buildings -Impact environmental of used materials.

Renewables & systems

Systems

Heating system :

- Condensing gas boiler

Hot water system :

- Condensing gas boiler

Cooling system :

- Others

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 1,00 %

Other information on HVAC :

Description of the ventilation system with heat recuperator:

One of the main problems that are emerging in the energy rehabilitation of homes are pathologies related to the lack of ventilation, condensation and worsening of salubrity. Thus the basic criterion based energy improvement of the envelope, the design becomes necessary, sizing and installation of a ventilation system to ensure indoor air quality and comfort of users of the homes. In this case it has an integrated ventilation system with heat recovery, renewable energy powered (photovoltaic), highlighting the positive effect from the point of view of indoor air quality for people such as energy efficiency. The HRV (Heat Recovery Ventilator with) High Performance, designed for horizontal mounting in false ceilings inside, with CE mark. The thermal / acoustic insulation and air tightness are secured. The new air and exhaust air is filtered by filters G4. The device is equipped with a by-pass for free cooling in summer. This system allows an automatic cooling, usually summer nights. The treatment was made by areas where local drive has been generated from the same area and lounge room and sweep extraction from the bathrooms and kitchen. The intake air is clean from facade and the expulsion of stale air is conducted through to the deck. It has had to make a false ceiling in corridors for installing interior ventilation network. This was run with thermoplastic conduit, accessed from public areas by locating hydrants drive in a dry and extraction in wet rooms, adjusted to stop the balanced right and placed above the doors of each room to avoid having to act on false ceiling each room. The toilet ventilation system is a system with heat recovery individual housing. It has been dimensioned according to the criteria specified in the current regulations Technical Building Code, in particular its Basic Document HS3 Requirement of indoor air quality, applying some improvements such as heat recovery energy efficient (up to 95%) and implementing a control system for housing, whose main advantages are; • Energy recovery from exhaust air up to 95%. • Integration of passive strategies (passive cooling night in summer) • Low cost of operation (EC motors low consumption) • Ventilation absence • Filtering of particles and elements suspended from abroad • Absence of odors, moisture and mold PHOTOVOLTAIC SOLAR ENERGY. It endows each portal of a photovoltaic solar installation at this stage of the project and pending regulations promoting renewable energies are released, the installation is designed for personal use in public areas (VRC, lighting and portal stairs) .The sizing criterion peak power was selected by the available space on the cover of each portal. In photovoltaic if discharged to the network no power problems occur, the situation changes for self-consume, because if you do not want to install batteries you need to check the consumption curve of common services; in this case we opted for the possible power depending on the surface with optimal orientation. Each installation consists of 5 245 Wp photovoltaic modules, each with dimensions of 982 mm wide and 1,638 mm high. The total peak power installed in each portal is 1,225 Wp with an estimated production of 1,260 kWh / year per portal.

The solar photovoltaic energy system, is designed to provide the total consumption of ventilation equipment with heat recovery of individual housing annually.

Smart Building

Users' opinion on the Smart Building functions : MONITORING In order to assess the different activities and variations in both the control and the all the elements that make up the ventilation system teh buiding has been monitored, obtaining continuously both hygrothermal as values are temperature and relative humidity . Public support of the Basque Government demanded this monitoring to all homes in order to check the insulation measures and consumption. Consumption is measured by a kilocalories counter in all boilers. It also controls the consumption of the VRC and the elevator and photovoltaic production .. These values are recorded by probes placed in the building and whose readings are sent daily to the Building Control Laboratory of the Basque Government.

Environment

GHG emissions

GHG in use : 9,50 $KgCO_2/m^2$/year

Methodology used :

ENERGY CERTIFICATION

Comfort

Calculated thermal comfort : Periodo de invierno 20ºC, no existe equipo activo para refrigeracion, periodo de sobrecalentamiento menor 10%.

Measured thermal comfort : Periodo de invierno 20ºC, no existe equipo activo para refrigeracion, periodo de sobrecalentamiento menor 10%.

Products

Product

VENTILATION HEAT RECOVERY

SIBER

SANTIAGO PASCUAL

http://www.siberzone.es/

Product category :

Equipment double flow ventilation with heat recovery of up to 90% yield.

Great acceptance by users, eliminating odors in homes, humidity and improving indoor air quality.

Costs

Construction and exploitation costs

Global cost : 1 258 060,00 €

Renewable energy systems cost : 13 684,00 €

Global cost/Dwelling : 41935.33

Cost of studies : 116 386 €

Total cost of the building : 1 058 056 €

Subsidies : 698 056 €

Urban environment

The building is located in the neighborhood of Zaramaga, Vitoria-Gaseiz. In an urban residential environment with green areas and shops.

Building Environnemental Quality

Building Environmental Quality

- indoor air quality and health
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- integration in the land

Contest

Reasons for participating in the competition(s)

La Rehabilitación Energética es un concepto holístico, que se debe abordar de forma global,cuando pensamos en la nueva envolvente y en el nuevo ascensor tenemos que tener presentes las instalaciones para prever los espacios por donde discurren. Esto repercutirá también en el resultado estético final, ya que el buen diseño es solucionar problemas con un resultado óptimo y con un coste y sistema constructivo abordables.
Estas ideas están englobadas en el concepto llamado REI (Rehabilitación Energética Integral). Esta hace referencia a la necesidad de acometer el hecho de la rehabilitación energética como una obra completa que aborde toda la problemática del edificio. El hecho de actuar a la vez nos hace mucho más eficientes energéticamente. Además se aprovechan sinergias y no se emplean medios auxiliares dos veces (como los andamios) y se reducen las emisiones y los residuos durante el proceso constructivo. Otra ventaja es la gestión de permisos, ayudas y proyectos, que no se duplican.

El control de la ejecución en obra en el caso de la REI es fundamental ya que la continuidad del aislamiento y sobre todo el correcto sellado de los sellados de estanqueidad en todas las uniones debe de ejecutarse a la perfección ya que todo se mide y monitoriza y corregir a posteriori es muy complejo.

La participación vecinal y la transparencia en el proceso es una herramienta indispensable ya que se trata en su mayoría de comunidades de vecinos.

Podemos concluir que las viviendas son mucho más sanas, confortables y ahorradoras.

La inversión solo como negocio también es rentable ya que revaloriza el precio de las viviendas.

La rehabilitación energética de los edificios en nuestras ciudades europeas supone uno de los grandes retos de la arquitectura y la construcción del siglo XXI con el objetivo de reducir el consumo energético.

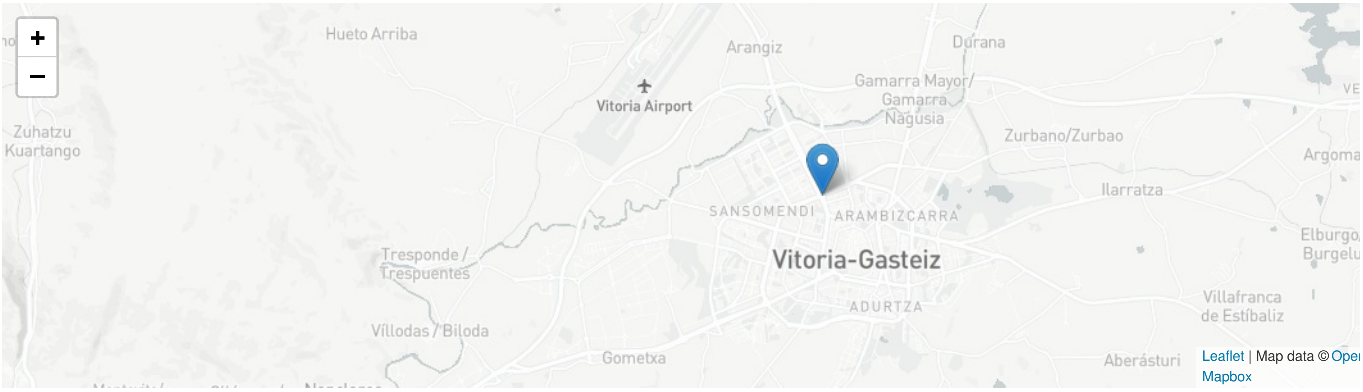
El banco de datos que están produciendo estas viviendas en Zaramaga hace de ellas un modelo de aprendizaje para todos.

Building candidate in the category

Energía y Climas Templados

Gran premio: Rehabilitación Sostenible

Premio de los usuarios



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