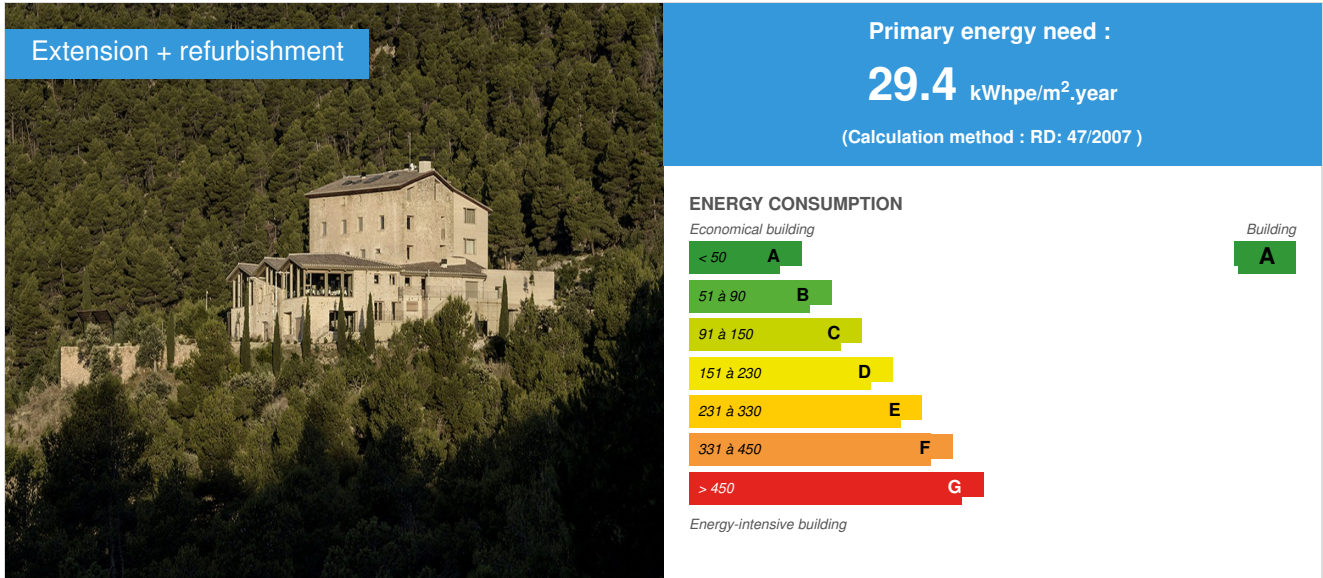


Hotel 'Mas Torre del Marqués' - Spain

by àngels castellarnau visús / 2023-03-13 00:00:00 / España / 1216 / ES



Building Type : Hotel, boarding house

Construction Year : 2017

Delivery year : 2020

Address 1 - street : Carretera Fuentespalda a Ráfales, Km 2,2 Paraje de Torre del Marques (Parcela 547, Polígono 3) 44652 MONROYO, España

Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 1 571 m² Superficie útil

Construction/refurbishment cost : 2 680 345 €

Cost/m² : 1706.14 €/m²

General information

Towards the 21st century farmhouse (decarbonisation strategies)

Masia or mas (in Catalonia and Aragon, lands of the Ebro of southeastern Spain): traditional agricultural exploitation with land, agricultural buildings and residence. The term derives from the Latin mansus which means to remain. The farmhouse has an identity characteristic of the territory, autonomous and sustainable; integrated into the landscape, it supplies itself without generating impact, in an ecological, balanced and long-lasting way.

The intervention consists of the rehabilitation and expansion of a farmhouse from the c. XVII "Torre del Marqués" in Monroyo, Matarranya, Teruel; to adapt it to the use of Hotel *****.

Decarbonization strategies were applied both in the building construction phase and in the use phase. As it was the case before, the new farmhouse, at the end of its useful life, will reintegrate its materials directly into nature. To achieve this closed resource cycle, 90% of the weight of construction materials used are km0.

A conscious selection of materials and craftsmen led us to plaster the interior walls with local clay, to cover the pavements in plaster from Albarracín or with handmade ceramic pieces, and to reuse and reinforce the existing wooden structure. The new wood, lime, hemp, and cotton insulation are selected with criteria of proximity. And local artisans, potters, blacksmiths and carpenters worked together to manufacture the different elements. This strategy led to a powerful circular economy project.

A life cycle analysis (LCA) shows that the environmental impact derived from the rehabilitation and expansion of the building is 60% less than that of a conventional intervention. Of the remaining 40%, 20% corresponds to the impact generated by the facilities, so the ecological footprint of the architectural intervention, apart from the facilities, is extremely low.

To reduce energy demand, a detailed bioclimatic strategy was put in place; working by superinsulating the original volume, thermal inertia in the extension, the south façade with large openings and inserting a greenhouse in the intermediate space between buildings. The energy that enters the building is stored in walls with great thermal inertia and is redistributed inside the rooms, generating spaces with very good thermal behavior.

At the agronomic level, the intervention consists of the reactivation of crops (almond, olive, vine and forest). Forest management begins with the use of wood for the production of woodchips. The new farmhouse, like a traditional one, uses its environment to produce the energy it needs. A system of ditches and ponds collects and recirculates rainwater for irrigation.

The energy for the building (hotel/spa/restaurant/employee housing) is produced by means of a biomass district heating installation fed by woodchips from the farm.

A 100kw photovoltaic plant has been installed on the roof of the car park pergola. The annual energy balance of the building generates a surplus.

We develop an architecture that remains, which adds to the pre-existence giving formal and material continuity, with respect for the local constructive culture but without prejudice to innovation and the reduction of environmental impact.

Clay, plaster, stone and wood, straw, hemp and light are the materials that shape the spaces of the building. These healthy spaces, free of additives and toxicity allow the user to reconnect and perceive the architecture through all the senses.

The vernacular building of the 21st century recognizes the beauty of the natural and the healthy, practices ethical aesthetics and creates identity.

See more details about this project

<http://arquitectura.edraculturaynaturaynatura.com/portfolio-item/hotel-5-torre-del-marques/>

Data reliability

Self-declared

Photo credit

Xavier d'Arquer (Double studio photography)

Stakeholders

Contractor

Name : ELECNOR S.A

Construction Manager

Name : ELECNOR S.A

Stakeholders

Function : Designer

EDRA arquitectura km0

angels@edraculturaynaturaynatura.com

<http://arquitectura.edraculturaynaturaynatura.com/>

Architecture

Function : Developer

Proyectos e Inversiones del Matarraña SL

elecno sa

Contracting method

General Contractor

Architectural description

<https://www.construction21.org/espana/data/sources/users/5770/20230227171602-dossier-sostenibilidad--masia-sxxi.pdf>

If you had to do it again?

We would eliminate the air conditioning system even if we were not complying with the norm, given that the building works bioclimatically on its own and the

facilities account for 44% of the environmental impact of the building.

Building users opinion

Very good acceptance of the building.

Energy

Energy consumption

Primary energy need : 29,40 kWhpe/m².year

Primary energy need for standard building : 38,00 kWhpe/m².year

Calculation method : RD: 47/2007

Breakdown for energy consumption :

- Heating: 3.32
- ACS: 4.14
- Refrigeration: 22.07

More information :

All the energy needed for the building is produced locally. The pine forest of the farm is managed to produce woodchips with which hot water for the Hotel is produced by means of a district heating system of biomass boilers. And the need for electricity is more than covered by an installation of photovoltaic panels. The building is energetically autonomous.

Initial consumption : 152,00 kWhpe/m².year

Envelope performance

Envelope U-Value : 0,49 W.m⁻².K⁻¹

More information :

the wall facades are built with a thickness of 60 cm, with an average 8 cm layer of lime mortar on the outside, an average 2 cm layer of lime mortar on the inside, and a layer of lime mortar with hemp on the inside.

Users' control system opinion :

The control is carried out centrally as it is a building for public use, also inside the rooms the climate systems are monitored and controlled individually by the guest through CO₂ and temperature probes. what maintains the space in conditions marked by the centralization or by the user at all times.

Renewables & systems

Systems

Heating system :

- Wood boiler

Hot water system :

- Wood boiler

Ventilation system :

- Double flow heat exchanger

☞ además de los sistemas de producción de calor el edificio cuenta con espacios de captación solar pasiva en las zonas comunes de planta baja por un lado los comedores abiertos a grandes cristaleras orientadas al sur y por otro un espacio invernadero en la u

Renewable systems :

- Solar Thermal
- Biomass boiler

Renewable energy production : 300,00 %

Solutions enhancing nature free gains :

Greenhouse and intake on the south façade, maximization of openings on façades facing south and east in order to maximize direct profits.

Environment

GHG emissions

GHG in use : 5,30 KgCO₂/m²/year

Methodology used :

Calculation by Ce3x tool

GHG before use : 740,00 KgCO₂/m²

Building lifetime : 200,00 year(s)

, ie xx in use years : 139.62

It is carried out with the ITEC database that only has data on the production and construction of the building.

Life Cycle Analysis

Material impact on GHG emissions :

el impacto de los materiales de construcción al margen de las instalaciones supone 325kg/m²

Eco-design material :

An extension of the building is carried out in Tapia lightened with straw, built with earth and straw from the farm itself. The wall is built with calicostrada with an outer crust of lightened lime and hemp mortar that has the function of isolating the outside.

All existing wood is maintained, strengthened, reused and expanded with local wood. the coatings are made of local clay mortar and plaster pavements from Albarracín (also local).

A meticulous design of the interior linings is made so that a conscious selection of materials not only reduce the environmental impact of the intervention but also develop a powerful circular economy project that involves local artisan fabric. In this way, the local craftsmanship is deliberately valued by participating in an emblematic building of this uninhabited area of Teruel.

The methodologies applied in the formulation and design of the earth-bearing walls develop characterization and quality control protocols for the new calicostrada wall system with lightened mortar crusts that edra arquitectura km0 has been developing in order to reintroduce and modernize the systems traditional earthen construction methods to make them more competitive, given that they have a very significant potential to respond to the current climate emergency scenario, both due to their bioclimatic behavior and their ability to influence the reduction of the environmental impact of buildings.

[🔗 tecnologas contemporaneas de tierra compactada, desarrollamos la mejora tecnologica de los sistemas de construccion con tierra tradicionales, se mejoran las formuSe introducen mejoras en el comportamiento termico introduciendo fibras naturales en las mezcl](#)

Water management

Consumption of grey water : 100,00 m³

Consumption of harvested rainwater : 100,00 m³

The hotel's water comes entirely from two existing wells on the farm, both for hotel use and for irrigation of crops. The water used in the hotel is discharged into a purification system with a biological filter and then infiltrates into an almond-growing field in the upper part of the estate. In other words, it is returned in its entirety to the aquifer, in the same way as irrigation. The system is completely autonomous and closed loop. Consumption is minimal since the water from all uses returns to the aquifer.

Indoor Air quality

The spaces have an interior air renewal system connected directly to the exterior that, through a heat exchanger, prevents losses due to air renewal. These systems are activated by a Co₂ probe so that renewal only occurs when the quality of the indoor air requires it; ensuring, on the one hand, the optimal quality of indoor air and minimizing energy losses due to renewal as much as possible.

Comfort

Health & comfort :

A meticulous design has been made to access natural light so that the spaces do not require artificial lighting during the day. All the spaces have interior light management elements so that the user can correct lightning to their liking and depending on the activity they are carrying out.

With respect to the interior materials, work has been done with materials of great thermal inertia that confer optimum hygrothermal behavior, enclosing walls in the bedrooms in the enlarged part and clay mortar renderings in the rest of the rooms, as well as flooring. Albarracín plaster inside the bedrooms. These geo materials are completely natural and do not have any type of additive in their composition. The woods are treated with natural oils or water-based varnishes.

Materials with high thermal inertia give the space thermal stability both in summer and winter, with thermal comfort achievable with minimal heat input in winter. In summer, cold input is not required, although the air conditioning system allows it.

Cross ventilation and recirculation throughout the building have been designed for the hot air produced in the common spaces on the south facade and in the greenhouse on the ground floor. This allows a very important preheating of the interior air that drastically reduces the energy demand of the building. The rooms in the common areas are sectionable so that the manager or user can optimize the use of this heat that is generated in the passive systems depending on the use of the spaces, being able to further optimize the bioclimatic management of the whole.

Calculated indoor CO₂ concentration :

según CTE

Calculated thermal comfort : verano 24 °C, invierno 22°C

Measured thermal comfort : verano 24 °C, invierno 22°C

Acoustic comfort :

The demand for protection against noise is resolved through mass systems both between common areas and bedrooms and between spaces in common areas. The existing masonry walls are maintained and new compacted earth walls are built. The enclosures between bedrooms are made with ceramic partitions and cotton insulation for airborne noise. The floor is also worked with dough and with acoustic insulation made from recycled cotton.

Products

Product

Calicostrada wall

Product category : Obras estructurales / Estructura - Albañilería - Fachada



Costs

Urban environment

The building is located at the foot of a Mediterranean pine forest on the edge of an area of almond, olive and cereal cultivation. The existing volumetry is maintained and the interventions are compacted in order not to reduce the agricultural land that is developed at the edge of the forest and in the surroundings.

The original farmhouse next to an existing water source is kept and renews. The new building does not modify the conditions of implementation of the original one and is supplied with both energy and water from the immediate environment. Woodchips that comes from the surrounding forest heat the water necessary to supply the hotel through biomass boilers. Furtehrmore, the photovoltaic installation produces more energy than the establishment requires.

Land plot area

Land plot area : 11 620,00 m²

Built-up area

Built-up area : 19,19 %

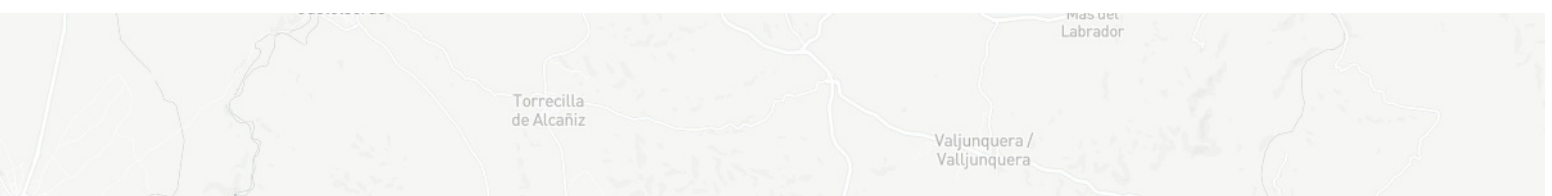
Parking spaces

300m²

Building Environmental Quality

Building Environmental Quality

- biodiversity
- comfort (visual, olfactive, thermal)
- water management
- energy efficiency
- renewable energies
- maintenance
- integration in the land
- building process
- products and materials



Reasons for participating in the competition(s)

<https://www.construction21.org/espana/data/sources/users/5770/20230227171103-dosier-sostenibilidad--masia-sxxi.pdf>

Rehabilitation of a building for use as a luxury hotel in an uninhabited area with natural materials and low environmental impact and local artisans.

The building intends to value traditional technologies with a strong identity character and, based on local materials and the agents of the territory, project the building into the future.

Building candidate in the category



Users' Choice



Date Export : 20230403132355