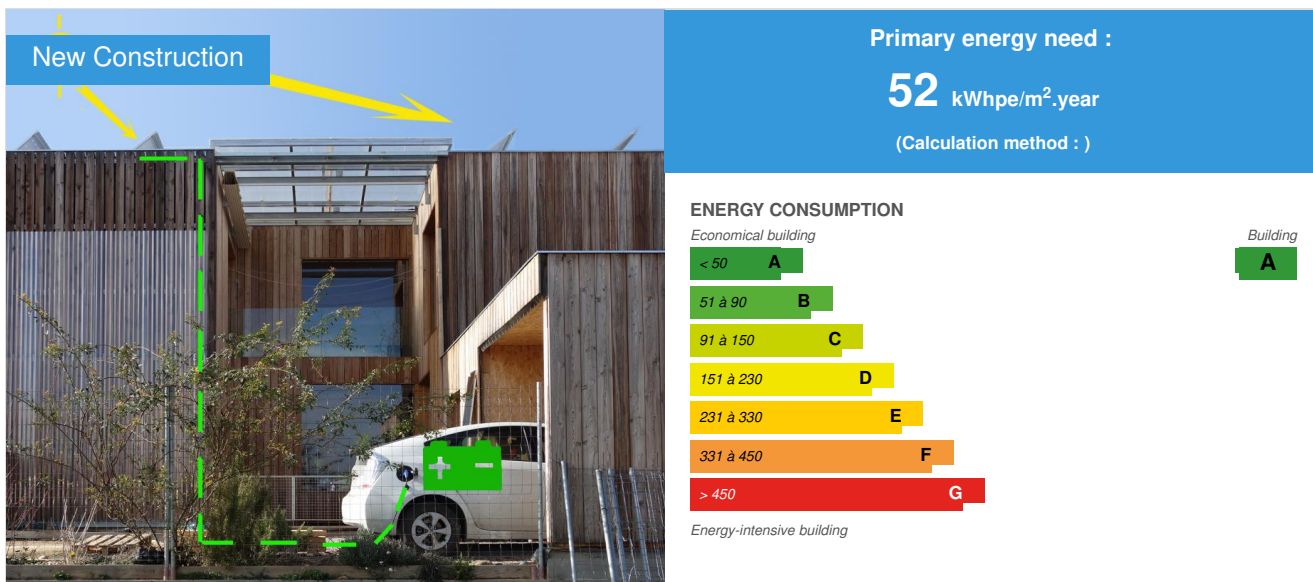


## Passive house Bunyesc

by Josep Bunyesc Palacin / 2012-12-24 13:08:07 / Espagne / 27397 / ES



**Building Type :** Isolated or semi-detached house  
**Construction Year :** 2009  
**Delivery year :**  
**Address 1 - street :** Arboretum, 21 25198 LLEIDA, España  
**Climate zone :** [Csa] Interior Mediterranean - Mild with dry, hot summer.

**Net Floor Area :** 190 m<sup>2</sup>  
**Construction/refurbishment cost :** 165 000 €  
**Number of Dwelling :** 1 Dwelling  
**Cost/m<sup>2</sup> :** 868.42 €/m<sup>2</sup>

### General information

Single-family house between party walls with ground floor, first floor and basement for office and housing. Although the plot is narrow and deep, this project attempts to open as much as possible to the south in order to get passive free solar energy but, at the same time, solar protection during summer it's also important. A central courtyard creates a new south facade which allows the solar energy distribution all along the building and avoiding the typical one dark side, one light side situation in this kind of buildings. This courtyard and the staircase articulate the internal circulation and create crossed views from the inside. The construction system it's innovative and it's formed by self-supporting timber panels with the insulation inside, OSB panel in the internal part and a breathable exterior panel to avoid condensations and thermal bridges. These panels, accurately manufactured in a workshop, are assembled easily and quickly, which leads to a competitive construction system and less than five months work. It's a high efficiency construction, less than 10kWh/m<sup>2</sup> year, class A, because of the insulation's thickness, between 18 y 28cm, low-e glasses and the orientation. The heating consumption it's about 200€/year and there aren't any buildings in the party walls yet. This constructive system it's based in the use of timber and sheep wool for insulation, organic materials 100% renewable, which made this a pretty sustainable construction, and low energy manufactured materials. The balance CO<sub>2</sub> emissions through the building is neutral, because the wood stores proportionally the same amount of CO<sub>2</sub> that produces when it's manufactured and the use of other materials which are not made of wood. This construction achieves the ambitious European guidelines in a short term of drastic reductions of building emissions and energy savings. This is an easy and affordable option to make this objectives come true globally.

[See more details about this project](#)

## Data reliability

Self-declared

### Stakeholders

#### Stakeholders

Function : Designer

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Function : Thermal consultancy agency

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Function : Developer

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Function : Manufacturer

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#### Owner approach of sustainability

To build a house that consumes less energy to get higher savings. The main point is to take the most of the natural resources in order to get these energy savings. All of this using natural materials like timber and trying to build with a similar price as the conventional house.

#### Architectural description

This Project was designed in order to take the most of the natural resources, but it's difficult to play with the orientation because the plots are narrow. The most of the windows are placed in the south to heat the dwelling during winter and a courtyard it's placed in the middle letting the sun go all along the house. All these windows can be protected by blinds or sliding doors. The volume is rectangular, which makes easier to construct the dwelling and the structure it's made by self-supporting manufactured timber walls, which allows to build the house in a short period of time. The roof is flat and ventilated, in order to avoid a hot roof during summer and collecting the rainwater in one side and store it for a reutilization. The main part of the house is the wood. The structure, the covering, the doors, the windows, the stairs, etc. are made of wood, a natural material, with zero ecological footprint, or even negative over the years. In the plot there's also a part where it's possible to place a vegetable patch, to let the residents of the house cultivate their own food. The low energetic consumption using active systems it's possible with thermal solar panels for the DHW and a heat recovery that allows the mechanical ventilation without the necessity to open the windows.

#### If you had to do it again?

We had the chance to project and identical dwelling in the same street with the same construction systems, materials, renewable systems... and the only thing that we have changed in the project is the heating system. The only thing that heats the house, when it's necessary, is a traditional chimney.

## Building users opinion

We are very satisfied with the dwelling's behavior, both in summer and winter, and with the real results of consumption, that confirm that this system is really working and we have huge energy savings, with not even 200 € of heating annual consumption. During summer we felt good only with natural night ventilation and sun protection, which allows us to live without air conditioning.

It's also a satisfaction to have a lot of sun light all around the house, also in the basement, because through the courtyard it's possible to have natural light, and ensure that all the rooms have natural light almost all the day.

## Energy

### Energy consumption

Primary energy need : 52,00 kWhpe/m<sup>2</sup>.year

Primary energy need for standard building : 220,00 kWhpe/m<sup>2</sup>.year

Calculation method :

### Envelope performance

Envelope U-Value : 0,20 W.m<sup>-2</sup>.K<sup>-1</sup>

Indicator :

Air Tightness Value : 1,00

## Renewables & systems

### Systems

Heating system :

- Individual electric boiler
- Radiant ceiling
- Solar thermal

Hot water system :

- Individual electric boiler
- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Nocturnal ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Biomass boiler

Renewable energy production : 80,00 %

### Smart Building

BMS :

Manual according to the weather forecasting.

## Environment

### GHG emissions

Building lifetime : 75,00 year(s)

## Life Cycle Analysis

Eco-design material : Timber structure and sheep wool insulation.

## Water management

Consumption from water network : 80,00 m<sup>3</sup>

Consumption of harvested rainwater : 17,00 m<sup>3</sup>

## Products

### Product

Sheep wool insulation (RMT-NITA WOOL)

RMT Recuperación de Materiales Textiles, SA

Pol. Ind. Can Magre - c/ Narcís Monturiol - Joan Güell 08187 - Santa Eulàlia de Ronçana - Barcelona Tel: +34 93 844 89 78 | Fax: +34 93 844 88 15

<http://www.rmt-nita.es/index.php>

Product category :

Sheep wool for thermal insulation served in bulk or in plates.

They have never seen sheep wool used as insulation but it seemed pretty innovative and interesting for them because it's a natural nearby material.



Low-e glass (Climalit)

VIDRES LA NOGUERA

C/GREGAL N° 7 25600 - BALAGUER (LLEIDA) Tel: 973451257

<http://www.vidreslanoguera.com/>

Product category :

Low-e glass with argon in the air cavity.

The visual result it's the same as a normal double glass but its thermal behavior it's highly satisfactory. It has U=1,1 which is much lower than a normal double glass.

## Costs

### Energy bill

Forecasted energy bill/year : 600,00 €

## Urban environment

The plot is placed in a new planification area, and there aren't so many neighbors in the street. Its location is on the outskirts of the city, close to a university campus. That means that the connection with the public transport it's great and there're also a shopping area. There's a botanic garden in the plot and as the facades are made of timber, the garden it's really integrated in the landscape.

### Land plot area

Land plot area : 200,00 m<sup>2</sup>

### Built-up area

Built-up area : 210,00 %

### Parking spaces

In the street, just in front of the plot.

Building candidate in the category



Materiales de origen biológico



Energías renovables



Edificios de consumo nulo



Salud y Confort

