Positive Social Housing - 3-room house

by isabelle Dorgeret / 2015-03-09 16:03:05 / Francia / 14332 / FR

Primary energy need :

41 kWhep/m².an

(Calculation method : RT 2012)

ENERGY CONSUMPTION

Economical building — *Building*

< 50	A	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 : Isolated or semi-detached house
Construction Year : 2013
Delivery year : 2013
Address 1 - street : 36 rue Georges Clémenceau 11400 CASTELNAUDARY, France
Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 89 m²
Construction/refurbishment cost : 104 949 €
Number of Dwelling : 1 Dwelling
Cost/m2 : 1179.2 €/m²

Certifications :

Bepos 2013

General information

The Positive Social Housing project is primarily a sustainable development project on the scale of a territory. It brought together the city of *Castelanaudary*, the social landlord *Habitat Audois*, students and teachers of the B*uilding trades Andreossy Highschool of Castelnaudary* and *TERREAL* company; a constructive solutions manufacturer for building envelopes and a major economic player of the region.

The project is the brainchild of four partners:

- **Imagine** an exemplary territorial project of Vallons de Griffoul Eco-district consisting in **two positive energy houses** using local materials mainly from extracted locally clay. The cost of construction and maintenance of the houses had to be compatible with the financing of social housing and therefore controlled. The materials selection and systems are robus and simple to operate. It is also designing efficient housings in which the human factor remains at the center.
- **Build:** Positive Social housing is a concrete project. Two houses were built by local actors, introducing innovative techniques with the support of Terreal for their implementation. The construction was achieved in accordance with the principles of bioclimatic architecture and particularly focused on the summer

comfort for the future residents.

- **Understand:** The Positive Social housing project allowed each player to understand how we imagine and how to build buildings that can compensate all consumptions of the house and its occupants by producing renewable energy at an exemplary cost. This project was also an excellent teaching tool for students in high school who imagined the technical solutions for shaders.

The Positive Social Housing project is also the practical support for the research conducted in 2015 by a PhD student at the University of CERTOP Toulouse. The research aimed to understanding the influence of the occupant behavior on the home performance, in order to work on supporting change management. That way, these positive energy buildings stay positive even with their inhabitants, and without coercion, to really meet the challenge of energy sobriety.

This case study concerns the 3-room house.

Sustainable development approach of the project owner

The goal was to learn and understand how to make a positive energy house controlled cost with actors and local materials, furthermore, to understand how it is occupied by the inhabitants to subsequently propose technical solutions that will adapt to occupiers and not the reverse. Make houses really positive energy!

Architectural description

The project consists of two adjoining houses T3 and T4 using building materials made locally and respecting the principles of bioclimatic architecture

See more details about this project

http://www.habitatsocialpositif.com/

Stakeholders

Stakeholders

Function : Manufacturer

TERREAL

isabelle Dorgeret

http://www.habitatsocialpositif.com/

Contribution to the initiation and project success

Function : Investor

Habitat Audois

Monsieur Armand Cathala

http://www.habitat-audois.fr

Contribution to the initiation and success of the project, social landlord and owner of the house

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Function : Environmental consultancy

Ville de Castelnaudary

Monsieur le Maire

http://www.ville-castelnaudary.fr/fr/

Contribution to the initiation and project success

Function : Others

Lycée Andréossy de Castelnaudary

Monsieur le Proviseur

http://www.lyceeandreossy.fr/

Contribution to the initiation and project success

Function : Construction company

Les Provinciales

M. Ludovic Garcia

http://www.les-provinciales-castelnaudary.fr/

Builder

Function : Designer

AEAA

Cécile Escourrou

http://www.alvaro-escourrou.fr/pagedegarde.html
Architect

Function : Thermal consultancy agency

CITE Vergé

Alain Biard

Thermal calculations

Function : Certification company

CEQUAMI

Maxime Parent Du Chatelet

http://www.cequami.fr/
Certification Bepos Effinergie 2013 and Effinergie +

Function : Others

CERTOP

Madame Zelem

http://www.certop.cnrs.fr/
Tenure of housing, habitat and occupants interraction

Contracting method

Off-plan

Energy

Energy consumption

Primary energy need : 41,00 kWhep/m^2.an

Primary energy need for standard building : 62,00 kWhep/m^2.an

Calculation method : RT 2012

CEEB : 0.0002

Breakdown for energy consumption : Actual energy consumption 2014:
Heating = 35.89 / m² / year
Lighting + ventilation auxiliaries = 5.81 kWef / m² / year
Hot water = 1.45 kWef / m² / year
All 5 usages of RT2012 real final energy = 43.15 kWef/ m² / year
All 5 usages of RT2012 primary energy = 68.61kWep / m² / year
Total specific consumption (household) = 13.23 kWef / m² / year
Total specific consumption (household) = 34.14 kWep / m² / year

Real final energy consumption

Final Energy : 53,17 kWhef/m^2.an

Real final energy consumption/m2 : 56,39 kWhef/m^2.an

Real final energy consumption/functional unit : 56,39 kWhef/m^2.an

Year of the real energy consumption : 2 014

Envelope performance

Envelope U-Value : 0,28 W.m^{-2}.K^{-1}

More information :
- Exterior walls: wall masonry type A 20 cm Calibric Terreal + stucco + 11.3 cm of insulation -> U = 0.214 W / m².K
- Interior walls: Partition placbric Terreal + coating + 9.3 cm of insulation -> U = 0.309 W / m².K
- Floors: concrete screed + isochape + compression slab + insulation -> U = 0.130 W / m².K
- Ceiling height lost: plasterboard 36cm + wool blown -> U = 0.154 W / m².K

Building Compactness Coefficient : 0,60

Indicator : n50

Air Tightness Value : 0,36

More information

Heating energy consumption is higher than expected in the thermal study. This is essentially because rooms temperature is above 19 ° C and the inhabitants were seeking for comfort closer to 21-22 ° C. However, the specific consumption is well below the forecast which makes this home a truly positive energy housing considering all consumption: those of the house and those of occupants.

Renewables & systems

Systems

Heating system :
- Electric heater
- Wood boiler

Hot water system :
- Heat pump

Cooling system :
- No cooling system

Ventilation system :
- Humidity sensitive Air Handling Unit (Hygro B

Renewable systems :
- Solar photovoltaic
- Wood boiler

Renewable energy production : 158,40 %

Total PV production in 2014 = 108.69 kWhep / m² / year which compensates for kWhep 68.6 / m² / year consumed by the building +the 34.14 kWhep/ m² / year for specific uses of the inoccupants

Smart Building

BMS :
no BMS

Environment

Urban environment

Land plot area : 500,00 m^2

Built-up area : 50,00 %

The HSP operation counts two houses, a 3-romm and a 4-romm, which consume less energy than they produce. They are built in eco-district Vallons des Griffoul in Castelnaudary with locally manufactured sustainable building materials. This case study covers the 3-room house. The ZAC "Vallons des Griffoul" won the “New Sustainable Urban Forms" prize awarded by the Languedoc Roussillon region in 2010.

Designed on the model of an eco-district, it offers new forms of housing in a sustainable and innovative neighbourhood; it is adapted to the needs of the population in all its diversity, respect the local identity and environmental requirements.

As part of its sustainable development policy, the city of Castelnaudary developed a project limiting the impact on the environment, ensuring an adequate energy management and with particular attention to the environmental quality of the ZAC. Designed as an eco-district, combining efficiency of consumption, technical and energy requirements, densification and diversity prioritizing the relation to nature, to agricultural land and water.

The eco-district completes the existing urban fabric, in line with the sustainable development objectives of the municipality:
- Form and urban integration: limitation of heights, reduced car use, presence of bike paths, pedestrian paths, proximity of public transport.
- Mixity: The units will be individual, grouped and collective individual and a quarter of them will be in social housing.
- Water: rainwater recovery, consumption control equipment, welcomes booklets for future occupants.
- Biodiversity conservation of woodlands.
- Orientation bioclimatic: living rooms oriented to south.
- Energy: low consumption building and solar thermal hot water.
- Waste: pre-sorting and composting spaces.
- Materials: local, natural, certified.
- Controlled costs.
- Consultation.

Products

Product

Calibric TH evolution TERREAL

TERREAL

isabelle.dorgeret@terreal.com

http://www.terrealstructure.com/

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '6'

New generation heat-resistant brick R = 1.15 Brick m²K / W. A highest quality of construction thanks to glued-down installation, adapted also to collective works. Perfect compatibility with the range of monoliths accessories of TERREAL for special point's treatment.

Regulation and certifications: Calibric® Th evolution under DTA CSTB No. 16 / 09-586 of 17/05/2010 (under revision) and Certificate No. 409-238-586 12/04/2012. It meets the requirements of NF EN 771-1 / CN " "Specifications for masonry units - Part 1: Clay brick buildings"; CE Products * NF in NF and NF S * Th * *

The certified characteristics for the NF Brick Terracotta is the appearance (for horizontal perforated bricks only), dimensions, dry bulk density, bursting, the expansion due to moisture, compressive resistance, resistance to hard impacts, resistance to scuffing, durability (frost resistance). The NF Thermal also certifies the thermal characteristic of the model.

The thermal resistance of the wall combining certified model is validated on the basis of a calculation. The NF Seismic also certifies the use for buildings subject to seismic requirements.

See the video shot with the building firm on the site dedicated to the project http://www.habitatsocialpositif.com/construire-hsp/en-images/videos/

LAHEROOF System - ECS Thermodynamics calories coupled with a collector placed under the tiles

TERREAL

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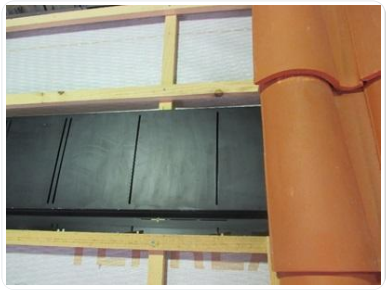
http://www.terreal.com

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '18'



Sloping roofs are traditionally ventilated on the underside of hedging products. Passing under the terracotta tiles, the air warms. This innovation can recover the energy of this air space. The heat recovered is used to heat the incoming air in a heat pump water heater which makes possible to improve the performance.

The system is placed between the tiles and the roof underlay screen in the thickness of the roof, it is connected by a tube to the heat pump of water heater. The complete system enables to lower the power consumption of the heat pump of water heater.

-20% reduction of electricity consumption in the hot water system for sanitary use. Due to its global approach of homes energy performance, this system improves the overall technical-economic ratio of individual houses according to current regulations.

The thermal system is installed at the same of the laying tiles or a posteriori by lifting a few tiles. The system was adopted easily by the stakeholders of the project. Laheroof performance is valuated in the regulatory thermal calculation holding an "arrêté titre V"http://www.construction21.org/france/community/pg/file/846/read/19355/titre-v-prise-en-compte-du-systme-laheroof-_-arrt-du-13octobre2014

Mud wall

TERREAL

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The dividing wall between the living room and bedrooms is mud brick, which helps to regulate the relative humidity of the pieces by increasing the feeling of comfort and significantly improve summer comfort.

The partition is mounted like any clay or plaster wall tile, it must nevertheless take particular care in choosing the coating and its application to allow the wall develop their hygrothermal properties.

Costs

Construction and exploitation costs

Reference global cost : 85 000,00 €

Renewable energy systems cost : 11 800,00 €

Reference global cost/Dwelling : 85000

Total cost of the building : 104 949 €

Carbon

GHG emissions

GHG in use : 1,00 $KgCO_2/m^2/an$

Contest

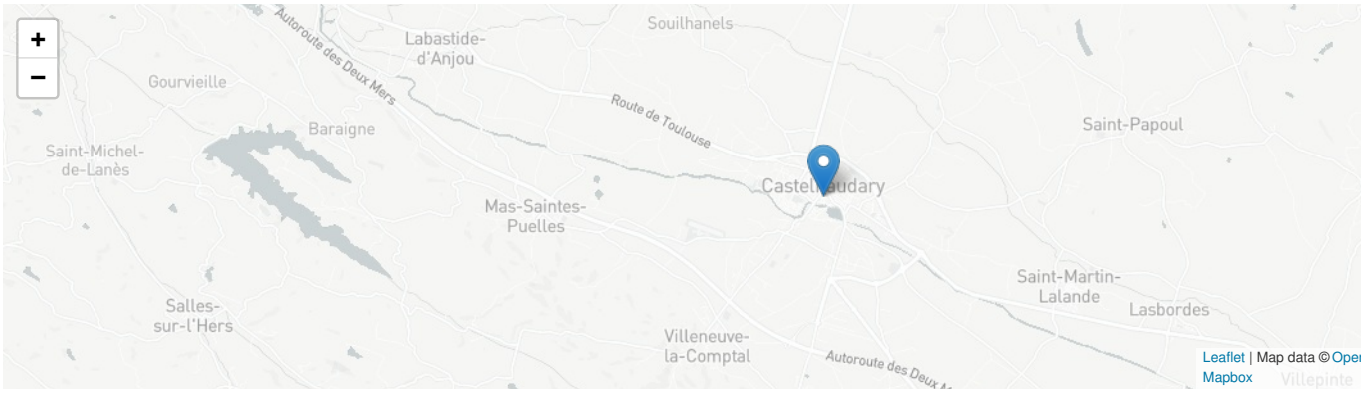
Reasons for participating in the competition(s)

The houses of the Positive Energy Social Housing project prove the reality of positive energy.
After 18 months of occupancy, all consumptions are optimised: the 5 usages of the French thermal regulation and the consumptions specific to th the tenants.
Theses consumptions are entirely compensated by renewable energies. That's why this house competes in the Net Zero Energy Building category.

Building candidate in the category

Bâtiment zéro énergie

Green Building Solutions Awards 2015
powered by Construction21



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