Avenger

by Bense Antoine / 2018-06-04 09:35:55 / France / 9424 / FR

Primary energy need :

30 kWhep/m^2.an

(Calculation method : Other)

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 : 2017
Delivery year : 2017
Address 1 - street : 23150 AHUN , France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 252 m^2
Construction/refurbishment cost : 373 000 €
Number of Dwelling : 1 Dwelling
Cost/m2 : 1480.16 €/m^2

Certifications :

Certifiée Maison Passive Passivhaus Institut classic | plus | premium

General information

After several years of R & D, Avenidor has embarked on an extraordinary project: to build the 1st Passive Premium certified and 100% autonomous house in the world.

The Avenidor building is located in the KZB Group's sustainable housing center (Ahun in Creuse).

Here are the peculiarities of this house:

- Certified passive premium by the PassivHaus Institute

No heating or cooling system (thanks to the design of the envelope and the orientation of the building in order to make the most of the solar contributions)

- Exceptional living comfort (no cold areas, optimal air quality, etc.)

100% autonomous in electricity (fields of photovoltaic panels bi-facial and park batteries)

100% autonomous in drinking water (rainwater drilling or recovery, filter body purification system and UV bactericide)

- WIFI system without being connected to the traditional wired network (amplification of the 4g and redistribution in WIFI)

In short, this house is so powerful that it surpasses the RT2020 (future thermal regulation of the building), it works by making the most of what nature has to offer.

Our goal is to make this type of housing accessible to all and thus drastically reduce pollution related to buildings. That is why, from September 2018 we offer our solutions to individuals wishing to afford an exceptional house, tailor-made and eco-responsible.

Sustainable development approach of the project owner

Pollution related to the building activity sector accounts for 25% of total CO2 emissions in France.

Alarmed by this observation Avenidor aims to design houses that have no impact on the environment, from their realization to their use. In order to take up this major challenge, the prototype presented here has been developed to consume very few resources and use only renewable energies, while favoring materials with low environmental impact.

Architectural description

Architecturally inspired Alsatian, the house Avenidor is built of cellular concrete (masonry material the least impacting ecologically and offering the best performance) and is insulated with polystyrene (recycled) extruded under raft and expanded in elevation. This house of 252m ², has 3 levels:

- A basement in heated envelope
- Ground floor (living room and open kitchen, WC)
- R + 1 (3 bedroom and 3 bathroom)

Through its aesthetics, Avenidor demonstrates that a high-performance building can have a traditional architecture. One of the challenges of this construction was to make half-timbering reconstituted stone fixed directly on the ITE without diminishing the effectiveness. In addition to benefit from a perfect insulation (R of 10 on average overall envelope) the building is oriented in order to make the most of the bioclimatic contribution (maximum opening to the south and very little to the north) .Here is precisely the constructive mode of the house:

Raders:

From bottom to top :

- All coming 100mm
- Geotextile membrane
- DOW XPS (λ = 0.029 W / mK) 240mm
- Anti-hiking membrane
- Reinforced concrete slab (λ = 2,500 W / mK) 300mm

U Radices = 0.104W / (m²K)

Exterior walls:

From outside to inside walls:

- 25 mm reconstituted stone cladding (aesthetic function)
- Crepe facade covering 15 mm
- TE ZOLPAN EPS (λ = 0.038 W / mK) 200mm
- YTONG cellular concrete block (λ = 0.090 W / mK) 365mm
- SIGA steam
- Unvented air gap 48mm
- 18mm plasterboard
  UMurs ext = 0.098W / (m²K)

Roofing:

From outside to inside:

- Roof tiles
- By rain
- Fir farmhouse
- Projected cellulose wadding (λ = 0.039 W / mK) 600mm
- Oriented Strand Board 22mm
- SIGA steam
- Ceiling in plasterboard 13mm

UToiture = 0.073W / (m² / K)

Window

- HF310 Wood-aluminum frame chassis
- Triple glazing 48mm, 44b.2 (VSG) / 16Ar / 4 / 15Ar / b4

U g-value = 0.88 W / (m²K)

g -value = 60%

Uw = 0.898 W / (m²K)

Building users opinion

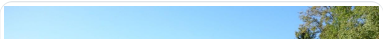
All the people having stayed in our house are unanimous on the comfort of life which it proposes:
Irreproachable quality of the air managed by the VMC double flux.
Outstanding acoustic comfort
Feeling of homogeneous heat throughout the house

If you had to do it again?

As our prototype house has achieved the expected consumption and performance targets, we would like to increase the share of bio-sourced in our homes. This is why we are currently developing a straw house carrier that will have the same performance and will also be 100% autonomous.

See more details about this project

https://www.avenidor.com/



Stakeholders

Contractor

Name : Avenidor
Contact : Bense Antoine
http://www.avenidor.com

Construction Manager

Name : Avenidor
Contact : Bense Antoine
http://www.avenidor.com

Stakeholders

Function : Construction company

SETIM

Kaszuba Boris

http://groupekzb.com/
Partner design and realization

Function : Thermal consultancy agency

SRKLIM

Legros Jean-Paul

http://groupekzb.com/
Thermal Study and Fluid Management Office

Contracting method

Lump-sum turnkey

Energy

Energy consumption

Primary energy need : 30,00 kWhep/m^2.an

Primary energy need for standard building : 50,00 kWhep/m^2.an

Calculation method : Other

CEEB : 0.0001

Breakdown for energy consumption : Hot water requirements: 11.03 kWh / m².an Heating requirements: 7.44 kWh / m².an Cooling requirements: 0.6 kWh / m².an Auxiliary electricity: 2.71 kWh / m².an Specific electricity: 6.14 kWh / m².an VMC double flow (need in electricity): 2.7 kWh / m².an

Real final energy consumption

Final Energy : 31,00 kWhef/m^2.an

Real final energy consumption/m2 : 31,00 kWhef/m^2.an

Real final energy consumption/functional unit : 31,00 kWhef/m^2.an

Year of the real energy consumption : 2 018

Envelope performance

Envelope U-Value : 0,10 W.m^{-2}.K^{-1}

More information :
Here is precisely the constructive mode of the house:
Raders:
From bottom to top :
All coming 100mm
Geotextile membraneDOW XPS (λ = 0.029 W / m.K) 240mm
Anti-hiking membrane Reinforced concrete slab (λ = 2,500 W / m.K) 300mmU
Raders = 0.104W / (m²K)
Exterior walls:
From the outside to the inside of the walls:
25 mm reconstituted stone cladding (aesthetic function)
Crepe facade covering 15 mmTE ZOLPAN EPS (λ = 0.038 W / m.K) 200mm
YTONG cellular concrete block (λ = 0.090 W / m.K) 365mm
Steam SIGAVide unventilated air 48mm
Gypsum board 18mmU Walls ext = 0.098W / (m²K)
Roofing:
From the outside to the inside:
TilesFor rainFarm fir treeUse of projected cellulose (λ = 0.039 W / m.K) 600mm
Oriented Strand Board 22mm
SIGA vapor barrier 13mmU plasterboard ceiling
Roofing = 0.073W / (m² / K)
Internally Window Wood-Aluminum HF310Triple Glazing 48mm, 44b.2 (VSG) / 16Ar / 4 / 15Ar / b4U g-value = 0.88 W / (m²K) g -value = 60% Uw = 0.898 W / (m²K)

Building Compactness Coefficient : 0,60

Indicator : n50

Air Tightness Value : 0,18

Users' control system opinion :

Extremely easy to use.

Perfect.

More information

The house is 100% autonomous thanks to its field of 96 m² bifacial photovoltaic panels (sized for two buildings) and its battery park. Production of photovoltaic panels = 19.2 kW peak battery storage capacity 15 kW

Renewables & systems

Systems

Heating system :
- Heat pump

Hot water system :
- Heat pump

Cooling system :
- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic

Renewable energy production : 100,00 %

The site is supplied with electricity by 96m² of photovoltaic panels bifacial (20% additional production) connected to an automated battery park. The bifacial panels are placed on a white slab and along a pond to enjoy a phenomenon of reverberation and donate more.The system generates electricity for 2 buildings (19.2 kW peak and 15kW storage), whose Avenidor house. Treatment and purification system for drilling water by filter body and UV bactericide. Microstation purification, operating without electricity, for the total treatment of gray and black water.

Solutions enhancing nature free gains :
Échangeurs thermiques pour la récupération de chaleur sur eau grises. VMC double flux avec rendement à l'échangeur de 90%

Smart Building

BMS :
Intelligent because of its simplicity. Intelligence is in the design of the building

Smartgrid :
Automatically manage by the energy storage system.

Users' opinion on the Smart Building functions :

RAS

Environment

Urban environment

Land plot area : 24 000,00 m^2

Built-up area : 112,00 %

Green space : 13 000,00

Building realized on the Research and Development Center of the KZB Group.

In the middle of the woods. Bordering 2 lakes.

Products

Product

House Avenidor

SETIM

Arnaud Ramelot, DO, arnaud.ramelot@groupekzb.com

http://www.groupekzb.com

Product category : Management / Stakeholders involvement

1st certified Passive Premium home and 100% autonomous. It is the combination of materials, equipment, know-how and studies that made this house a success. Nowadays we have the experience and the technology to build the future, why stay anchored in the past?

Each stakeholder must be told the purpose and the issue of their work. On-site crews are rigorous when they understand the impact of their tasks on building performance. The most complicated is to obtain the insurance of CMiste (procedure started in November 2017 ...)

Costs

Construction and exploitation costs

Global cost : 680 000,00 €

Reference global cost : 3 500,00 €

Renewable energy systems cost : 80 000,00 €

Global cost/Dwelling : 680000
Reference global cost/Dwelling : 3500
Cost of studies : 75 000 €
Total cost of the building : 650 000 €

Health and comfort

Water management

House totally off networks. Drilling water.

Indoor Air quality

Optimal: about 350 ppm on average (house in Creuse, in the countryside)

Comfort

Health & comfort :

Optimal.

Calculated indoor CO2 concentration :
350

Measured indoor CO2 concentration :
de 350 à 1200ppm avec des fumeurs

Calculated thermal comfort : 20 et 25
Measured thermal comfort : de 19 à 24.6
Acoustic comfort :

27dB on one of the ventilation vents (worst measurement)

Carbon

GHG emissions

GHG in use : 0,45 $KgCO_2/m^2/an$
Methodology used :
GES calculation tool developed by Ecobatiment

GHG before use : 1,00 $KgCO_2/m^2$
Building lifetime : 100,00 année(s)
, ie xx in use years : 2.22
GHG Cradle to Grave : 297,00 $KgCO_2/m^2$

RAS

RAS

Life Cycle Analysis

Material impact on GHG emissions :
89

Material impact on energy consumption : 45,00 kWhEP
Eco-design material :

RAS 100% bio-sourced prototype under design. Start of work on July 30, 2018

Contest

Reasons for participating in the competition(s)

La maison Avenidor est 100% autonome et certifiée Passive House Premium.

En résumé, cette habitation :

- Est totalement hors-réseaux
- Profite de toutes les ressources naturelles de son environnement
- Recycle la majorité de son énergie thermique (échangeur air vicié & eaux grises)

Un système de collecte de données techniques a été mis en place dans ce prototype pour étudier le comportement du bâtiment sur le long terme.

Le système constructif est le suivant :

Radiers :

De bas en haut :

- Tout venant 100mm
- Membrane géotextile
- DOW XPS (λ = 0,029 W/m.K) 240mm
- Membrane anti randon
- Dalle en béton armée (λ = 2,500 W/m.K) 300mm

U Radiers = 0.104W/(m²K)

Murs extérieurs :

De l'extérieur vers l'intérieur des murs :

- Bardage en pierre reconstitué de 25 mm (fonction esthétique)
- Revêtement de façade crépit 15 mm
- ITE ZOLPAN EPS (λ = 0,038 W/m.K) 200mm
- Bloc de béton cellulaire YTONG (λ = 0,090 W/m.K) 365mm
- Par-vapeur SIGA
- Vide d'air non ventilé 48mm
- Plaque de plâtre 18mm

U Murs ext = 0.098W/(m²K)

Toiture :

De l'extérieur vers l'intérieur :

- Tuiles
- Par pluie
- Fermette en sapin
- Ouate de cellulose projetée (λ = 0,039 W/m.K) 600mm
- Oriented Strand Board 22mm
- Par-vapeur SIGA
- Plafond en plaque de plâtre 13mm

U Toiture = 0.073W/(m²/K)

Fenêtre

- Internorme châssis Bois-aluminium HF310
- Triple vitrage 48mm, 44b.2(VSG)/16Ar/4/15Ar/b4

U g-value = 0.88 W/(m²K)

g -value = 60 %

Uw=0.898 W/(m²K)

Ventilation double flux :

- MAICO WS 470
- Heat recovery system HER = 87,6%
- Isolation des gaines (λ = 0,039 W/m.K) – 100mm
- Batterie de chauffe (spirale de cuivre) en aval de la VMC permettant de réchauffer l'air souffler de la VMC en période hivernal

Eau chaude sanitaire :

- Pompe à chaleur air/eau DAIKIN Altherma BT 260L
- Echangeurs thermique sous les bacs de douches.

Aspect écologique :

96m² de panneaux photovoltaïques bifaciaux (20% de production supplémentaire)connectés à un parc batteries automatisé. Le système génère l'électricité pour 2 bâtiments, dont la maison Avenidor.

Des peintures dépolluantes ZOLPAN ont été utilisés pour assainir l'air intérieur (jusqu'à 80% de réduction des COV).

Système de traitement et de potabilisation de l'eau de forage (corps de filtre et bactéricide UV).

Echangeurs thermiques pour la récupération de chaleur sur eaux grises.

Microstation d'épuration, fonctionnant sans électricité, pour le traitement total des eaux grises et noirs.

Données et consommations :

- Surface habitable de la maison : 252m²
- Perméabilité à l'air N50=0.18/h
- Production des panneaux photovoltaïque 19.2 kW crête
- Besoin de chauffage annuel 6kWh/(m²a)
- Besoin d'énergie primaire : 43 kWhEP/m²/a (sur l'installation de chauffage, l'eau chaude sanitaire, l'électricité domestique et l'électricité auxiliaire).
- Prix de la maison : 1489€/m²

Building candidate in the category

Energie & Climats Tempérés

Coup de Cœur des Internautes

Prix des Etudiants

Date Export : 20230504172913