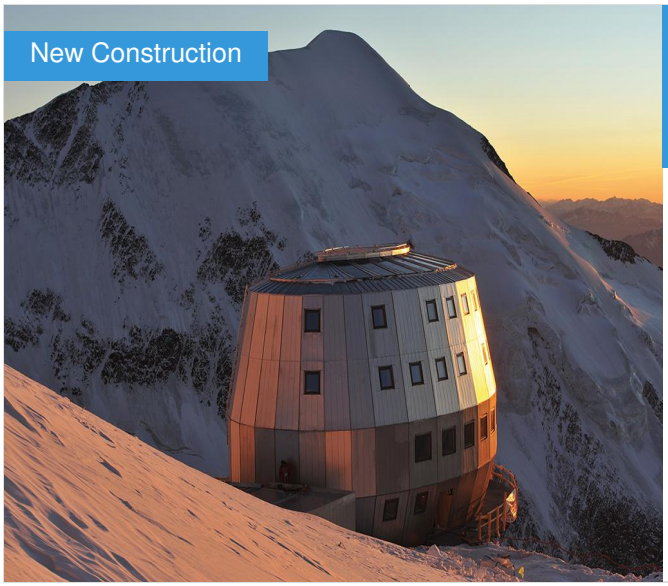
Refuge du Gouter

by Architecture & Ingénierie GROUPE H / 2015-04-23 10:09:09 / Francia / 40325 / FR



Primary energy need :

50 kWhep/m^2.an

(Calculation method :)

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 : Historic castle, other freaky buildings,…
Construction Year : 2012
Delivery year : 2013
Address 1 - street : 74170 SAINT-GERVAIS-LES-BAINS, France
Climate zone : [ET] Tundra - Polar tundra, no true summer.

Net Floor Area : 681 m^2
Construction/refurbishment cost : 5 500 000 €
Number of Dwelling : 120 Dwelling
Cost/m2 : 8076.36 €/m^2

Certifications :

Proposed by :

VELUX®

General information

The new Gouter refuge in the Mont-Blanc, one of the highest in Europe (3835 m altitude) replaces the old building, inadequate and dilapidated building dating from 1962. This building ovoid structure wood and metal cladding, real constructive and technical challenge facing the laws of nature is located 1000 m below the summit of Mont Blanc, the most frequented route by climbers.

Started in spring 2010, the site, due to extreme weather conditions, was over three spring-summer seasons, five months a year, and was completed in summer 2012.

Designed to accommodate 120 people, the shelter operates **autonomously:**

- thermal energy comes from solar collectors and electricity with photovoltaic panels.
- the processing air and the heating is provided by a double flow ventilation system and a rotary exchanger.
- Sanitation is based on recycling.

Sustainable development approach of the project owner

FFCAM is a multi-sport federation that offers -alpinisme activities, hiking, climbing, snowshoeing, air sports, mountain skiing, mountain biking, canyoning, caving, etc.- in an exceptional environment. The French Federation of Alpine and Mountain Clubs also seeks to promote awareness and protection of the mountain, a sensitive natural environment. It contributes to sustainable development of the high valleys through its 125 refuges and mountain chalets. It is a major player in the world of the mountain. FFCAM is a member of the UIAA (International Mountaineering and Climbing Associations) and the Club Arc Alpin.

Architectural description

Established in 3835 meters, on a plot of 2000 m² facing west overlooking a rocky outcrop, subject to winds up to 250 km / h and temperatures of -40 ° C, the architectural concept was conditioned by his environment. This situation led to a focus Harmonic Energy determining the shape and orientation of the shelter. To tame the wind, we studied fluid mechanics and aerodynamics of the envelope. Thus our research on a convex structure led us to a plan ellipse then projected in three dimensions, an ellipsoid of revolution. The main axis of the ellipse was placed into the prevailing wind to guide the deposition of snow in a kettle on the back of the building. To transpose the shaped structure, the elliptical plan was translated into segments of a circle, divided into 128 equal parts of trapezoidal or rectangular facets. This form is both simple and smooth, has been proportionally according to the principle of harmonic paths, the plane and along profile is part of a golden rectangle and the short profile in a square. The aesthetic dimension joins the ingenuity of the building. The wooden overall structure represents a volume of 400 m3. The 720 m² of hollow boxes floors based on a grid of beams fixed to 69 piles - piles. The assemblies are made by sealing resin. The facets constituting the envelope are isolated by panels wood fibers and are covered with satin stainless steel. Dimensioned for transport, the prefabricated modules are assembled on site.

See more details about this project

http://www.construction21.org/articles/fr/userschoice-awards-tied-winner-refuge-du-gouter.html
http://www.construction21.org/france/articles/fr/laureat-coup-de-coeur-des-internautes-2015-ex-aequo-refuge-du-gouter-france.html

Stakehol

Stakeholders

Function : Contractor

Federation Francaise des Clubs Alpins et de Montagne (FFCAM)

Président Georges Elzière

http://www.ffcam.fr

Function : Designer

GROUPE H, Société d'Architecture

Hervé DESSIMOZ, E-mail: architectes-ch@groupe-h.com, Tél.: +33(0)1 42 66 55 36

http://www.groupe-h.com
Design and project management of architectural work, steering unit, OPC

Function : Designer

DECALAAGE Architecture

Christophe de LAAGE, E-mail: contact@decalaage.com, Tél.: +33 (0)4 50 53 81 65

http://www.decalaage.com
Design and project management architectural work, construction management

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Function : Structures calculist

CHARPENTE CONCEPT, Ingénieurs et designers du bois

Thomas BUCHI, E-mail: contact@charpente-concept.com, Tél.: + 33 (0)4 50 07 80 71

http://www.charpente-concept.com
Design and project management on batches wood structure, exterior joinery, steel structure, stainless steel cladding, steering unit, construction management

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Function : Thermal consultancy agency

CABINET STREM, Ingénieur fluides

Pierre Stremsdoerfer, E-mail: contact@strem.fr, Tél.: + 33 (0)4 78 17 39 09

http://www.strem.fr

Design project management on batch ventilation heating, plumbing water production, sanitation, high and low voltage electricity, kitchen equipment.

Function : Structures calculist

BETECH SA

Olivier Percie du Sert, E-mail: contact@betechsarl.com, Tél.: + 33 (0)4 50 87 19 63

http://www.betechsarl.com
Design and project management on the lot earthworks foundations

Function : Other consultancy agency

ALBEDO ENERGIE

Michel Meunier, E-mail: info@albedo-energie.fr, + 33 (0)4 79 62 55 41

http://www.albedo-energie.fr
Dynamic thermal simulations, environmental quality of the building

Function : Environmental consultancy

Cabinet DENIZOU, Economiste

Stéphane Nardy, E-mail: cbt.denizou@denizou.fr, Tél.: + 33 (0)4 78 84 44 71

Studies on consignments interior wood joinery, metalwork, ceilings, walls, paint, flooring, furniture, signage.

Energy

Energy consumption

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

Primary energy need for standard building : 400,00 kWhep/m^2.an

Calculation method :

CEEB : 0.0001

Breakdown for energy consumption : - Heating: 4 kWh / m² / year - hot water: 3.9 kWh / m² / year - Cold water (melter): 13.6 kWh / m² / year - Electricity: 11.3 kWh / m² / year

Real final energy consumption

Final Energy : 48,16 kWhef/m^2.an

Real final energy consumption/m2 : 48,16 kWhef/m^2.an

Year of the real energy consumption : 2 013

Envelope performance

Envelope U-Value : 0,14 W.m^{-2}.K^{-1}

More information :
- Exterior walls: 0.142 W / mqK - Level Floor 0: 0.188 W / mqK - Roof: 0.9 W / mqK - Windows: 0.139 W / mqK

Indicator : n50

Air Tightness Value : 0,19

More information

THE YEAR 2013 Renewable Energy Production: Thermal - 21,500 kWh Power - 4400 kWh TOTAL: 25 900 kWh non-renewable production (cogeneration rescue group to vegetable oil): Electrical - 6900 kWh The non-renewable energy savings is 79% of final energy production. Also note that 100% of the final production of thermal energy from the Refuge du Gouter is from renewable sources and recovery.

Renewables & systems

Systems

Heating system :

- Combined Heat and Power
- Water radiator

- Fan coil
- Solar thermal

Hot water system :
- Solar Thermal

Cooling system :
- Water chiller
- Fan coil

Ventilation system :
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic
- Solar Thermal

Renewable energy production : 79,00 %

Other information on HVAC :

Comfort ventilation dimensioned on the basis of 9 m3 / h per person. This installation comprises: - A double central stream of a maximum flow of 1660 m3 / h of fresh air / 1650 m3 / h of exhaust air with heat recovery from exhaust air rotary exchanger (efficiency greater than 75 %), installed in the equipment room. - This turbofan power plant will be equipped with a hot water coil (brine) supplied from the thermal storage tank. - A new air intake in the vacuum refuge, northwest side - a side outer rejection opposite, east side - a blow networked panels freestanding M0 25mm coated glass wool thickness on the outside of a 100µ aluminum, and on the inside of a black high speed sailing anti erosion, with insufflation in dorms level 3, rooms at custodian housing the lobby, and the local reserves. - A return system galvanized sheet metal with extraction at the kitchen hood, stove of room, infirmary, sanitary guards, technical room ventilation, and public health. It is provided on the extraction kitchen triple filtration to protect the rotary heat recovery CTA turbofan - shock filters at the kitchen hood - Filter G4 + F7 filter with activated carbon extraction kitchen - Des dampers Resettable fire autonomously trigger at 70 ° C on the network blowing and recovery system, ensuring the continuity of walls Fire - The air transfers ensuring a scanning all local, with valves and hatches Fire 1h crossing each wall firewall. - An automatic modulation of ventilation rate depending on the instantaneous actual occupation of refuge.

Thermal energy is produced by: - a field of solar thermal flat plate collectors, below the building, of 54 sqm - For cogeneration fueled by rapeseed oil, the responsibility of the electricity lot - For the photovoltaic production, the load of the electricity lot The circuit of solar thermal collectors feeds by priority: -The snow melter, for the production of water -The preparation of the balloon ECS -The energy storage ball 2000 liters When the photovoltaic power exceeds the power requirements and the electrical storage batteries are full, device, the responsibility of the electricity lot, then allows the transfer of surplus electrical energy to an electrical resistance 6 kilowatts mono implanted in the energy storage tank. The thermal energy from cogeneration is also stored in the energy storage tank. The thermal energy from the energy storage tank is distributed to 4 secondary circuits - circuit heaters. - Heating coil CTA turbofan fan coils and heating coils in the common room. - Preparation of the ECS. The maximum temperature condition the return to co-generator to ensure proper cooling it is achieved by means of a plate heat exchanger operating on the stock with cold water, and to send hot water to the melter snow. Photovoltaic panels integrated monolycristallins front (97 m2). These panels are grouped into 6 strings. Total power: 13.58 kWp. Two sets of electric batteries 24 V 970 AH each. Islanding network installation comprising: - For each of the 6 groups of photovoltaic panels, a DC / AC inverter. - Three bidirectional inverters between the batteries and the AC network. - A device "Smart Load" for feeding the resistance of energy storage tank when the photovoltaic power exceeds the power requirements and the electrical storage batteries are full. The inverters are connected by bus and a remote transmission parameters and alarms via GSM is planned.

Smart Building

BMS :

The regulations are ensured by digital controllers liaisonnés by bus. BMS provides supervision of all, the remote transmission of alarms and remote diagnosis. Alarm type 1 with detection in all local, manual call

Environment

Urban environment

Land plot area : 2 000,00 m^2

Built-up area : 15,00 %

Located on the Aiguille du Gouter to 3835 meters altitude, the refuge welcomes mountaineers during their final stage in the conquest of the roof of Europe - MONT-BLANC. Overlooking a rocky outcrop facing west, this location allows you to secure the whereabouts of rock climbers and has a quality suitable for receiving a stable anchorage. Subject to winds up to 250 km / h and temperatures of minus 40 ° C, the architectural concept was conditioned by his environment. This situation led to a focus Harmonic Energy determining the shape and orientation of the shelter.

Products

Product

Exterior carpentry VELUX

VELUX France

Christophe Chambon

http://www.velux.fr

Product category : Table 'c21_spain.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 = '10'

Since the creation of the first roof window, there are now 70 years, the VELUX company has continued to innovate to improve the living environment thanks to the entry of natural light and fresh air through the roof. Present in nearly 40 countries worldwide, VELUX products adapt to all types of architectures and different climates. This commitment could only lead the VELUX company and its engineers to meet the technical challenge of designing 55 new windows outsized Refuge du Gouter.

Given the environmental requirements of the project, the windows are wood-aluminum joinery VELUX® "Special GGLX 62_65 GX" composed of a frame, an opening and a triple glazing combined with an additional exterior glazing. Outside glazing composition inwards: 8 mm hardened / 36 mm air / 4 mm hardened / 10 mm argon / 3mm reinforced / 10 mm argon / 3.3.2 reinforced laminate.

Costs

Construction and exploitation costs

Global cost : 5 500 000,00 €

Renewable energy systems cost : 800 000,00 €

Global cost/Dwelling : 45833.33

Cost of studies : 400 000 €

Total cost of the building : 5 000 000 €

Subsidies : 2 500 000 €

Energy bill

Forecasted energy bill/year : 1 200,00 €

Real energy cost/m2 : 1.76

Real energy cost/Dwelling : 10

Health and comfort

Water management

Consumption of grey water : 82,10 m^3

Consumption of harvested rainwater : 157,80 m^3

The production of cold water is ensured by the snow melter, powered by solar thermal circuit and storing thermal energy booster. The domestic hot water (DHW) is provided by a 1000L preparation ball, fed via a heat exchanger in the solar thermal circuit and a booster exchanger on the secondary network (heating) of the storage flask Energy (extra heat from cogeneration). It was produced during the 2013 season 157.8 m3 of cold water at 10 ° C through the snow melter; the thermal energy needed for this production represents 17 MWh, making it the largest item of energy consumption of refuge. This energy was provided by solar energy, valued at the average thermal sensors, and partly by heat recovered from the operation of the cogeneration unit. The hot water on the season is 78.7 m3, an average temperature of 59 ° C, a thermal energy consumption of 4.5 MWh. This energy was also provided by solar energy, and partly by heat recovered from the operation of the cogeneration unit.

Indoor Air quality

The fan speed is automatically adjusted according to the actual instant occupation of refuge, since the latter can vary during a day; Moreover, for a given total workforce, the distribution of the public between the dormitories and common room varies. This modulation is performed based on the CO2 content (or humidity level) air measured at the common room. The VMC turbofan did not result in any thermal energy consumption, thanks to its high efficiency recovery. Its electricity consumption are integrated electricity balance later in this report. Heating needs were covered by solar energy, and partly by heat recovered from the operation of the cogeneration unit.

Comfort

Calculated thermal comfort : Pour le renouvellement d'air nécessaire pour obtenir une hygrométrie relative de 65 % à 20 °C, le dimensionnement de la ventilation se fera sur un débit d'air de 9 m3/h par personne et sur la base de l'occupation maximale. Lors d‟une occupation maximale d

Carbon

GHG emissions

GHG in use : 5,00 $KgCO_2/m^2/an$

GHG before use : 319,00 $KgCO_2$ $/m^2$

Building lifetime : 50,00 année(s)

, ie xx in use years : 63.8

GHG Cradle to Grave : 569,00 $KgCO_2$ $/m^2$

Life Cycle Analysis

Eco-design material : The choice of construction methods and materials aimed at generating efficient buildings, high energy efficiency under the thermal and moisture quality, and ensure a good quality of interior spaces vis-à-vis the quality and of the life of the materials used. The constructive choices have been adapted compared not only to the life of over 50 years required by the client, but also to climatic and environmental constraints (snow load, average wind speed, seismic standards ...). In addition, they are compatible with a duration of reduced construction, difficult working conditions, innovative architecture and the use of each local area or the work.

Contest

Building candidate in the category

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