

REFUGIUM.BETZENSTEIN - Bio-Passive House in the Franconian Switzerland Nature Park

by Herbert Bucher / 2021-02-19 09:35:20 / Deutschland / 208 / DE

New Construction



Building Type : Collective housing < 50m
Construction Year : 2016
Delivery year : 2016
Address 1 - street : Metzenbühlstr. 6 91282 BETZENSTEIN, Deutschland
Climate zone : [Dfb] Humid Continental Mild Summer, Wet All Year

Net Floor Area : 237 m² NGF
Construction/refurbishment cost : 420 000 €
Cost/m2 : 1772.15 €/m²

Primary energy need :

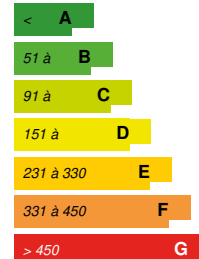
11.3 kWhpe/m².year

(Calculation method : DIN V 18599)

ENERGY CONSUMPTION

Economical building

Building



Energy-intensive building

Proposed by :



Certifications :



Description

ARCHITECTURE AND INTERIOR DESIGN AS A HARMONIOUS UNIT

The architecture of the elongated building with its distinctive double gable roof is based on the topographical conditions and traditional forms and materials of the local environment. These have been architecturally reinterpreted with modern means. Nestled on a north-facing slope, the building blends unobtrusively into the surrounding hilly landscape of rocks and beech forests. The roof and façade appear as a monolithic structure, completely smooth and as if cast from a single mould. The dark shingles respectfully pick up on the regional building tradition with slate in Upper Franconia. Architecture and interior design merge into a holistic, harmonious unit. The clear formal language with reduction to the essentials and restrained choice of materials and colours merges seamlessly into the interior design. The openings in the façade and interior areas allow the house to be experienced in ever new ways from all sides in the daylight and open up exciting views and vistas for the residents. Large panorama windows bring light and energy into the interior. Lift-and-slide doors with access to terraces and the covered outdoor seating area extend the living space to the outside and allow the lush surrounding nature to be experienced directly. The near-natural exterior design with natural ponds, native trees and shrubs, scattered fruit meadows and Jurassic limestone reflects the typical surrounding landscape in the Franconian Switzerland Nature Park.

SUSTAINABILITY, ENVIRONMENTAL PROTECTION AND ECOLOGICAL ASPECTS

- Consistent use of organic, ecological and regenerative building materials
- Almost energy-autonomous operation with use of 100% green electricity
- Use of renewable energies and highly energy-efficient electrical appliances and lights
- Seepage-capable paths and surfaces, rainwater cisterns
- Nature-oriented exterior design with natural ponds, native trees and orchards

See more details about this project

<http://www.bh-architektur-innenarchitektur.de>

https://passivehouse-database.org/#d_4195

<https://www.heinze.de/architekturobjekt/refugiumbetzenstein/12728482/>

Data reliability

3rd part certified

Stakeholders

Contractor

Name : BUCHER | HÜTTINGER - ARCHITEKTUR INNEN ARCHITEKTUR

Contact : Herbert Bucher, hb@passivhaus-eco.de, Betzenstein

Construction Manager

Name : BUCHER | HÜTTINGER - ARCHITEKTUR INNEN ARCHITEKTUR

Contact : Herbert Bucher, hb@passivhaus-eco.de, Betzenstein

Stakeholders

Function : Contractor

BUCHER | HÜTTINGER - ARCHITEKTUR INNEN ARCHITEKTUR

Herbert Bucher, hb@passivhaus-eco.de, Betzenstein

Contracting method

Other methods

Owner approach of sustainability

Ecological and healthy building in harmony with nature

The new retreat in the countryside was to be built in a consistent ecological construction method according to the passive house standard and meet all criteria of healthy living.

For over 20 years, the architectural firm BUCHER | HÜTTINGER has stood for sustainable, ecological, healthy building and living in high-quality, modern architecture. Ecological building means taking into account the needs of the environment and minimising its impact. The building materials used should be made of renewable raw materials in order to relieve our environment. The development and implementation of a holistic, environmentally friendly and sustainable concept aims to create the highest possible quality of life with the least possible interference in natural cycles. Ecological building also means creating houses and spaces that allow people to live healthily and comfortably.

Architectural description

See description of initiation

If you had to do it again?

If we had to build again, we would do it all over again.

Energy

Energy consumption

Primary energy need : 11,30 kWhpe/m².year

Primary energy need for standard building : 67,80 kWhpe/m².year

Calculation method : DIN V 18599

CEEB : 0.0001

Final Energy : 4,70 kWhfe/m².year

Breakdown for energy consumption :

Above figure excludes household electricity and lighting, only for heating, hot water, cooling and ventilation. Solar yield from solar system 10.1 kWh/(m²a)

Envelope performance

Envelope U-Value : 0,11 W.m⁻².K⁻¹

Building Compactness Coefficient : 680,00

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,30

More information :

Solid timber construction with rear-ventilated shingle façadeInsulation: Wood fibre insulationU-values: External wall and roof = 0.096 W/(m²K)

Real final energy consumption

10,60

2 020

Renewables & systems

Systems

Heating system :

- Heat pump
- Solar thermal

Hot water system :

- Heat pump
- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar Thermal
- Heat pump

Renewable energy production : 100,00 %

Following aspects of sustainability and energy efficiency, renewable energies were used for the building services. A compact unit with a ventilation system with passive heat recovery ensures permanently fresh and hygienically clean air. The central vacuum cleaning system removes pollen and house dust from the room air without any air turbulence. Active and passive use of solar energy, the high insulation standard of the building components and particularly energy-efficient electrical appliances and lights additionally reduce energy consumption and enable almost energy-autonomous operation using 100% genuine green electricity.

GHG emissions

No exact calculations were made.

Life Cycle Analysis

No exact calculations were made.

Eco-design material :

Following nature's example, the Bio-Passive House has been built with the consistent use of materials that are compatible with health and the environment and that are subject to critical materials that stand up to critical scrutiny in terms of sustainability, raw material extraction, recyclability and ingredients. From the supporting structure to insulation materials to the interior, the renewable building material wood dominates. For ecological and economic reasons, the buildings were prefabricated entirely from large-format, solid cross-laminated timber elements. Wood fibre insulation was used for the well-insulated building envelope. In addition to the construction, the windows and the insulation, wood, a renewable building material, was also used almost exclusively for the interior fittings. The wood used comes from sustainable forestry with the FSC seal. The remaining building materials used are recommended by the Sentinel Haus Institut and certified nature-plus or eco-INSTITUT.

Water management

Consumption from water network : 100,00 m³

Water Consumption/m² : 0.42

Water Consumption/Dwelling : 33.33

Rainwater cistern (9.1 m³) for watering the garden

Indoor Air quality

HEALTHY LIVING

The energy-efficient building was constructed using 100% building biology materials and has excellent indoor air quality. The sum of all volatile organic compounds (TVOC), measured at 150 µg/m³, is far below the guideline values of the Federal Environment Agency and the World Health Organisation (WHO). A ventilation system with passive heat recovery also ensures permanently fresh and hygienically clean air. A central vacuum cleaner system removes house dust and pollen from the room air without any air turbulence.

Health & Comfort

Measured indoor CO₂ concentration : Stets unter 800 ppm

Measured thermal comfort : Durchschnittstemperatur: Winter: 21 °C - Sommer: 23 °C

Daylight factor : Große Panoramafenster bringen Licht und Energie ins Innere.

Health & comfort :

ELECTROSMOG-FREE LIVING

Another important point was to avoid electrosmog in the building. In order to provide the residents with a restful sleep and an electrosmog-free environment, DECT telephones and WLAN were deliberately avoided. In addition, only shielded cables were used and all metal components were earthed. For a healthy place to sleep, locations without geopathic interference fields were selected and a mains isolation system was used to protect against electrosmog. Healthy living means, on the one hand, that the indoor air meets scientifically recognised criteria for a large number of pollutant groups and individual pollutants, but also sound and heat protection, good air and light quality and, last but not least, the aesthetics and design of the living space. The overall result is an allergy-friendly bio-passive house with excellent, low-pollutant indoor air quality and very comfortable living. The electrosmog- and barrier-free flats offer its residents an aesthetic living space in which they feel comfortable.

Acoustic comfort :

Noise protection measures: floor ceiling, noise protection wall between the apartments, doors with noise protection class 3

Product

Board plywood

Product category : Rohbau / Struktur, Mauerwerk, Fassade

Cross laminated timber is made from coniferous wood from sustainably managed forests. Compared to other solid construction methods, the production and processing of cross laminated timber elements requires little energy and contributes to permanent CO2 storage and minimisation of the greenhouse effect. At the end of its service life, cross laminated timber can be recycled. Even in the case of thermal recycling, only the CO2 that was stored in the wood during the growth of the trees is released into the atmosphere.



Costs

Construction and exploitation costs

Total cost of the building : 420 000 €

Urban Environment

Urban environment

In the midst of the Franconian Switzerland Nature Park, the healthy bio-passive house was embedded in a north-facing slope. The building blends unobtrusively into the surrounding hilly landscape with rocks and beech forests.

LOCAL, sustainable building products and the exclusive use of regional craftsmen contribute to the building's environmental compatibility, as do the energy efficiency and the near-natural exterior design, which ensures biodiversity without sealing any surfaces.

Land plot area

1 460,00 m²

Built-up area

12,00 %

Green space

1 100,00

Parking spaces

A total of 5 car parking spaces at ground level and one garage space, bicycle parking spaces in the garage and in the shed.

Building Environmental Quality

Building Environmental Quality

- Building flexibility
- indoor air quality and health
- biodiversity
- acoustics
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- integration in the land
- building process
- products and materials

Contest

Category Buildings: Local, sustainable building products and the commissioning of exclusively regional craftsmen contribute to environmental compatibility, as do

the energy efficiency and ecological construction of the building, as well as the near-natural exterior design that ensures biodiversity without sealing the surface.

Contest categories



Alle Kategorien



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