AIDA AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION

Co-funded by the Intelligent Energy Europe Programme of the European Union

EURAC research

Operational success story

Naturaliabau
New building, Merano (IT)

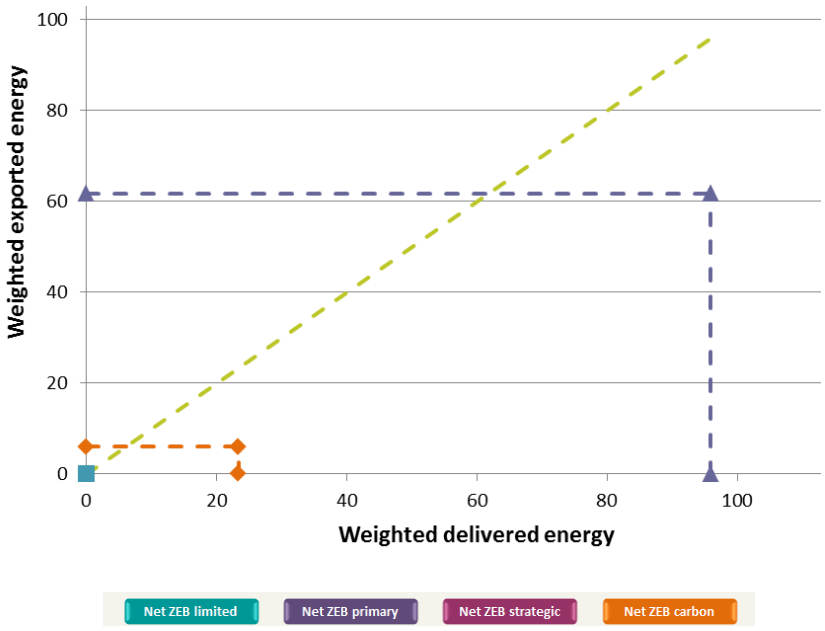
GENERAL INFORMATIONS

Owner:	Naturaliabau
Architect:	arch. Dietmar Dejori
Use :	Office and storage area for building materials
Surface :	894 m²
Volume :	3516 m³
Built:	2007 -2008
Construction cost:	1.230.000 €
Design cost (architectonic, electronic, plans, structure and security..):	183.000 €
Total cost:	1450,00€/m²
Cost distribution:	- 2,4 % insulation (ecological materials) - 9,7 % windows - 4,2 % geothermal heating plant - 2 % ventilation system - 12,8 % total building system (heat pump + distribution) - 7,4 % PV panels - 11,8 % design

ENERGY PERFORMANCE

Type of certification: CasaClima certification ´Casa Clima Gold´:
- Heating energy demand 7,44 kWh/m²y
- Total energy efficiency - 4 kg Co2/m²y

Saving of CO2 emissions: -4,00 kWh/(m²y)

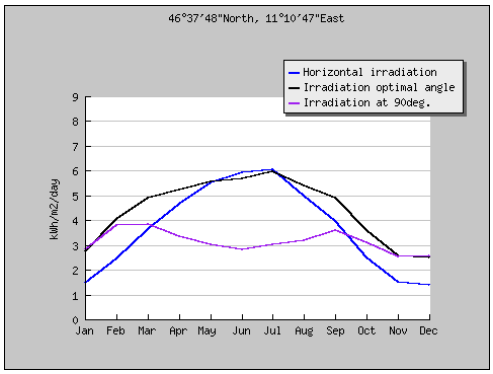


Graphic1: Monitored Import/Export calculated by Net ZEB Evaluation Tool.* Elaboration made by monitoring data.

*Developed within the IEA - SHC Task 40/ECBCS Annex 52 - "Towards Net Zero Energy solar Buildings". Created by: Eurac Research within STA. Draft: V4.3

DESCRIPTION OF THE CLIMATE:

Address:	Via Carlo Abarth 20 39012 Merano, Bolzano.
GPS:	Latitude = 46,62835 Longitude = 11,18135
Altitude:	262m
Yearly solar radiation: (graphic)	3680 Wh/m²*day (average sum of horizontal global irradiation per square meter) 1343 kWh/m² (average sum of horizontal global irradiation per square meter) (http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php)
HDD20 (http://www.degreedays.net/):	HDD_{20}= 3131 Bolzano, IT (11.33E,46.46N)
CDD26 (http://www.degreedays.net/):	CDD_{26}= 106 Bolzano, IT (11.33E,46.46N)



SPECIFICATIONS OF THE BUILDING

1) Built

Orientation	North
The building envelope	
Compact:	S/V = 0.43 (1/m)
Heating demand	7,44 kWh/m²a Klimahaus Gold
Office part	
U-value of the opaque surface	
○ Walls:	0.20 W/m²K
○ Roof:	0.16 W/m²K (green roof)
○ Basement	0.27 W/m²K
U-value of the window surface	1.10 W/m²K
Store area	
U-value of the opaque surface	
○ Walls:	0.20 W/m²K
○ Roof:	0.17 W/m²K (green roof)
○ Basement	0.30 W/m²K
U-value of the window surface	1.40 W/m²K

2) Systems

Mechanical ventilation system with heat recovery

Centralized ventilation system
- 90% efficiency

Heating and cooling system

Electric heat pump
- 3,1 kW $_{electric}$
- 15,6 kW $_{thermal}$

(COP_m 3,8 heat pump for hesting- COP_m 4,2 heat pump for cooling)

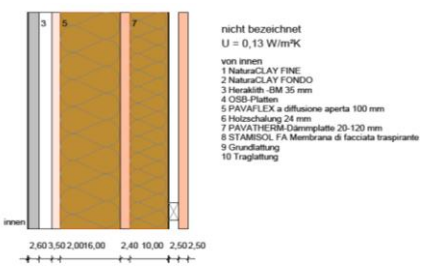
Geothermal probes
- 5 ground probes, 100m deep

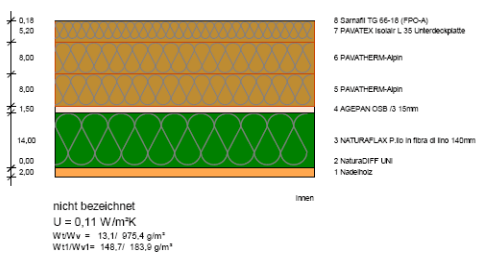
On site electric energy generation

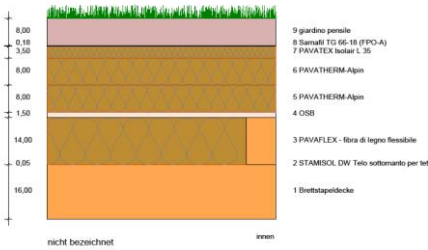
The electricity production from PV allows to cover the electricity demand of the whole building and to sell the surplus to neighbouring buildings.

Photovoltaic panels
- 200 m² polycrystalline photovoltaic panels

Total electric peak power installed: 19.8 kWp collocated on the Naturalias' roof and on the close buildings´ roof.







CONTEXT AND HISTORY OF THE BUILDING

March 2007

Planning phase – energy design concept

The first idea of the Naturalia-Bau was to built a very energy efficient office building with a storehouse. From the beginning of the design process on, the energy target was fixed to achieve a nearly Zero Energy Building. The available area for the installation of PV-panels as well as the not advantageous position and the orientation of the building were in contradiction to this objective.

The main orientation of the building with entrance and transparent surfaces was aligned to north and northwest: no passive energy gains could be exploit.

From the beginning was specified, that the building should reach the standard CasaClima Gold, with an energy efficient envelope, by employing natural isolation materials, optimizing daylight and using efficient building systems.

July 2007

Design development, technical design, feasibility study

- The distribution concept is based on a big hall in the entrance and all rooms are connected with this area. The Hall, a double height room, has big vertical windows for maximizing the entry of daylight. The meeting room was located on the third floor, where the windows could be orientated to south façade.
- To reduce the construction time, the building was designed as a prefabricated structure.
- To limit the environmental impact, the building was built by using mostly ecological materials (where it was possible).
- To maximize passive energy strategies, walls were finished with a thick clay plaster of 4,5 cm in order to guarantee a thermal mass.
- Building system: heat pump with geothermal probes
- Floor heating and wall heating system
- Ventilation System with a constant flow rate
- PV system on the roof

November 2007

Construction phase

- Construction of the basement and geothermal plant.

April 2008

Construction phase

- Building structure in prefabricated wood construction.
- Many architectural details and material choices were taken during the construction phase to increase flexibility and efficient technical solutions.

➢ *Good coordination and time management is necessary, in order to reduce the construction time and to guarantee the synchronized presence of different trade workers it the same period, side by side.*

15 July 2008

Handover of the works – commissioning of building

- Even if at the beginning the ventilation system didn´t work, the building had a positive energy balance.
- Start of a monitoring campaign of the building