

# Primary School Laion / Novale

## New building 2006, Laion (IT)



### GENERAL INFORMATION

**Owner:** Municipality of Laion

**Architect:** Arch. Johann Vonmetz, (Dir. Lav.)  
Arch. Stefan Trojer

**Engineer:** Ing. Paolo Rosa (statica)  
Malleier Walter (impianti tecnologici)  
Brugger Manfred (imp. Elettrici)  
Günther Gantioler (casa passiva)

**Design office:** arch.tv, Arch. Johann Vonmetz,  
Arch. Thomas Ebner  
Www.archtv.net

**Use:** Primary school for 40 students divided in:  

- 4 classrooms
- a workroom
- a multipurpose room
- a teachers room

**Heated surface:** Usable area of 625 m<sup>2</sup>  
Gross area 755,37 m<sup>2</sup>

**Gross volume:** 3115 m<sup>3</sup> (from PHPP calculation)

**Built in:** 2004 - 2006

**Cost:** Total budget 1.207.000 €  
(construction costs without planning costs and TVA),  
1.930 €/m<sup>2</sup>

**Method of financing:** Financial support by Provincia Autonoma di Bolzano and Municipality of Laion

### ENERGY PERFORMANCE

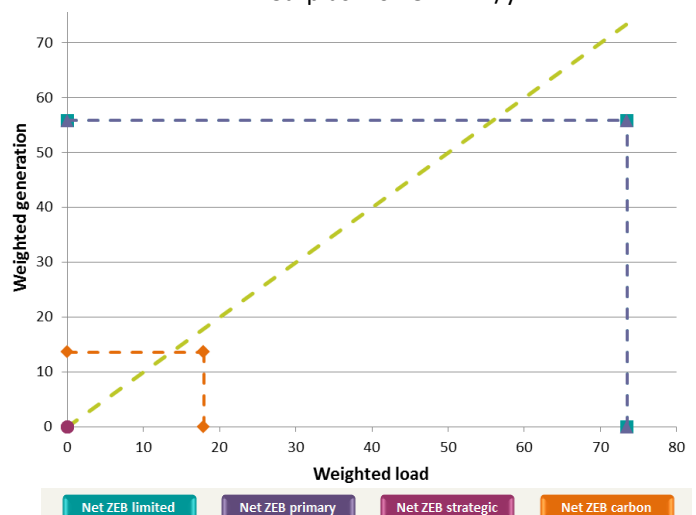
**Primary energy demand:** 89 kWh/m<sup>2</sup>\*y

**Type of certification:** CasaClima Gold + (heating demand <10kWh/m<sup>2</sup>\*year)

**CO2 emissions:** 22,20 kg/(m<sup>2</sup>\*y)

**Total energy balance** Positive energy balance (solar thermal production and PV production doesn't cover the energy demand from November to February):

- Demand: 5'690 kWh/y
- Production: 16'471 kWh/y
- Surplus: 10'781 kWh/y



Graphic1: Monitored Import/Export calculated by Net ZEB Evaluation Tool 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

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### DESCRIPTION OF THE CLIMATE:

Address: Primary school  
Località Villa, 139040 LAION (BZ)

39040 Lajon  
Location: 46°36'32" North, 11°33'50"

GPS: 39040 Lajon

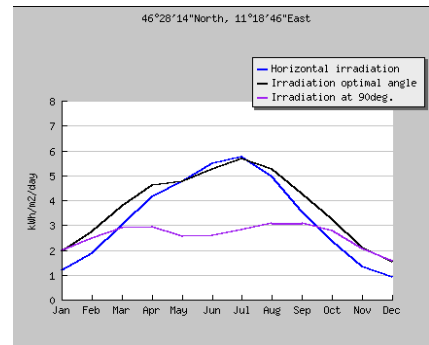
Altitude: 1099 m

Yearly solar radiation: 3,58 kWh/m<sup>2</sup> \*day (Average sum of horizontal global irradiation per square meter received)  
(graphic) 1310 kWh/m<sup>2</sup> (Average sum of horizontal global irradiation per square meter received)  
(<http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php>)

HDD20 3131 Bolzano, IT (11.33E,46.46N)  
(<http://www.degreedays.net/>):

CDD26 106 Bolzano, IT (11.33E,46.46N)  
(<http://www.degreedays.net/>):

HDD20, Italian Classification: HDD20= 4186 Lajon  
(italian law: n. 412 26/august/1993)



### SPECIFICATIONS OF THE BUILDING

#### 1) Building envelope

##### Surface to volume ratio

Compact: S/V = 0.53 m<sup>-1</sup>

##### U-value of the opaque surface 0.23W/m<sup>2</sup>K

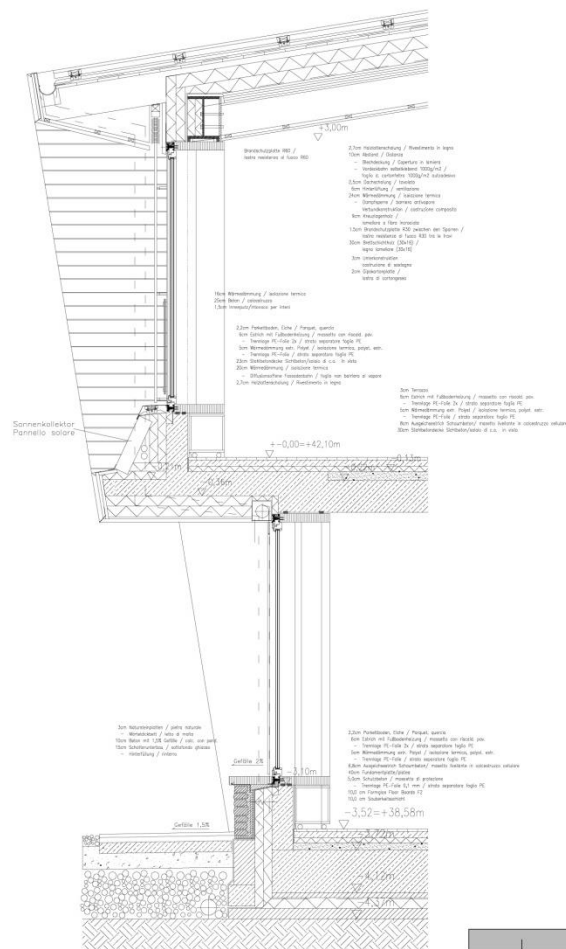
- Walls: 20cm mineral foam
- Roof: 24cm wood fibers

##### U-value of the window surface 0.78W/m<sup>2</sup>K

- Argon triple coated panes with Oak windows frames
- Large glazed surface facing south with venetian blinds
- Maximized solar gains
- Natural daylighting

##### Overall building envelope energy performance:

- 9kWh/m<sup>2</sup>a CasaClima Gold
- 7.6kWh/m<sup>2</sup>a PHPP
- Blower Door: 0.49 [h-1] air tightness demonstrated



#### 2) Systems

##### Mechanical ventilation system with heat recovery

##### Heating system

- Radiant floors
- Electric heat pump 1.8kW electric  
8.3kW thermal
- Geothermal plant 3 ground probes of 50m
- Solar thermal collectors 18m<sup>2</sup> of flat plate collectors integrated in the 1stfloor facade

##### Electric energy production

- Electric energy production from PV allows to cover the electricity demand of the whole building and to feed into the grid a high amount of energy.

- Polycrystalline photovoltaic panels
  - 140 m<sup>2</sup> of silicon polycrystalline photovoltaic panels
  - electric peak power of 17.7kWp

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### CONTEXT AND HISTORY OF THE BUILDING

- 1938** Erection of elementary school building in Lajen Ried (heating system with wood boiler) .
- 1980** School expansion (heating system with electric radiators).
- April 2002** Assignment of the feasibility study for a building renovation or expansion of the existing building.
- August 2002** Positive result of the feasibility study to build a new school.
- April 2003** Assignment of the design project to the architectural studio Arch. Vonmetz. Energy requirements fixed by the owner, the Municipality of Lajon:
- ClimaHouse A +
  - Architectural concept for maximizing the energy savings
  - Passive House standard was not fixed as a necessary requirement as well as the installation of a ventilation system.
- The architect had the objective to reach a Passive House building.  
Architectural choices:
- landscape integration and urban architectural language
  - interior distribution
  - passive solutions
- July 2004** Construction phase  
Demolition of the existing school and beginning of construction works.
- August 2004** The Municipality evaluated the integration of a central ventilation system for the classrooms and the integration of necessary distribution pipes into the building structure.
- September 2005** Municipal election.  
The new administration decided the objective to achieve the Passive House standard. Verification of the passive requirements through PHPP calculation was effected. Modification of the heating system and choice of a heat pump with geothermal probes.
- June 2006** The municipality decided to achieve an active building and realized a PV system.
- July 2006** End of works.
- September 2006** Inauguration of the new building.
- December 2006** Connection of the PV panels to the grid. Opening of the school: training session on the use of the building for teachers and students.  
The heating system was equipped with a remote control and allows the Municipality to monitor the correct functioning of the plant. A monitoring system was installed to measure energy consumption and production.

