

Enzian Office



Aesthetic integration

Enzian Office is a 10-storeys building located in the industrial zone of Bolzano. The whole building is covered with photovoltaic modules integrated into the building glass facade. The PV modules are made of amorphous silicon that homogenizes the external surfaces, so that the difference between opaque and semi-transparent facade parts is not recognizable. The integrated PV skin makes the 'sustainable design' highly visible from outside.

Energy integration

The building is certified CasaClima Gold. The PV system integrated into the building envelope, together with modules placed on the roof, produce around 113 MWh/year, supplying enough energy to feed the building's heating and cooling needs using a reversible heat pump and a pellet heating system. The system is grid connected, so the excess energy is fed into the power grid (Eurac Research).

Technology integration

According to the solar exposure of the building facades, either double or triple insulating glass with amorphous silicon modules or opaque laminated glass is used. The photovoltaic modules (Volarlux) are designed on the basis of Schott Solar's ASI THRU thin-film technology as silicon tandem cells (3 mm) on a glass substrate. Some modules replace the semi-transparent facade part. The interior is protected with laminated safety glass. The chamber between the glass panes is filled with argon for thermal insulation. Other modules replace the opaque facade part with an insulating layer behind them. The gap between the modules and the insulation is 5 cm and is covered on the bottom and top. Cables are contained within the framing system.

Decision making

The building was designed to be an energy self-sufficient unit. Hence, the decision to integrate a photovoltaic plant. The wide building facades were covered as much as possible with PV modules in order to maximize the electric energy production exploiting most of the available solar radiation. Amorphous silicon was chosen instead of crystalline silicon, because of its uniform shading effect inwards and its uniform appearance outwards (Energytech Srl). Additional PV modules were applied to the building roof in order to increase the electric energy building supply.

Lesson learnt

The PV modules are integrated into different building components, providing examples of how the PV might be used in place of traditional building materials. The PV substitutes the semi-transparent parts, the insulated windows, the external parapets and the external cladding. In the semi-transparent part, it is used as a sun shielding without the need for additional shading provisions that would have increased the costs. Moreover, the amorphous silicon texture produces a special lighting scenario, a uniform shading effect that does not disturb the office's users. The light controlling function of the photovoltaic cells is added to the insulating function of the glazing system, highlighting the multifunctional feature of the BIPV technology. Regarding the BIPV system design, one of the main challenges reported by the designer is related to the strict fire-safety regulations which need to be respected in the facade design (Energytech Srl).

PROJECT DATA

Project type	New construction
Building function	Office
Integration system	Opaque cold façade
Location	Via Ressel 3, Bolzano (BZ), Italy

BIPV SYSTEM DATA

Module type	Custom made modules
Solar technology	Thin-film amorphous silicon
Nominal power [kWp]	100
System size [m²]	2,340
Module size [mm]	1,020 x 626
Orientation	West, South, East
Tilt [°]	90

BIPV SYSTEM COSTS

Total cost [€]	-
€/m²	-
€/kWp	-

PRODUCER DATA

Producer	Arnold Glas GmbH
Address	Alfred Klingele Str. 15, Remshalden, Germany
Contact	-
Web	https://arnold-glas.de/



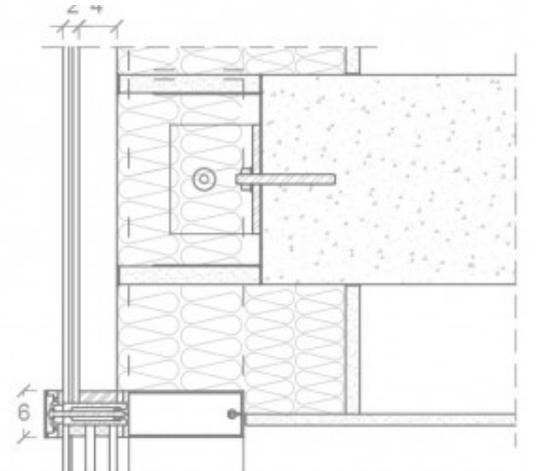
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1. Enzian Office BIPV system: the modules replace opaque parts of the façade (under the windows high) and semi-transparent sections (beside the windows) (Eurac Research)
2. The building railings also are made of glass BIPV modules (Eurac Research)
3. Detailed view of the semi-transparent modules texture (Eurac Research)
4. External view of the modules metal framing system (Leitner Electro Srl)
5. Technical detail of the modules fixing structure (opaque facade section), re-drawn by Eurac (Leitner Electro Srl)
6. Sun shielding effect of the BIPV modules (Eurac Research)
7. The building shows an impressive appearance highly visible from the surrounding areas (Eurac Research)