Single-family house in Lasa

Introduction

The BIPV system is integrated into a 2-storey residential building located in a small village of Val Venosta, along the Adige River. It consists of semi-transparent glass modules installed in the glazed balconies railings on the first level. The modules represent a barrier that protects the large windows characterizing the main building façade, without blocking the mountain landscape view from inside.

Aesthetic integration

The modules' pattern highlights the building's horizontal development. Due to the refined design, the BIPV system combines the energy production functionality with an aesthetically pleasing aspect.

Energy integration

The BIPV plant was designed to provide a yearly energy of around 800 kWh. Its electricity output, together with the production of additional PV modules located on the roof (1 kWp), supplies the energy demand of a connected PV-Heater (REFUsol), which is used to heat up tap water with a heating rod in the house's hot water tank. The two PV plants form a stand-alone system which is able to cover the whole building's thermal energy need (building owner).

Technology integration

The BIPV plant is made from 6 frameless modules (EGM 84-90 ST), which are assembled using laminated safety glass (10 + 10 mm). The PV cells between the glass layers are spaced out leaving gaps of 2–5 cm, thus making the modules semi-transparent (37–38%). The modules are connected to inner bypass diodes, which do not require the modules to be divided into sub-modules. Two junction boxes are placed at the bottom of each glass panel. The PV mounting system (Q railing Easy Glass Slim) does not require holes because the laminated glass is wedged into a 120 mm metal rail all along the balcony which also guarantees the water drainage.

Decision making

The owner decided to integrate photovoltaic modules into the balcony's railings when the building construction was almost completed. Primarily, the PV plant is a useful solution to supply the boiler energy demand, previously supplied by a pellet stove. Second, the owner wanted to use a semi-transparent shading device to partially cover the view into the large windows, initially thinking about a satin or serigraphic glass solution. The final BIPV solution was found visiting a PV products exhibition, where he compared different solar glass solutions and found the best one (building owner).

Lessons learnt

The building owner carried out a detailed evaluation before deciding to integrate the photovoltaic

technology in the glazed parapet. He wanted something that could partially cover the windows, so he also considered to install satin or serigraphic glass. An economic assessment revealed that the glazed PV could be quite competitive with the glass. Aesthetically, quite the same striped texture could be produced. So, the photovoltaic option has been preferred (building owner). The low amount of energy production and the lack of a suitable storage solution on market, in 2012, led the owner to connect the photovoltaic plant to the PV heater exploiting in a different way the generated electricity. The current innovation level reached on the photovoltaic market allowed him to re-think other possible solutions, as using an inverter with integrated energy storage (building owner). This confirms that the energy integration aspect is becoming more and more important in BIPV.

PROJECT DATA

Project type	new construction
Building use	Residential
Building address	Via Venosta 70/a, Lasa (BZ), Italy

BIPV systems

BIPV SYSTEM DATA

Architectural system	Balustrade
Integration year	2012
Active material	Monocrystalline silicon
Module transparency	semi-transparent
Module technology	glass-glass, recognizable PV, customized modules
System power [kWp]	1.3
System area [m²]	13
Module dimensions [mm]	1,120 x 1,905, 1,120 x 2,005
Modules orientation	South
Modules tilt [°]	90
Annual FV production [kWh]	800

BIPV SYSTEM COSTS

Total cost [€]	5992
€/m²	461
€/kWp	4609

Stakeholders

Main building designer

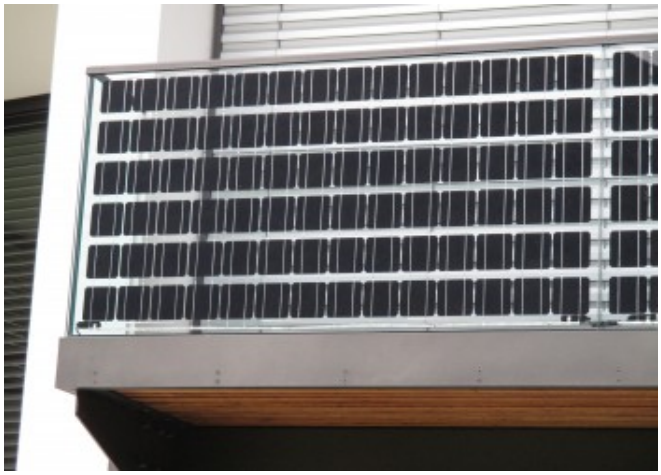
Geom. Renato Coletti

BIPV components producer

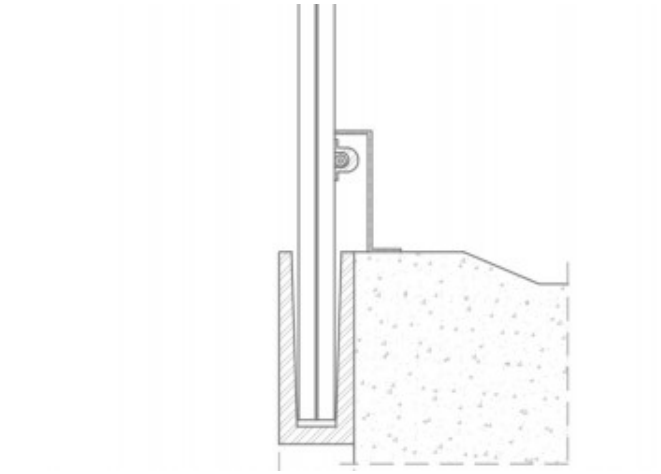
EnergyGlass Srl
Via Domea 79, Cantù (CO), Italy
contact@energyglass.eu
www.energyglass.eu

View of the two photovoltaic railings © building owner

The semitransparent railing allows to enjoy the landscape from inside © building owner

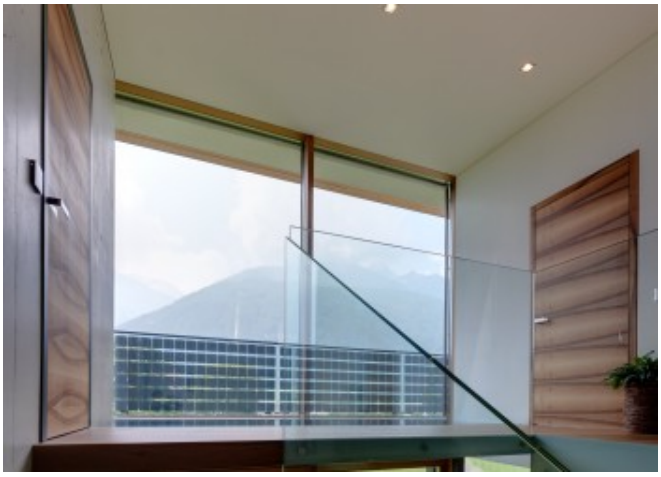


The crystalline cells partially protect the large windows from outside view © building owner



Technical detail of the ‘Q railing’ mounting system by building owner, re-drawn by Eurac Research

Detailed view of the modules cables junction © building owner



View of the photovoltaic railing from inside © building owner

Case study author:

Eurac Research