



Winter Plus Energy Building Sol'CH



Operazione co-finanziata dall'Unione Europea, Fondo Europeo di Sviluppo Regionale, dallo Stato Italiano, dalla Confederazione elvetica e dai Cantoni nell'ambito del Programma di Cooperazione Interreg V-A Italia-Svizzera. (Codice progetto 603882)

Introduction

The Sol'CH project is a BIPV building that is a model in terms of energy, with high-quality architecture that blends harmoniously into the landscape and the urban area. The idea to design the entire envelope with integrated photovoltaic modules had a significant influence on the shape of the new building. It was designed to obtain a south-facing roof with an ideal inclination of 35 degrees, and a south-facing facade with a large surface area for the production of electricity during the winter. A particular characteristic of the Sol'CH project is the energetic use of the north facade and roof, which enhances the overall architectural expression of the building and at the same time contributes to the generation of electricity. The Canton of the Grisons recognised the Sol'CH project, the only one of its kind in Switzerland, as a pilot project, and intends to publish the experience gained during the construction process as well as the monitoring data gathered from the system over the first few years of operation. Furthermore, the project respects all the directives of the Minergie-P and Minergie-A labelling system and has received the relative certification.

Aesthetic integration

The dark matte surface of the photovoltaic façades in shades of anthracite and brown contribute to the building's blending into the surrounding landscape. The surface of the modules was chosen with a degree of transparency that allows the individual silicon cells to be seen up close, but at the same time creates a homogeneous and matte surface from distance. The shape of the building and the colour of the photovoltaic modules changes according to the point of view and the angle of incidence of the light.

Energy integration

The BIPV system produces 47,770 kWh per year, approximately five times the energy requirements of the home. The energy requirements for appliances, lighting, heating and hot water are extremely low thanks to the 26-cm insulation in the walls and the roof, the use of an efficient heat pump, class-A appliances and LED lighting. Heating and hot water supply is fed by a 3000-l storage tank. Furthermore, in the future it will be possible to use a portion of the electricity produced for the bidirectional charging of electric vehicles, for which two connection points have been set up. The remaining portion is fed back into the local grid.

Technology integration

The BIPV modules serve as both an envelope for the building and for the production of electricity.

Decision making

The initial idea for the design was that every façade and section of the roof of a new building can also be used to generate electricity as well as serve as an envelope for the building.

Lessons learnt

One important challenge was to find producers of photovoltaic modules that were prepared to work with us in developing modules of differing shape and colour, as well as a suitable support structure. To identify solutions that are viable from an architectural point of view in the field of BIPV, it is necessary to establish a solid dialogue with suppliers in terms of surfaces, installation and all the details regarding connections. From the outset, it was essential for the entire construction process to be carried out with the utmost precision. This was a challenge for all the companies involved, but the greatest challenge was coordinating the various operations. The project developed contributes to the development of solar energy use, focuses on architectural aspects, and demonstrates what is currently possible from a technical and aesthetic point of view.

PROJECT DATA

Project type	New construction
Building use	Residential
Building address	Via dal Solch, Poschiavo, Switzerland

BIPV systems

BIPV SYSTEM DATA

Architectural system	opaque roof, opaque façade
Integration year	2021
Active material	polycrystalline silicon
Module technology	Glass layers, hidden PV, standard and customized modules
System power [kWp]	34 (roof), 31.6 (façade)
System area [m²]	187 (roof), 284 (façade)
Module dimensions [mm]	several
Modules orientation	West, South, East, North
Modules tilt [°]	35, 55, 90
Annual FV production [kWh]	47770

BIPV SYSTEM COSTS

Stakeholders

Main building designer

Nadia Vontobel Architekten GmbH

BIPV system designer

Nadia Vontobel Architekten GmbH

BIPV system installer

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