BiPV

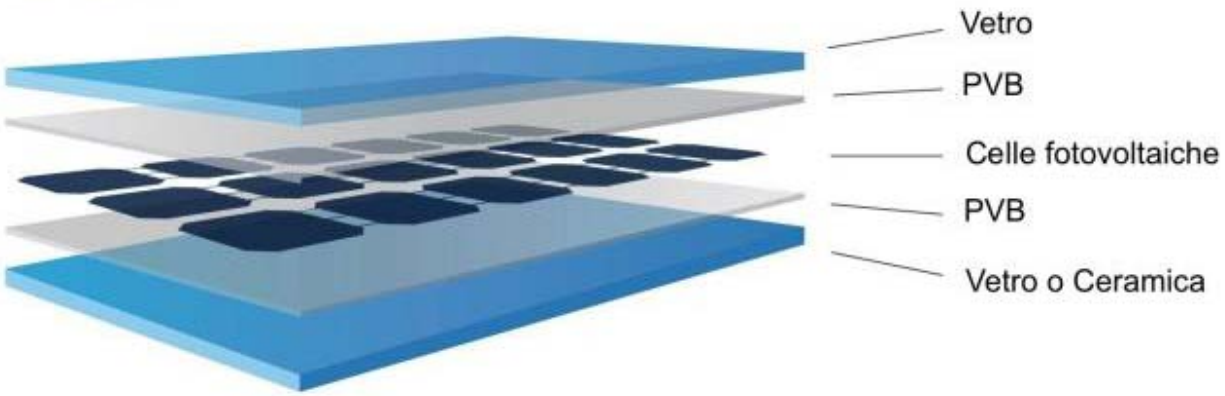
DEFINITION

BiPV (Building integrated PhotoVoltaic) describes the multifunctional integration of photovoltaic modules in the building's enclosure that is architecturally and constructively conceivable.

It can correspond to the total replacement of the components outside the building (tiles, metal sheets, sheaths, glazing, etc) or to the production of system that contain photovoltaic cells inside them and that form the external part of the building.

THE PRODUCT

Polycrystalline photovoltaic glass with unlimited architectural design to synergize the aesthetic appearance with solar energy.



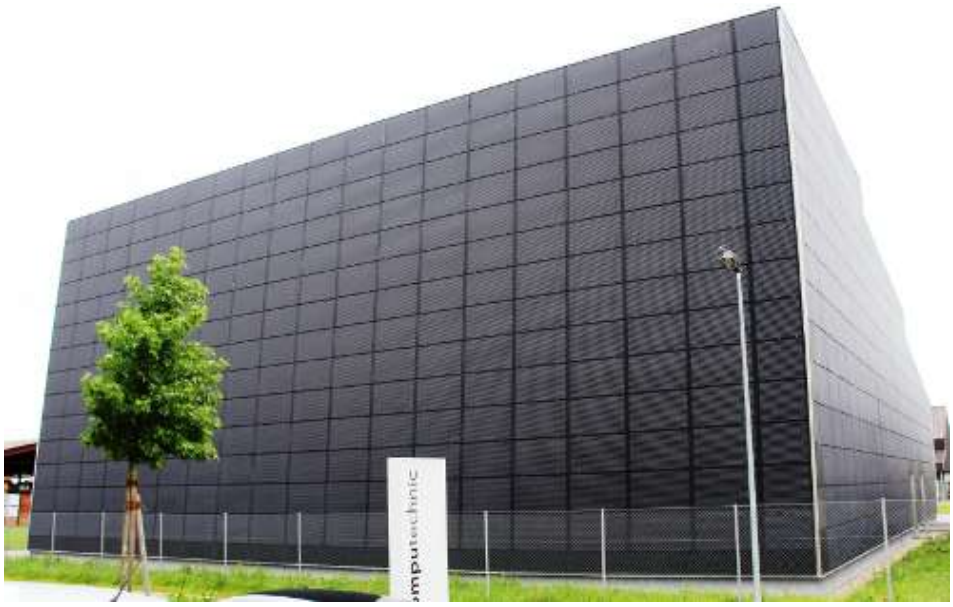
Representative image – Source EnergyGlass

WHERE IT APPLIES

Roofs of buildings, facades, cantilevered structures, winter gardens, railings, soundproofing protections, etc.
Photovoltaic glasses are used in great spectacular projects on all continents until the private homeowner's project of a private buyer.

EXAMPLES

Project: Mont Cenis – Source: M. Lindberg, www.akademie-mont-cenis.de



High-pressure Pump Station Rietli – Source: ViaSolis

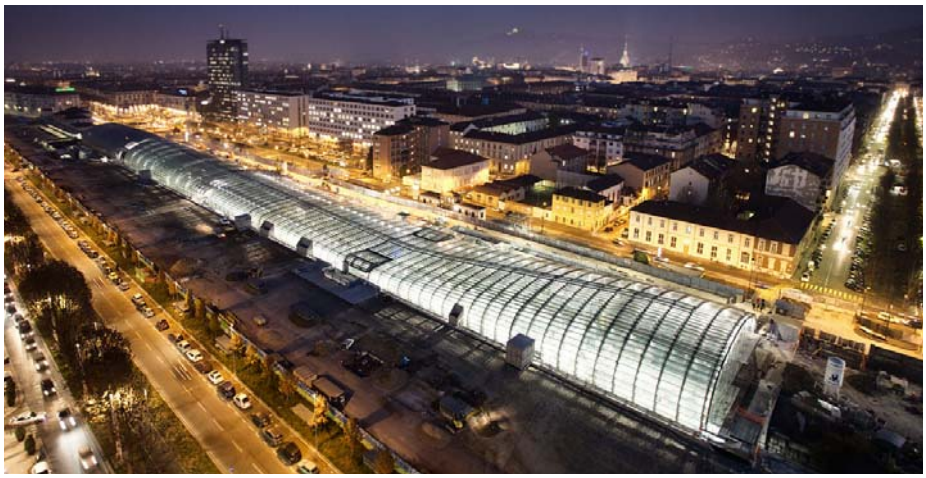
Ferdinand Braun Institute. Source: Sulfurcell

Riedel Recycling GmbH – Source: Sputnik Engineering AG

Belvedere Restaurant - Pessinate AL
Source: EnergyGlass

Stadtwerke Konstanz – Source: Ertex Solar

Regione Lombardia Building
Photovoltaic glass EnergyGlass



Torino Porta Susa Rail station
Photovoltaic glass EnergyGlass

ADVANTAGES

Photovoltaic building elements are essential components for architecture that requires the use of building materials that integrate into a single product:

- Coating of the building
- Renewable Energy production
- Energy saving
- Aesthetic value

Being at the same time part of the housing/building system and Energy generator, BiPV systems reduce the initial investments costs as both the material and workforce needed for the photovoltaic system are smaller that a traditional one where photovoltaic modules do not replace traditional constructive elements.

Thanks to the on-site use of PV technology, the use of non-renewable Energy (fossil and nuclear) is reduces, as well the greenhouse gases.

All these points makes BiPV technology one of the sector of the photovoltaic industry with the highest growth rate.

Building industry professionals can take advantage of the most innovative photovoltaic technique: the architectural and constructive integration of photovoltaic elements (BiPV).

INTEGRATION

Two major types of integration can be identified at the construction scale.

The ***functional integration*** refers to the role that photovoltaic modules play within the building system. That is why *multifunctionality* can be said.

Building functions handled at the BiPV can be as follow:

- ✓ Protection against atmospheric agents
- ✓ Structural requirements
- ✓ Thermal and acoustic requirements
- ✓ Shading
- ✓ Specific certification for buildings (eg. LEED)

So that the BiPV module is a prerequisite for the integrity of the building's functionality.

The ***aesthetic integration*** (architectural, figurative), in the other hand, refers to the architectural concept and image of the building. The aesthetic integration (morphological-figurative) must be understood as the ability of photovoltaics to define the morphological and linguistic rules governing the structure and composition ot the architectural language of the building. In the contemporary architecture, the image is one of the first factors of recongnizability of the building and it is a new specific field of innovation linked to the "solar architecture".

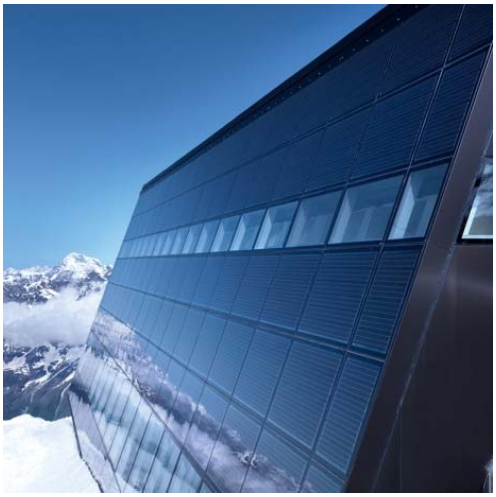
All the features of the photovoltaic system that can affect the appearance of the building (eg. Formal or immaterial features) should be consistent with its overall design.

In the perspective of BiPV, photovoltaic is progressively becoming part of the contemporary architecture and of architects, like any other building material.

Pan Elettrica Panzeri selects, advises and designs various BiPV solutions that meet the system requirements.

ARCHITECT'S PART

The reduction in energy consumption and the use of renewable energy are issues that have become too important for a sustainable development point of view in order to ignore them if the field of architecture.



In the era of the Nearly Zero Energy Buildings, the architect plays a very important role as an adviser to clients. He is obliged to inform them of the benefits of a low-energy building that can drastically reduce energy demand (and the resulting enviromental and economic costs) and operate with renewable energy.

The architect must therefore have the knowledge and tools necessary to promote, in this case, the photovoltaic integrated building. It is necessary that he can understand and consider the possibilities, the obligations, the advantages and the difficulties of a BiPV project.

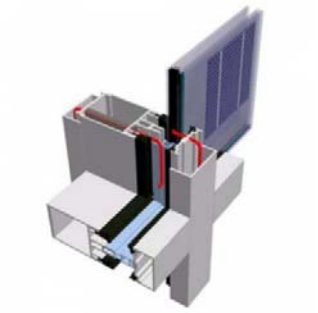
In the case of a BiPV integration, keep it in mind from the begininng of the project will allow for a better integration of aesthetic, constructive, energetic and economic points of view.

Pan Elettrica Panzeri is the integrator of expertise and skills to support architects and professionals, desigining complex BiPV systems.

PAN ELETTRICA ADDED VALUE

In order to provide a product and a BiPV system that meets the needs of the customer and it can be implemented from a structural point of view, the engineering department carries out the following project activities:

- Support for the implementation of aesthetic-architectural return (so that there is no obstacle to creativity)
- Analysis of the technical and constructive aspects of architectural integration of PhotoVoltaic system
- Definition of BiPV product and preparation of technical requirements
- Desing of glazing in relation to the type of window
- Analysis of thermal and acoustic insulation
- Government and supervision of the design of each components
- Plant engineeering
- Paperwork management (VVF; GSE; ENEL; UTF etc.)
- Work realization
- Construction supervision or Costruction Management



PAN ELETTRICA'S PART

Pan Elettrica Panzeri is the integrator of expertise for Architects and Professionals and design BiPV complex systems.

Pan Elettrica Panzeri selects, suggests and designs various BiPV solutions that meet the required requirements; enginneers and implements the project from the most prelminary stage up to the final test.

The expertise in the electrical engineering field, a multifunctional technical office and the partnership with photovoltaic and window glass manufacturers, makes **Pan Elettrica Panzeri** the most complete and prepared part on BiPV.

Experience in complex sites and special enviroments completes the skills and clearly defines the features of a company that since 50 years is consistente with its mission and looking forward to the future.

Standards for PV modules

IEC
International Electrotechnical Commission

CENELEC
European Commission for Electrotechnical Standardization

CES
Comité Electrotechnique Suisse

Construction standards

ISO
International Organization for Standardization

CEN
European Committee for Standardization

SIA
SchweizerischeIngenieur- und Architekten-Verein

IEC standards on photovoltaic modules
In particular the modules used in the BiPV must meet the following quality standards:

IEC 61215 (single and multicrystalline modules) and **IEC 61646** thin film modules): specification of the minimum requirement for electrical, thermal and mechanical performace. These standards concern climate testing, mechanical testing, UV resistance testing, etc. combined with the maintenance of visual and electrical performance.

IEC 61730 (specification for safety and mechanical strenght).
This standards describes the necessary assumptions for PV panels to be used in buildings, ensuring mechanical and electrical safety margins.

In addition, to be present on the European market, CE mark is required (if meet IEC 61730-1 and IEC 61730-2).

Since photovoltaic modules are to be integrated in buildings, they must meet both electrical quality standard and building regulations. It is important to remember that any use of photovoltaic modules must follow the specific rules in force in the country of employment.