



San Anton Market



Introduzione

This project is part of the refurbishment of San Anton Market, located in the centre of Madrid, where a 168 m² skylight, comprised of transparent low-E photovoltaic glazing, has been completely integrated into the building.

Source: [Successful Building Integration of Photovoltaics – A Collection of International Projects](#)

Integrazione estetica

The solution chosen for the photovoltaic installation have a modern appearance similar to conventional glazing solutions which facilitate their integration in urban environments. In order to optimize the aesthetic of the final installation and reduce the visual impact of the electric elements, the junction boxes and wires are hidden inside the supporting structure.

Integrazione energetica

This photovoltaic skylight generates over 7,700 kWh per year and prevents the emission of 5 tons of CO₂. For this reason, it has been selected as a sustainable project of reference by the European Commission. The system enables the generation of electricity in situ, while providing multifunctional bioclimatic properties such as the filtration of solar radiation (photovoltaic glass reduces the infrared, 90 %, and ultraviolet radiation, 99 %, compared to with conventional laminated glass), and at the same time enhancing interior light and providing thermal and acoustic insulation thanks to its double glazing.

Integrazione tecnologica

The photovoltaic glazing employed is made of 54 amorphous silicon modules, with a semitransparency degree of 20 % (L vision). In addition to the low-E PV glass, a 12 mm air-filled cavity was chosen to increase the thermal and acoustic insulation of the system. The modules are installed with a small slope to facilitate water drainage.

Processo decisionale

The photovoltaic glazing allows two functions to be combined: the possibility of illuminating an interior space, while having a solar installation. In this case, the skylight in which the installation was placed is the backbone of the project, so it was also wanted to add a pedagogical function, making the visitors ware of the need of using renewable energy. (Arch. Ana María Montiel Jiménez, estudio ATARIA)

Lessons learnt

The result is absolutely satisfying. The main objective of having a photovoltaic installation as a fully

integrated element in the building was an absolute success, as the qualities of double functionality sought were provided. Using renewable energy is a key objective in society in general, and architecture in particular, and photovoltaic glazing allows it to be incorporated in a natural way in necessary elements of the interior space. (Arch. Ana María Montiel Jiménez, estudio ATARIA)

The San Anton Market project was a technical challenge for Onyx Solar since it was the first one that they executed using photovoltaic glazing with an insulating gap between two panes (IGU, Insulated Glazing Unit). It created a twofold challenge as it was necessary to provide a solution to the exit of the wiring from the rear part of the photovoltaic glazing through the connection box and, at the same time, to find a technical solution to hide the wiring that interconnects the glazing units with each other and the strings that reach the inverters. The design of the skylight in a saw-tooth pattern was the most suitable solution to position the junction boxes on the photovoltaic glazing offsets. The work carried out by the architectural company's team, the construction company and Onyx Solar technical team was completely coordinated during the execution of the project, which allowed agile solution of any small setbacks that occurred during the different project stages. The final result of the skylight was satisfying. It was possible to achieve the goals of integrating 100 % photovoltaic glazing with an insulating air gap and allowing the light to pass into the building in a controlled manner. The integration with the building is so satisfactory that the employees and users of the Mercado de San Anton building are unable to perceive that part of the energy they consume is being produced cleanly "over their heads" thanks to the sun. (Arch. Ángel Gallego, Onyx Solar)

Although the initial cost of this skylight could be higher if it is compared to conventional solutions because of the photovoltaic and electrical components, economic viability is achieved due to the capacity of the PV glazing to generate free electricity from solar light and the passive properties that reduce climate control loads and HVAC demands. A feasibility analysis was done on the basis of total cost and an estimation of electricity generation per year of about 7,748 kWh. Under these conditions, the energy price was estimated to be about 0.02 €/kWh. Besides, the use of the BIPV solutions could lead to a reduction of 34 % in HVAC energy demands with 55 % as the internal rate of return and a payback less than 2 years.

Low-E photovoltaic glazing has a Solar Heat Gain Coefficient (SHGC) that is much lower than that of conventional laminated glazing. A low SHGC value is critical for thermal comfort, particularly for hot climates such as Madrid.

DATI EDIFICIO

Tipologia progetto	riqualificazione
Destinazione d'uso	commerciale
Indirizzo edificio	Calle de Augusto Figueroa 24, Madrid, Spagna

Sistemi BIPV

DATI SISTEMA BIPV

Sistema architettonico	lucernario
Anno integrazione BIPV	2010
Active material	silicio amorfo
Trasparenza modulo	trasparente
Tecnologia modulo	vetro-vetro, FV non riconoscibile, modulo customizzato
Potenza sistema [kWp]	6,5
Area sistema [m²]	168
Dimensioni modulo [mm]	2536 x 1147, 2668 x 1147
Orientamento moduli	sud-ovest
Inclinazione moduli [°]	10
Produzione FV annuale [kWh]	7748

COSTI SISTEMA BIPV

Costo totale [€]	77280
€/m²	460
€/kWp	11890

Stakeholders

Progettista principale

Arch. estudio ATARIA

Progettista sistema BIPV

Onyx Solar

Produttore componenti BIPV

Onyx Solar

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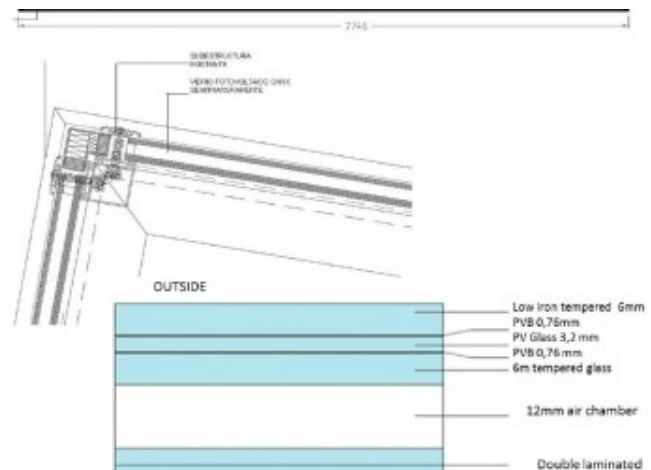
San Anton Market in the centre of Madrid © Onyx Solar



San Anton Market local meeting point, including a market of perishable goods, bars and restaurants © Onyx Solar



BIPV roof from the outside © Onyx Solar



Details of glass configuration and installation on the supporting structure © Onyx Solar



Sunlight effect of the BIPV modules © Onyx Solar

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