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Universidad de Granada

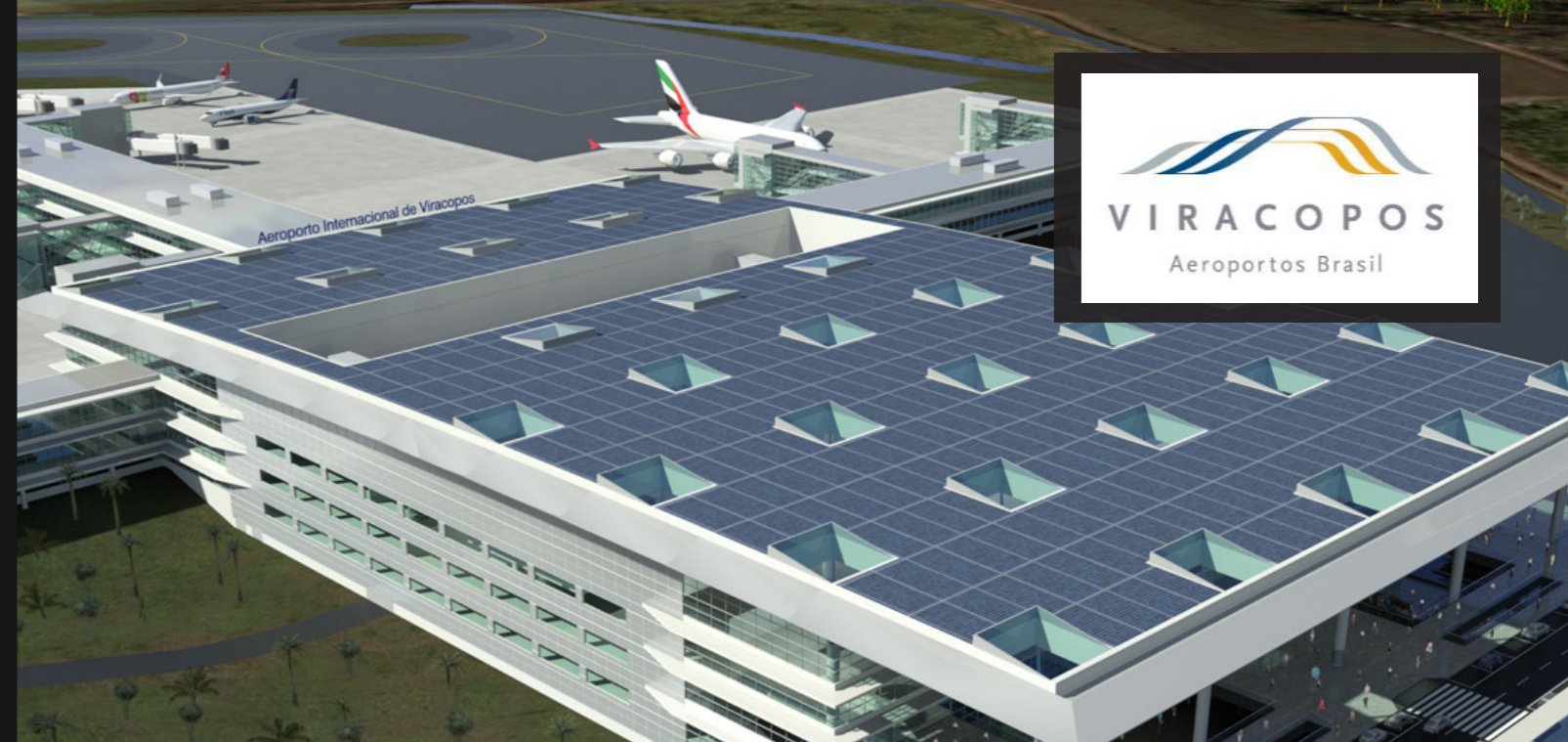
PROJECTS & REFERENCES



EMBLEMATIC PROJECTS



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Photovoltaic Skylight, International Airport of Viracopos-Campinas, Sao Paulo (Brazil)

*General Contractor: Consorcio Constructor Viracopos
Architect: NACO (Netherlands Airport Consultants B.V)
Client: Viracopos International Airport*

The International Airport of Viracopos-Campinas, represents Onyx's largest project in South America. It includes 33 photovoltaic skylights installed on the roof. This constructive PV solution has been configured by means of semitransparent low-e, photovoltaic glass that filters out UV and IR radiation, enhancing both thermal and acoustic insulation. The total installed capacity reaches 153 kWp covering a total area of 34,875 sqm. This airport will be used by over 15 million passengers yearly, which will make it one of the largest and most modern airports in South America.



Photovoltaic Skylight in Chatelaudren, Brittany (France)

General Contractor: SPIE

Onyx Solar has worked together with the French company SPIE in the retrofit of the historical building Le Petit Echo de la Mode, located in Britain and considered a National Heritage due to its memory of the evolution of our society over the last century.

The installation of a photovoltaic skylight in the building, comprised of 10% semi-transparent, low-e, photovoltaic glass, allows the building to generate more than 42 kWh per sqm yearly.



Curtain Wall in the Headquarters of GDR, Guadalhorce (Spain)

General Contractor: TRAGSA
Client: Region of Andalusia

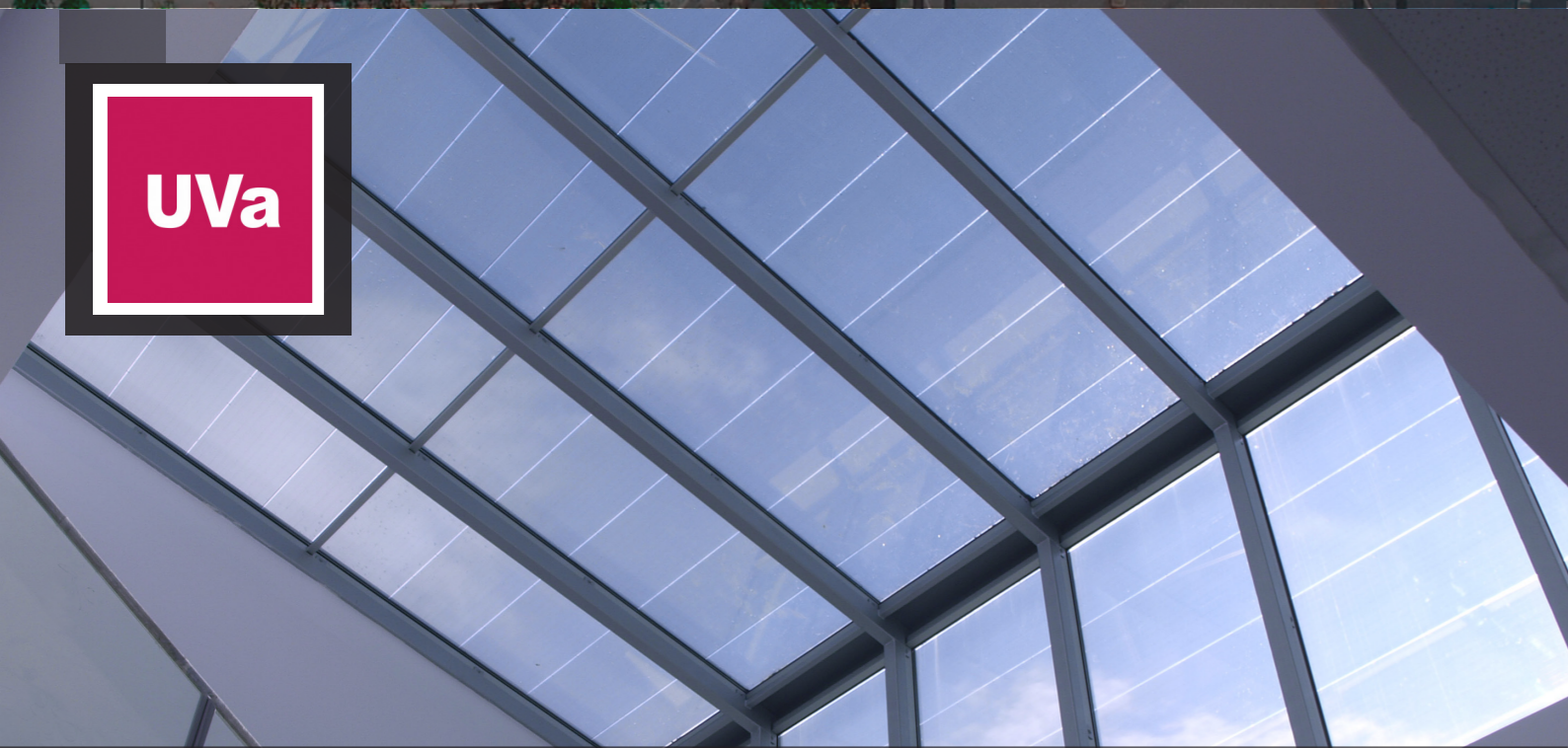
Installation of a curtain wall for the headquarters of GDR Guadalhorce, a non for profit organization for the promotion and innovation in the Guadalhorce Valley. Glasses of various sizes were custom manufactured for the needs of the client. The total installed power is 2,554 Wp allowing the system to generate more than 3,600 kWh per year.



Photovoltaic Ventilated Façade, FEMSA/Coca-Cola, Monterrey (Mexico)

General Contractor: Bioconstruccion
Client: FEMSA (Coca-Cola)

Onyx Solar has completed the first photovoltaic façade in Mexico for the headquarters of FEMSA, the most important bottling plant of Coca-Cola as well as the biggest one in the world. A double skin made of photovoltaic glass held by a metal framing was designed for this project. About 400 large-size PV glasses were manufactured with amorphous silicon technology in gray color. This façade respects the architectural and aesthetic values of the building and generates 17,223 kWh per year, while it avoids the emission of 7 tons of CO₂ annually into the atmosphere.



Photovoltaic Skylight, LUCIA Building, Valladolid (Spain).

General Contractor: UTE San Jose – CYM Yañez.
Architect: Francisco Valbuena
Client: Valladolid University's

The project consists of a brand new building which will host the Valladolid University's I+D labs; the building has been designed according to green building and sustainable architectural practices which include energy generation onsite by means of building integrated photovoltaics, among other sources. The semi-transparent photovoltaic glass of the system has been incorporated in the skylights to provide daylighting and free electricity from the Sun, around 5,552 kWh/year approx. The building avoids 3.7 Tons of CO₂ to be released to the atmosphere.



Photovoltaic Skylight, Novartis Headquarters, New Jersey (USA)

General Contractor: Turner Construction
Architect: Rafael Viñoly
Client: Novartis Pharmaceuticals Corporation

This innovative photovoltaic skylight, the largest in the world, has been installed as a second skin over the traditional, existing skylight on the rooftop of the new Novartis Headquarters. It comprises 820 units of photovoltaic glass with crystalline perforated solar cells that allow a more homogeneous light transmission toward the building.

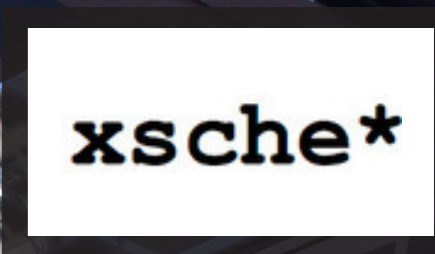
This innovative technology contributes to the production of 273,135 kWh per year, equivalent to the lighting of more than 600 homes and a reduction of more than 186 tons of CO₂ emitted to the atmosphere.



Photovoltaic Floor, The George Washington University (USA)

General Contractor: Hubert Construction
Client: The George Washington University

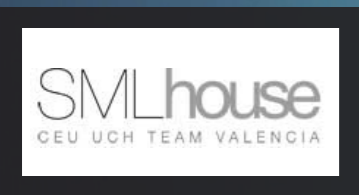
The George Washington University (GWU) recently partnered Onyx Solar to install the first ever walkable, solar photovoltaic sidewalk in the world, located at GW's Virginia Science and Technology Campus in Ashburn, Virginia. The sidewalk includes slip-resistant and semi-translucent glazing that convert solar radiation into electricity with the use of semiconductors. The total power installed is 42 Wp per sqm and it generates 51 kWh per year, enough electricity to feed the LED lighting system that illuminates the floor. This is a benchmark project that reflects the mentality of a venerable institution such as the GWU, which is always looking for new technologies and sustainable practices for a greener future.



Photovoltaic Canopy, XSCHE's House, Barcelona (Spain)

General Contractor: Jean Porsche
Client: Jean Porsche

Integration of a photovoltaic canopy in the well-known district of Gracia in Barcelona by the architect Jean Porsche. This unit consists of poly-crystalline glazing, 30% see-thru, that generates 11,710 kWh per year and avoids the emission of 7 tons of CO₂.



Photovoltaic Façade SML House, Madrid (Spain)

Client: University Cardenal Herrera

Onyx Solar has participated in the integration of a photovoltaic façade and floor for SMLsystem 2012, designed by students and researchers from the Architecture and Engineering School at the CEU University. This project was awarded with the second prize for Innovation. Both PV architectural solutions were configured using opaque, laminated photovoltaic glass which allow the building to generate over 4,493 kWh per year.



Photovoltaic Windows and Door, Gotarrendura Shelter, Ávila (Spain)

Client: The City Council of Gotarrendura

OnyxSolar has participated in the retrofit of the Gotarrendura Shelter with the integration of photovoltaic glass in the windows and the door, generating 230 kWh per year. Thanks to this installation, the local community was awarded in Seoul (South Korea) with the Livcom Award that recognizes "good environmental practices and local sustainable communities". It is the only award that recognizes local communities, focused in the environmental management and the creation of livable cities.



Arcadia Commons BIPV Brise-Soleil (USA)

General Contractor: Delan Builders Inc.
Architect: Kliment Halsband
Client: Arcadia University

This solution consists of a combination of two types of semi-transparent photovoltaic glass modules (84 in total), which were customized to perfectly meet the architectural needs of the project. This BIPV solution generates 4,800 kWh/year. Arcadia University is a private university founded in 1853 and located in Glenside, Pennsylvania. The university has a 4,000 co-educational student population and from a historical point of view, it is one of the most sustainability-concerned Campuses in the Unites States. This project will have a great PR media impact for the educational sector in the USA.



Photovoltaic Canopy in Lundberg K-96, Kona, Hawaii (USA)

General Contractor: Ryan Associates
Architect: Lundberg
Client: American Solar

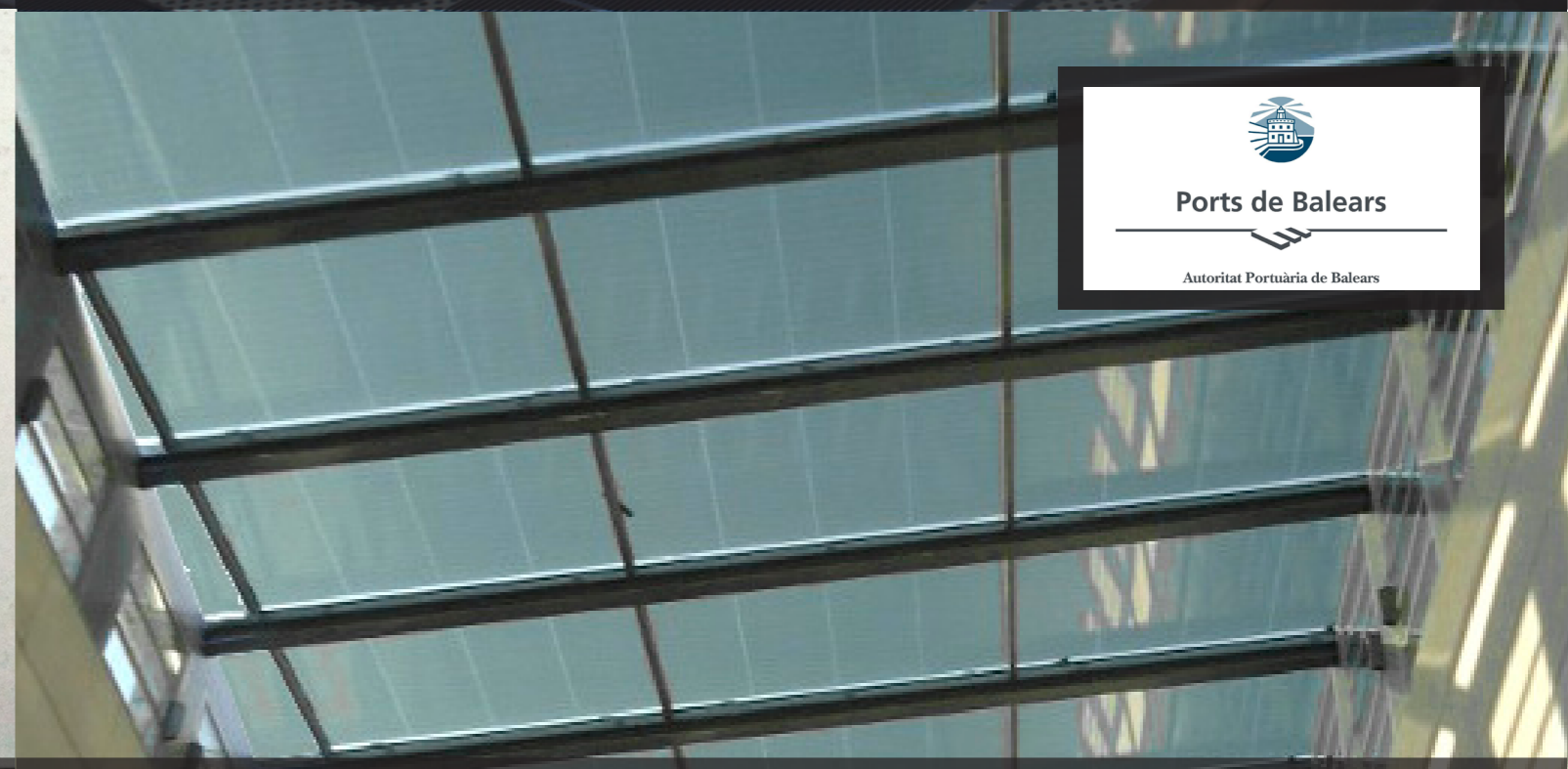
This project consists of the delivery 319 photovoltaic double laminated glazing units based on monocrystalline Silicon active material to be integrated for a BIPV canopy.



Photovoltaic Skylight in Garonne River, Bordeaux (France)

General Contractor: BMA
Architect: Jean Louis Montagnier
Client: Coveris

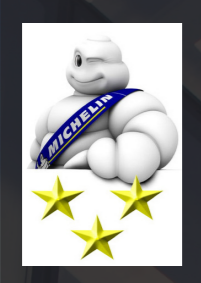
As part of the modernization of an industrial building of the XIX Century, a colorful skylight was incorporated into the Project. Double and triple laminated PV glasses were chosen for this project, improving the acoustic and thermal insulation of the building. This skylight generates 71 kWh per sqm yearly.



Photovoltaic Skylight, Mallorca (Spain)

General Contractor: Acciona infrastructure
Client: The Balear Port Authority's building in Mallorca

Onyx Solar installed a photovoltaic skylight within the retrofit of the Balear Port Authority's building in Mallorca, Spain. The solution incorporated low-e photovoltaic glass which controls daylighting and enhances both its thermal and acoustic insulation. Total installed power was 6,048 Wp which leads to 8,709 kWh/year generated.



Photovoltaic Curtain Wall and Skylight, Bodegas Iturralde, Biscay (Spain)

General Contractor: PROIEK
Architect: Naia Eguino
Client: Bodegas Iturralde

Sustainable building certified LEED Gold by the USGBC. The project, with more than 5,382 sqm of photovoltaic glass integrated as a curtain wall and as a skylight, is considered one of the most distinguish solutions of photovoltaic integration in Europe. The solution generates 30,347 kWh per year and prevents the emission of 11 tons of CO₂ into the atmosphere.



Photovoltaic Skylight at Bejar Market, Salamanca (Spain)

General Contractor: Tuconsa
Retrofit
Client: The City Council of Bejar

This project performs the retrofitting of the Bejar Traditional Market, located in Bejar city center (Salamanca, Spain), a traditional market where a 1,884 sqm skylight, based on photovoltaic insulating glazing units, was fully integrated into the building. This skylight is able to generate 8,811 kWh/year and it saves over 5.6 tons of CO₂/year.



Photovoltaic Façade and Skylight Cabinet House, MAXXI Museum (Rome)

General Contractor: Sami Rintala
Architect: Sami Rintala
Client: MAXXI Museum, Roma

The Cabinet House, installed at the Maxi Museum of Rome, is one of the most emblematic projects of the iraian architect Zaha Hadid and it was selected as the best building in the world in 2010. They were installed triple laminated glasses for the skylight and double laminated ones for the façade. Both solutions provide a total of 929 kWh per year.



BART BIPV Canopy - Union City, CA (USA)

General Contractor: West Bay Builders
Architect: Roma Architects
Client: Union City District

The photovoltaic canopy at BART Station in Union City, CA., consists of 800 PV glass/glass crystalline BIPV lites leading to a installed power of 150 kWp, generating 247,680 kWh per year and avoiding the emission of 120 tons of CO₂/year. The 16 mm laminated BIPV lites are frit patterned on the rear side providing an undeniable aesthetic appearance. This is considered one of the largest BIPV projects carried out in the United States and it was released in several industry magazines such as Glass Magazine which dedicated its cover page to this project.

1st PRIZE

MARKET & INDUSTRIAL VIABILITY
SOLAR DECATHLON EUROPE

SMLhouse
CEU UCH TEAM VALENCIA

CEU
Universidad
Cardenal Herrera

Solar Decathlon Europe, SML House Project, Madrid (Spain)

Client: Cardenal Herrera University

The SML House, designed by CEU Cardenal Herrera University for the Solar Decathlon Competition in 2010, was awarded as first of its class for industrialization and market feasibility. Onyx Solar participated in the project with the integration of a photovoltaic façade combined with Corian (Dupont) for an aesthetic finish, and it generates 4,188 kWh per year.



Ajuntament d'Alzira

Photovoltaic Skylight, Alzira, Valencia (Spain)

General Contractor: Conscea
Client: The City Council of Alzira

This photovoltaic skylight, located in Alzira's Town Hall, in Valencia (Spain), is composed of triple laminated glasses with a 10% transparency level. This solution generates 7,420 kWh per year and avoids the emissions of 2 tons of CO₂ annually.

Ayuntamiento de Coslada

Photovoltaic Canopy, Coslada, Madrid (Spain)

General Contractor: Elecnor
Client: The City Council of Coslada, Madrid

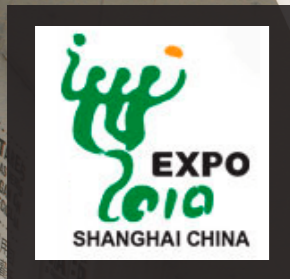
Photovoltaic Canopy in the elderly home Centro de Mayores Primavera, in Coslada. OnyxSolar supplied and installed 48 units of opaque photovoltaic glass of amorphous silicon thin film technology, with an unitary power of 85Wp.

Pfizer

BIPV Double Skin at Pfizer - Genyo Building, Granada (Spain)

General Contractor: Hinsa
Architect: Enrique Vallecillos, Emiliano Rodríguez
Client: Pfizer

Onyx Solar designed and developed the ventilated photovoltaic façade for the Pfizer-University of Granada-Junta de Andalucía Center for Genomic and Oncologic Research (GENYO in Spanish). The 7,535 sqm façade combines three different types of glasses: two white, conventional serigraphic glass and a third one, sizing 2.5 x 1 meters photovoltaic glass, specially customized for this project. Thus, the PV technology is integrated in an aesthetic manner replacing conventional materials such as glass, ceramics or stone, with a great final result.



Photovoltaic Skylight of the Expo of Shanghai (China)

General Contractor: The City Council of Madrid
Architect: FOA
Client: The City Council of Madrid

The Casa de Bambú was awarded as the best urban practice of 2010. It consists of a photovoltaic skylight covered with bamboo, so that besides contributing to the landscape with its image, it allows controlling the solar radiation while it provides the building with thermal, acoustic and visual insulation that protects it against rain, wind and high temperatures. This building, designed on the basis of bioclimatic concepts, produces 1,103 kWh per year and it avoids 0,78 tons of CO₂ emissions.



Photovoltaic Skylight, San Anton Market, Madrid (Spain)

General Contractor: Geocisa/Dragados
Architect: QVE
Client: Madrid City

This project is part of the retrofit of San Anton Market, located in Madrid city center, where a 1,808 sqm skylight composed of photovoltaic glass has been totally integrated into the building. The system generates 7,448 kWh per year while it adds bioclimatic multifunctional properties, such as filtering of harmful solar radiations or acoustic and thermal isolation provided by the double glazing. It has been selected as a reference project by the European Commission.



Onyx Solar - The black box, Ávila (Spain)

The Black Box consists of the integration of a photovoltaic facade in OnyxSolar Headquarters with an active surface of 3,014sqm. 135 units of laminated 20% transparent glass and 175 opaque ones have been installed, reaching 12,685 kWh/year.



Our professionals gather **30 years** of experience engineering and installing photovoltaic technology integrating it on buildings as well as in solar farms, accumulating almost **50.000 installed kWp** and **30.000 m²**



REFERENCES



“ Onyx has been a preferential technological partner in this project, developing a highly innovative solution, such as the photovoltaic skylights, a very attractive system from the point of view of the sustainable construction and the LEED certification.”

Francisco Valbuena, Architect, Technical Department,
University of Valladolid

“ We did count on Onyx as subcontractor for Novartis BIPV skylight project. Being a fast track project, Onyx did an outstanding job and finished product under difficult logistics and weather conditions. I would recommend counting on this firm for highly specialized BIPV glazing solutions”

William A. De Pasquale, Turner Construction Company,
Project Manager, Field Operations LEED AP BD+C

“ Working with Onyx on this project has been a very good experience. Both companies have faced the challenge of developing the first photovoltaic glass façade in Mexico in a record time and the outcome has been very successful. As in any project, counting on first-class and specialized companies is a guarantee of success.”

Alfredo de la Rosa, Manager of Intern Civil Works, FEMSA

“ Onyx was a key partner in the Bart Canopy BIPV project being the selected company ensuring the delivery of the PV glazing as prescribed for the project and within the delivery schedule. Onyx selection was based on previous experience with other custom projects of similar magnitude along with the excellent clients reference provided.”

Alex Diaz, Project Manager Union City, Bart Station,
West Bay Builders



“ Metrotek and Onyx developed an highly skilled team to successfully complete the challenges of the Novartis B 337 BIPV skylight project. It was an absolute pleasure for Metrotek to integrate with Onyx and hope to work with them again sometime in the future”

Reiner E. Jaeckle, Chief Operations Officer, MetroTek Electrical
Services

“ Onyx Solar provided Arcadia University an integrated photovoltaic brise soleil which enhanced sustainability's awareness among the students; they did a great job and we would recommend them for projects involving innovative and high quality building integrated photovoltaics”

Chris Chapman, Project Manager Arcadia Delran
Builders Co. Inc.

“ The photovoltaic glazing is a sustainable solution that can be easily incorporated in any type of construction project, either for new construction or retrofits”

Mauricio Vázquez Vela, General Director of Vazquez
Vela Group

STAND ALONE INSTALLATIONS



1980 Installation in a stand alone, one floor Single Family Dwelling (SFD) in Mingorría (Ávila) with a 1500 W inverter for washing machine, TV and water well. 100 Wp.

1984 Wind-Photovoltaic installation in a country house (Dehesa del Arrelobo, Ávila) with 200 Wp (polycrystalline panels) and a 500 W wind turbine. 300 W inverter for lighting, pumps, heating, TV and refrigerator.

1985 - 1988 Intervention in La Lastrilla (Arévalo) in the fire surveillance tower, for a transmitter and lighting (50 Wp power each).

1989 Photovoltaic installation in the Nogal del Barranco (Ávila) summer camp of 150 Wp and a 5 kw generator for common areas lighting and refrigerators.

1990 Wind-Photovoltaic installation in a mountain shelter in José Antonio Elola (Ávila) with a 500 W wind turbine, 560 Wp panels and two interconnected diesel generators. The shelter was designed to host 60 people, with a kitchen and a restaurant.

1991 Batteries and panels power increase for the sewage treatment plant at the José Antonio Elola shelter, and assembly of a power generator.

1993 Installation at a grocery store in Río Arbillas (Arenas de San Pedro, Ávila) 150 Wp, 1500 W inverter and 6,5 kW generator for common areas lighting.

1995 Solar portable installation for an expedition to the Everest, sponsored by IPIX Photography and Diario As, with an 80 W flexible panel, 800 W gas generator and a 1500 W inverter.

1997 Wind-Photovoltaic installation in a house in Navarredonda de Gredos, with a 1500 W wind turbine, 450 Wp of polycrystalline panels and 3 kW diesel generator.

1998 Wind-Photovoltaic installation in a house in Navarredonda de Gredos, with 300 Wp of polycrystalline panels, a 1500 W inverter and a 1500 W gas generator.

STAND ALONE INSTALLATIONS



2001 250 Wp installation in a Sanchorreja house, with a 1500 W inverter.

2003 300 Wp installation in a Sanchorreja house, with a 1500 W inverter. Used for a sewage treatment plant, water pump and lighting.

2005 ssembly of a solar feeded water deposit for human consumption (Navatalgordo, Ávila).

2006 Assembly of a similar system as the previous one in Gallegos de Altamios.

2007 800 Wp installation with a 5 kW inverter in a house in Robledillo (Ávila), with swimming pool, refrigerator, washing machine.

Between 1995 and 2009, assembly of several direct solar pumpings, from ¼ de HP to 3 HP. Also installaed lighting for particular gardens, animal fodder dispenser, etc.

2010 Photovoltaic Skylight. Madrid Pavilion Expo Shanghai. Energy generated: 1,382 kWh/year.

2010 Photovoltaic Façade and Skylight Cabinet House, MAXXI Museum (Rome) Energy generated: 929 kWh/year.

2011 Photovoltaic Skylight installed in Béjar (Salamanca) Energy generated: 8,811 kWh/year.

2011 Photovoltaic Windows and door, Gotarrendura Shelter, Ávila (Spain) Energy generated: 230 kWh/año.

2011 Photovoltaic Skylight & Curtain Wall installed in Bodegas Iturralde (Vizcaya). Energy generated: 16,380 kWh/year.

2012 Photovoltaic Canopy, XSCHE House, Barcelona (Spain) Energy generated: 11,710 kWh/year.



STAND ALONE INSTALLATIONS



2012 Retrofitting of the Port Authority Building in Majorca, Spain.
Energy generated: 8,709 kWh/year.

2012 Photovoltaic Skylight Garona River, Bordeaux, France.
Energy generated: 2,475 kWh/year.

2012 Lundberg K-96 Photovoltaic Canopy, Kona, Hawaii.
Energy generated: 58,000 kWh/year.

2013 The World's First Walkable Photovoltaic Floor, installed in The George Washington University (USA).
Energy generated: 512 kWh/year.

2013 Photovoltaic Skylight FEMSA, Coca Cola, Monterrey (Mexico).
Energy generated: 17,223 kWh/year.

2014 Photovoltaic Skylight, Bretagne (France)
Energy generated: 4,884 kWh/year.

2014 Curtain Wall in the Headquarters of GDR, Guadalupe (Spain)
Energy generated: 3,678 kWh/year.

2014 Photovoltaic Skylight Viracopos International Airport
Campinas, Sao Paulo (Brasil)
Energy generated: 221,400 kWh/year.

GRID CONNECTED INSTALLATIONS



2004-2007 Over 5 MW in small installations (50 KW-200 KW) including bi-axial tracker systems, parking lots, fix systems, etc.

2004 Two 5 kW solar farms in Castillejos (Solosancho).

2005 5 kW increase of the two aforementioned solar farms in Solosancho.

2006 Installation of the first solar farm with a tracking system in Ávila (10 kW).

2006 First 100 kW solar farm installation in Ávila.

2007 750 kW solar farm installation in Madrigal de las Altas Torres.

2007 3Mw installed, bi-axial trackers system, crystalline technology in Villalpando (Zamora).

2007 2 MW installed, bi-axial trackers system, crystalline technology in Arévalo (Ávila).

2007 Empresa Municipal de Aguas, 3MW, 1,5 MW fix-system (Córdoba).

2008 Assembly of the three largest solar trackers in Ávila (33 kW each).

2008 Boecillo Industrial Park, 60K Wp as vertical façade, Crystalline technology.

2008 6,1 MWp installed bi-axial trackers, Crystalline technology in Montelareina (Zamora).

2009 10 MWp installed bi-axial trackers, Crystalline technology in Zamora.

GRID CONNECTED INSTALLATIONS



2009 1 MWp installed bi-axial trackers, Crystalline technology in Paradinas (Salamanca).

2009 500 kWp installed bi-axial trackers, Crystalline technology in Fresno el Viejo (Valladolid).

2009 3,1 MWp installed bi-axial trackers, Crystalline technology Villar del Buey (Zamora).

2009 5,1 MWp installed bi-axial trackers, Crystalline technology in Valladolid.

2010 Ventilated PV façade for the Pfizer-University of Granada Center for Genomic and Oncologic Research. Energy generated: 31,837 kWh/year

2010 Photovoltaic Skylight. San Antón Market (Madrid). Energy generated: 7,448 kWh/year.

2010 Solar Decathlon 2010. SML House Project. Energy generated: 4,188 kWh/year.

2011 Photovoltaic Canopy. Bart Station. San Francisco (USA) Energy generated: 174,276 kWh/year.

2011 Photovoltaic Pergola installed in Coslada (Madrid). Energy generated: 5,757 kWh/year.

2011 Photovoltaic Skylight installed in Alzira (Valencia). Energy generated: 7,402 kWh/year.

2012 Photovoltaic Brise Soleil installed in Arcadia University (Pennsylvania, USA). Energy generated: 4,800 kWh/year.

2013 Photovoltaic Skylight, LUCIA Building, Valladolid (Spain). Energy generated: 5,552 kWh/year.

2013 Turn Key installation of the largest Photovoltaic Skylight in the World for Novartis brand new headquarters in New Jersey (USA). Energy generated: 273,135 kWh/year.

PHOTOVOLTAIC GLASS INNOVATION LEED BIPV CURTAIN WALL
SKYLIGHT GREEN BUILDING SUSTAINABILITY CLEAN ENERGY FROM THE SUN BIPV SKYLIGHT
ARCHITECTURE BUILDING PHOTOVOLTAIC WALKABLE ROOF INNOVATION TECHNOLOGY GENERATION ONYX SOLAR SUSTAINABILITY PHOTOVOLTAIC
BIM ARCHITECTURE PHOTOVOLTAIC WALKABLE ROOF GREEN BUILDING PROJECT PHOTOVOLTAIC FACADE WALKABLE ROOF LEED BIM
LEED CERTIFICATION WALKABLE ROOF PHOTOVOLTAIC FACADE PV BIPV BUREAU ARCHITECTS DESIGN INNOVATION ARCHITECTURE
CANOPY ECOTECH REVIT SIMULATION ANALYSIS ROOF LEED BIM BIPV SUSTAINABLE PROJECTS PHOTOVOLTAIC
CANOPY



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