

The logo for Onyx Solar, featuring the word "onyx" in a lowercase, sans-serif font with a power symbol (a circle with a vertical line) as the letter "o". To the right of "onyx" is the word "SOLAR" in a smaller, uppercase, sans-serif font. The logo is set against a dark, rounded rectangular background.

onyx
SOLAR

PHOTOVOLTAIC GLASS FOR BUILDINGS

Gioia, 22, Italy. 5,000 m² of crystalline silicon PV Glass on spandrels · 773 kWp

THE GLOBAL LEADER IN PV GLASS FOR BUILDINGS

Onyx Solar® is the world leader in the manufacture of photovoltaic (PV) glass for buildings. PV Glass is an architectural glass that generates clean, free electricity from the sun. It is installed on façades, curtain walls, skylights, and floors systems, allowing buildings of our cities to generate their own electricity for a minimal outlay.

Our aim is to help buildings becoming self-sufficient from an energy viewpoint, which is key to fight climate change. In fact, buildings are responsible for the consumption of most of the electricity produced worldwide.

We have completed over 500 projects across the world, several of which are large-scale developments for renowned companies such as Samsung, Microsoft, Hewlett Packard, Pepsi, Coca-Cola, McDonald's, Heineken, ING, Balenciaga, Marriot, Pfizer and Novartis. All of them have installed our photovoltaic glass in their buildings.

We also provide advice to architects, engineers, consultants and contractors worldwide, including Foster+Partners, Perkins+Will, Gehry Partners, Gensler, HOK, AECOM, GMP, Ricardo Bofill, Pelli Clarke & Partners, L35, Dialog Design, Grimshaw Architects, SOM, and Rafael Vinoly Architects. We have also worked alongside the most important construction companies in the world, such as Skanska, Turner Construction, Acciona, HB Reavis, Jacobs, ACS and Ferrovial.

This catalog features several of the most iconic projects that we have completed to date. We hope that you will enjoy reading it as much as we have enjoyed partaking each project.

Welcome to the RevolutiONyx!

Alvaro Beltran
Founder of Onyx Solar®



Pelli Clarke
& Partners



Real Estate Investment



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104	ICSE CENTER	SPAIN, a-Si	129	LARSEN & TOUBRO	INDIA, a-Si
106	PFIZER-GENYO LABS	SPAIN, a-Si	130	VALDECILLA HOSPITAL	SPAIN, c-Si
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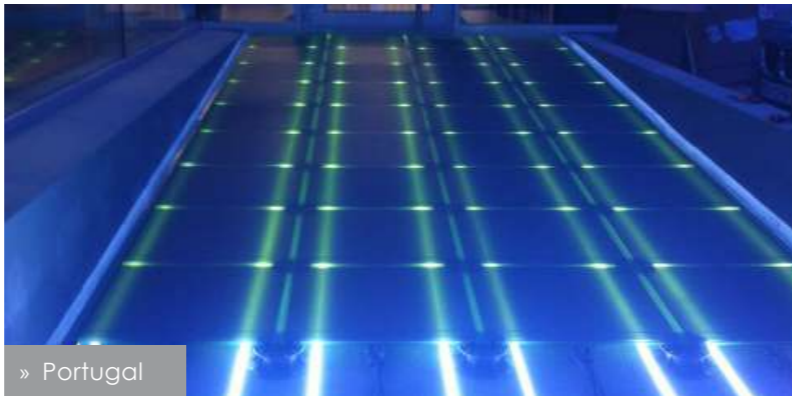
» USA



» Monaco



» Canada



» Portugal



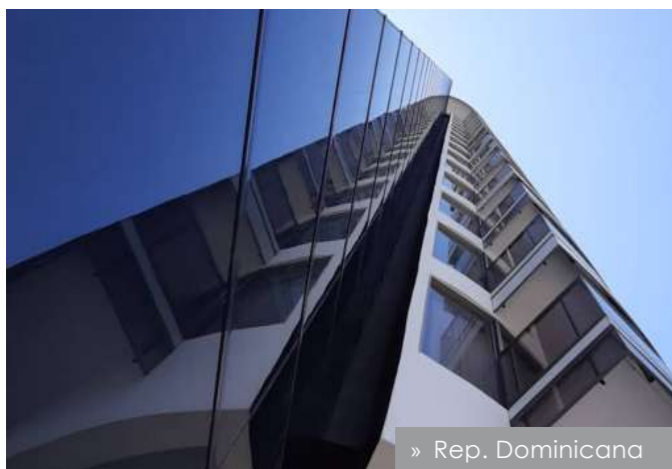
» France



» Spain



» USA



» Rep. Dominicana



» Portugal



» California



» USA



» Poland



» UAE



» Spain

OVER 500 PROJECTS COMPLETED OVER FIVE CONTINENTS PROVE OUR GLOBAL LEADERSHIP



» Mexico



» France



» South Korea



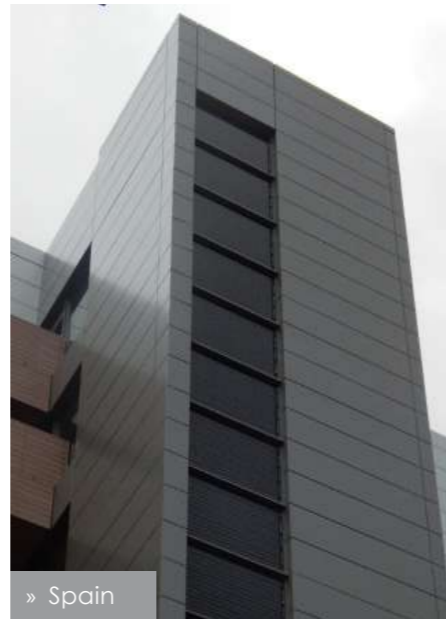
» Spain



» USA



» Italy



» Spain



» Spain



» Spain



» Spain



» Spain



» USA



» USA



» USA



» UAE



» USA



» USA



» Australia



» Italy



» USA



» Egypt



» USA



» USA



» Spain



» USA



» Spain



» Spain



» USA



» Spain



» Indonesia



» Spain



» Panama



» Brazil



» Morocco



» Spain



» Malta



» Singapore



» Turkey



» Slovakia



» Mexico



» Belgium



» Mexico



» Spain



» Spain



» Australia



» India



» USA



» Italy



» Spain



» Rep Dominicana



» China



» Australia



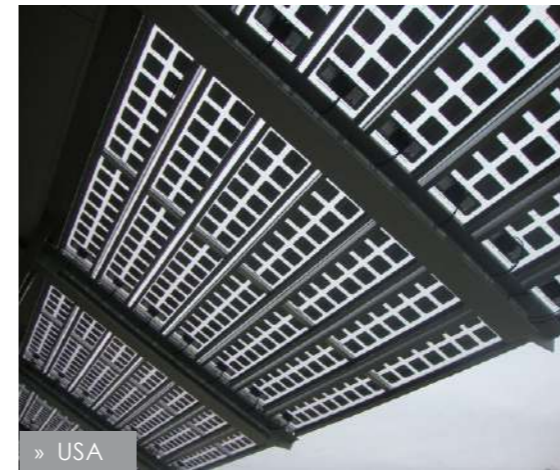
» Netherlands



» Australia



» UAE



» USA



» Portugal



» USA



» Spain



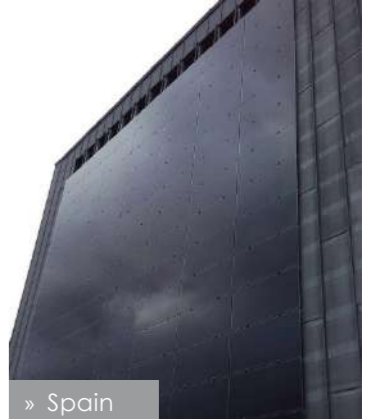
» Chile



» USA



» Australia



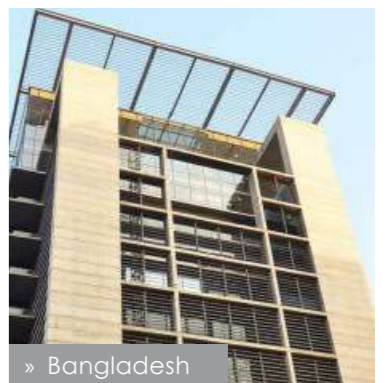
» Spain



» Denmark



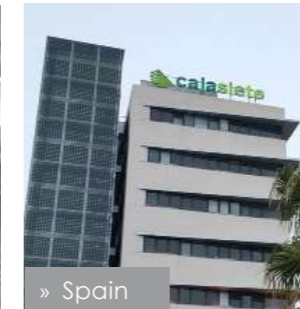
» Spain



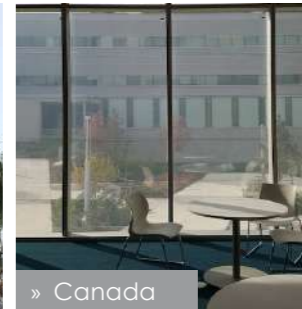
» Bangladesh



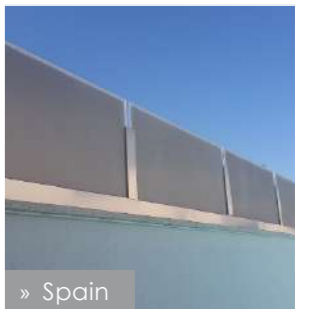
» Spain



» Spain



» Canada



» Spain

OUR PRODUCT

PHOTOVOLTAIC GLASS FOR BUILDINGS

■ SUSTAINABLE, AESTHETIC & FUNCTIONAL

Onyx Solar is the Global Leader in the development and manufacture of photovoltaic glass for buildings. PV glass shows the same mechanical properties as a conventional, architectural glass used in construction. However, in addition, it also **generates free and clean energy thanks to the sun** (active properties). Given these properties, **PV Glass maximizes the performance of the building's envelope**. It is able to completely offset the energy demand for indoor air conditioning, and drastically reduce the cost of electricity.

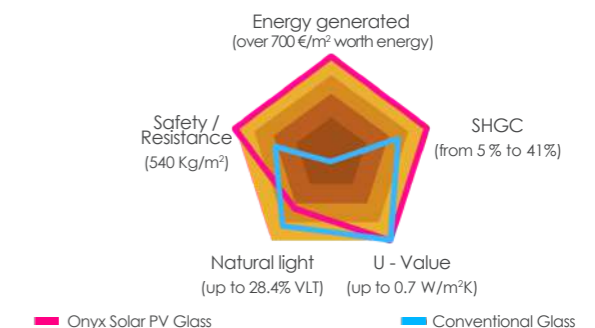
PV Glass can also be **customized in shape, color, size** (up to 8 m²), **thickness, and semi-transparency degrees**, easing its integration within any project and design.

Onyx Solar has also developed the **first photovoltaic raised access floor tile in the world**, as well as the first photovoltaic ventilated façade that can be customized onsite.

OUR PV GLASS MAXIMIZES YOUR BUILDING'S ENVELOPE PERFORMANCE AND TURNS IT INTO A VERTICAL POWER GENERATOR



COMPARISON BETWEEN A CONVENTIONAL GLASS AND ONYX SOLAR PHOTOVOLTAIC GLASS

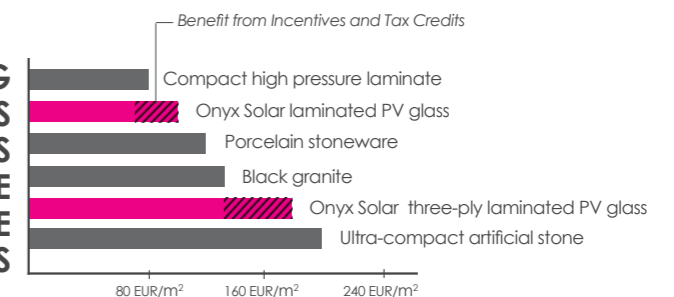


PV GLASS: THE ONLY BUILDING MATERIAL THAT PAYS FOR ITSELF

Our PV Glass can achieve an IRR of up 70% and a payback period of up to less than a year. PV Glass works as a revenue accelerator:

- It decreases HVAC load and usage thanks to the optimized performance of the PV Glass.
- It unlocks tax credits and incentives at federal, state and local level.
- It generates free and clean electricity from the sun, which locks the cost of the electricity generated for over 30 years.
- It contribute to the preservation of the natural environment.
- It reduces the building's carbon footprint.

FACT: USING ONYX SOLAR PV GLASS IN VENTILATED FAÇADES IS NOT MORE EXPENSIVE THAN OTHER ALTERNATIVE BUILDING MATERIALS



LOW-E PHOTOVOLTAIC GLASS

LOW-EMISSION PV GLASS

CLEAN ENERGY GENERATION (PEAK POWER)
up to 57.4 Wp/Sqm

VALUE OF THE ENERGY GENERATED
up to 704 €/Sqm

NATURAL LIGHT
up to 29 % VLT

THERMAL INSULATION
up to 0,7 W/m²K

UV & IR FILTER
up to 99 %

ACOUSTIC INSULATION
up to 37 (-1,-5)

ENERGY GENERATION **ELECTRICITY COST REDUCTION** **ENERGY DEMAND REDUCTION FOR INDOOR AIR CONDITIONING**

Why do Onyx Solar®'s products add value to any building?

Photovoltaic glass panels produce clean, free electricity from the sun, enabling daylight inside buildings, filtering out the harmful components of solar radiation, and providing buildings with thermal and sound insulation as needed. They also offer innovative, modern designs to meet the aesthetic requirements of any architect and client.

Onyx Solar® has developed the first photovoltaic low-emissivity (low-e glass). In addition to generating clean energy from the sun, low-e photovoltaic glass outperforms conventional glass:

INSULATION PROPERTIES

These are expressed by the thermal transmittance of the glass which, as we have seen before, is also known as "U-value". This parameter represents the amount of heat that passes through the glass when there is a difference in temperature between its two sides. The lower the U-value, the better the thermal performance of the glass. This helps building becoming more energy efficient and saving costs. In this sense, Onyx Solar®'s Low-e glass offers U-values up to 0.7 W/m²K, equaling the performance of conventional low-e glass.

ELECTRICITY GENERATION

Photovoltaic glass generates free, clean energy from the sunlight. This happens thanks to the micrometric active layers of photovoltaic material deposited on one of the sides of the glass. As an example, 100 square meters of photovoltaic glass could power over 250 lights points working hours for 35 years in the city of Los Angeles. Nowadays, buildings can save a lot of money by generating clean, free power onsite, especially considering the electricity rate spikes that we have witnessed for the past months.



Onyx Solar®'s Low-E photovoltaic glass was awarded "The Most Innovative Glass" back in 2015 by the US National Glass Association.

For further information about this innovative construction material, please download our **Low-E Photovoltaic Glass Technical Guide**.

	ONYX SOLAR®	LOW-E GLASS	CONVENTIONAL GLASS	CONVENTIONAL PV MODULE
Selective IR Filter	✓	✓	✗	✗
Selective UV Filter	✓	✓	✗*	✗
Solar factor / SHGC	✓	✓	✗	✗
Natural lighting	✓	✓	✓	✗
Thermal performance U < 2 W/m²K U < 0,35 BTU/hft²F*	✓	✓	✗	✗
Acoustic performance	✓	✓	✓	✗
Electricity generation	✓	✗	✗	✓
Aesthetic integration in buildings	✓	✓	✓	✗

* The UV filter can only be achieved by laminated glass.

SELECTIVE ULTRAVIOLET FILTER

Onyx Solar®'s photovoltaic glass panels filter out 99% of the ultraviolet radiation (UV) which harms harmful indoor spaces, furniture and people potentially.

SELECTIVE INFRARED FILTER

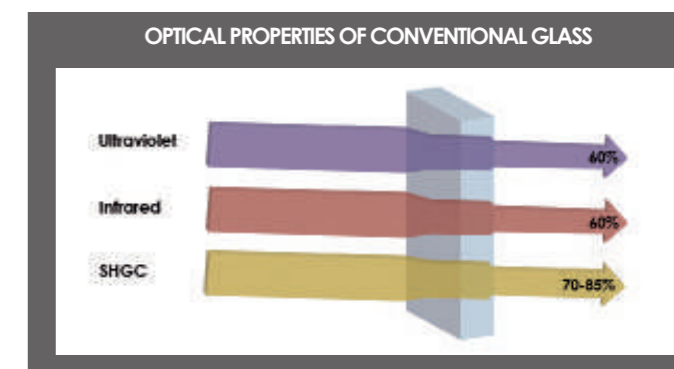
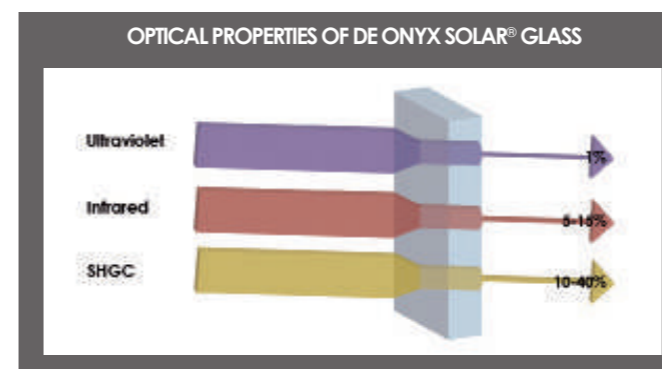
PV Glass reduces the transmission of infrared radiation by up to 95% compared to a conventional laminated glass.

OPTIMIZED SOLAR FACTOR

The solar factor, known as "g-value" or SHGC (Solar Heat Gain Coefficient) tells us the amount of energy that a glazing will allow into our building with regard to the energy reaching it in the form of solar radiation. This is a key factor to achieving indoor thermal comfort in buildings. For instance, a high g-factor might cause the temperature to rise too high due to the greenhouse effect, while low values will prevent this from happening, particularly in a hot climate. Onyx Solar®'s ThinFilm transparent photovoltaic glass displays a solar factor between 10% and 40%, which makes it an ideal candidate to achieve control over the interior temperature.

NATURAL LIGHT

As these are transparent glass, they enable the natural lighting of the building. The visible light entering through Onyx Solar®'s ThinFilm photovoltaic glass comes in different light transmittance levels, from fully opaque glass, up to 10, 20 and 30% LT levels. The more transparent the glass, the more daylight inside the building, but the lower the energy generation, since solar cells are removed from the surface of the glass in order to offer a semi-transparent product.



SOLAR TECHNOLOGIES

Onyx Solar® is a company devoted to the design, manufacture and marketing of architectural photovoltaic glass, using two technologies mainly: **amorphous Silicon** and **crystalline Silicon (mono- and polycrystalline)**.

CRYSTALLINE SILICON PV GLASS

For projects seeking maximum power output per m², choosing **crystalline Silicon glass** may be the right answer. Its power capacity is given by the number of solar cells used per glass unit. **Crystalline Silicon glass shows a nominal power that usually ranges from 100 up to 180 Wp/m²**, depending on the solar cell density required by design. Selecting the right balance between natural light and nominal power will help you better achieving your energy efficiency goals.

ADVANTAGES:

- Greater power density per square metre (Wp/m²).
- Less surface area of the installation for the same power capacity.
- Greater efficiency (up to 16%).

For further technical details visit:
www.onyxsolar.com/product-services/technical-specifications

SIZE (mm)		THICKNESS CONFIGURATION* (mm)		WEIGHT (Kg/m ²)	IGU COMPATIBLE**	JUNCTION BOX
STANDARD 1475 x 480 1245 x 635 1641 x 989 1650 x 850	CUSTOMIZED from 600 x 300 to 1706 x 1006	GLASS + BACKSHEET	4T + Backsheet with aluminium frame	15	NO	Bipolar
			4T + 4T	20	YES NO	Bipolar
		LAMINATED GLASS	5T + 5T	27	YES	Bipolar Edge
			6T + 6T	30	YES	
			8T + 8T	40	YES	
STANDARD 1700 x 1000 1700 x 1460 2000 x 2000 2400 x 2000	CUSTOMIZED from 1706 x 1006 to 4000 x 2000 (The biggest of the market!)	LAMINATED GLASS	4T + 4T	20	YES	Bipolar Edge
			5T + 5T	27		
			6T + 6T	30		
			8T + 8T	40		
			10T + 10T	50		
RAISED ACCESS PHOTOVOLTAIC FLOOR TILE						
STANDARD 750 x 750	CUSTOMIZED from 750 x 750 to 3000 x 1500	LAMINATED GLASS	8T + 8T	40	NO	Bipolar Edge
			10T + 10T	50		

*Dimensions in mm, T = tempered glass according to UNE-EN12150. For glass 5T+5T, please ask availability.
 **The IGU glazing is customized in all cases according to the requirements of the project.

AMORPHOUS SILICON PV GLASS

Amorphous Silicon glass offers a **superior performance under diffuse light conditions** (overcast conditions).

OFFSET YOUR BUILDING'S ENERGY DEMAND BY USING OUR PV GLASS

Choose from our several transparency degrees (LT) and start generating free and clean electricity thanks to the sun.

This PV Glass can be fully opaque/dark (higher nominal power), or present different light transmittance levels, which enables daylight, while maintaining unobstructed views. Onyx Solar®'s transparent photovoltaic glass also **filters out harmful radiation** (ultraviolet and infrared).

ADVANTAGES:

- Given the same system size (kWp), it yields more power than crystalline Silicon glass under diffuse light conditions, and high temperature.
- It provides natural light while maintaining unobstructed views.
- It provides a very uniform, aesthetic integration.

For further technical details visit:
www.onyxsolar.com/product-services/technical-specifications

SIZE (mm)		THICKNESS CONFIGURATION* (mm)		WEIGHT (Kg/m ²)	IGU COMPATIBLE**	JUNCTION BOX
STANDARD 1245 x 300 1200 x 600 1245 x 635	CUSTOMIZED from 600 x 300 to 1245 x 635	LAMINATED GLASS	3 + 4	17	YES	Bipolar Monopolar
			3 + 5T	22	YES	
		THREE-PLY LAMINATED GLASS	4T + 3 + 4T	30	YES NO	Bipolar Monopolar Edge
			5T + 3 + 5T	35	YES	
			6T + 3 + 6T	41	YES	
STANDARD 1245 x 1242 2462 x 635 1245 x 1849 1245 x 2456	CUSTOMIZED from 1245 x 635 to 4000 x 2000 (The biggest of the market!)	THREE-PLY LAMINATED GLASS	4T + 3 + 4T	30	YES	Bipolar Monopolar Edge
			5T + 3 + 5T	35		
			6T + 3 + 6T	42		
			8T + 3 + 8T	52		
RAISED ACCESS PHOTOVOLTAIC FLOOR TILE						
STANDARD 600 x 600	CUSTOMIZED from 600 x 600 to 4000 x 2000	THREE-PLY LAMINATED GLASS	6T + 3 + 6T	42	NO	Bipolar Monopolar

* Dimensions in mm, T = tempered glass according to UNE-EN12150.
 **The IGU glazing is customized in all cases according to the requirements of the project.



OPTICAL & THERMAL PROPERTIES

AMORPHOUS SILICON GLASS

TRANSPARENCY (LT)	CONFIGURATION**	SHGC	U value**	U value	Ligh Reflection (external)
		%	W/m²K	Btu/h ft² F	%
no transparency (0.0 - 0.2%)	3.2+4	22%	5.70	1.00	7.6%
	6T+3.2+6T *	23%	5.20	0.92	7.3%
	6T+3.2+6T/12Air/6T (also valid for 4+4) **	6%	2.70	0.48	7.3%
	6T+3.2+6T/12Air/6T low-e	5%	1.60	0.28	7.3%
	6T+3.2+6T/12Argon/6T low-e	5%	1.20	0.21	7.3%
	6T+3.2+6T/12Argon/4/12Argon/6T low-e	5%	1.00	0.18	7.3%
low transparency (10.1 - 10.8%)	3.2+4	29%	5.70	1.00	7.6%
	6T+3.2+6T	29%	5.20	0.92	7.3%
	6T+3.2+6T/12Air/6T	11%	2.70	0.48	7.3%
	6T+3.2+6T/12Air/6T low-e	9%	1.60	0.28	7.3%
	6T+3.2+6T/12Argon/6T low-e	9%	1.20	0.21	7.3%
	6T+3.2+6T/12Argon/4/12Argon/6T low-e	9%	1.00	0.18	7.3%
medium transparency (16.3 - 17.3%)	3.2+4	34%	5.70	1.00	7.1%
	6T+3.2+6T	32%	5.20	0.92	7.0%
	6T+3.2+6T/12Air/6T	14%	2.70	0.48	7.0%
	6T+3.2+6T/12Air/6T low-e	12%	1.60	0.28	7.0%
	6T+3.2+6T/12Argon/6T low-e	12%	1.20	0.21	7.0%
	6T+3.2+6T/12Argon/4/12Argon/6T low-e	12%	1.00	0.18	7.0%
high transparency (26.7 - 28.4%)	3.2+4	41%	5.70	1.00	7.6%
	6T+3.2+6T	37%	5.20	0.92	7.1%
	6T+3.2+6T/12Air/6T	19%	2.70	0.48	7.1%
	6T+3.2+6T/12Air/6T low-e	17%	1.60	0.28	7.1%
	6T+3.2+6T/12Argon/6T low-e	17%	1.20	0.21	7.1%
	6T+3.2+6T/12Argon/4/12Argon/6T low-e	17%	1.00	0.18	7.1%

Notes: *These values are valid with minimum changes in thickness configuration, such as 4T+3.2+4T instead of 6T+3.2+6T, and 4T+4T, 8T+8T instead of 6T+6T.

**The thickness of the internal glass layer does not change the U value, so there are valid both 6T and 4+4.

CRYSTALLINE SILICON GLASS

TRANSPARENCY (LT)	CONFIGURATION**	SHGC	U value**	U value	Ligh Reflection (external)
		%	W/m²K	Btu/h ft² F	%
High density of PV cells (15%)	6T+6T* (see notes)	27%	5.50	0.97	8.3%
	6T+6T/12Air/6T	9%	2.70	0.48	8.3%
	6T+6T/12Air/6T low-e	7%	1.60	0.28	8.3%
	6T+6T/12Argon/6T low-e	7%	1.20	0.21	8.3%
	6T+6T/12Argon/4/12Argon/6T low-e	7%	1.00	0.18	8.3%
Low density of PV cells (38%)	6T+6T	40%	5.50	0.97	8.3%
	6T+6T/12Air/6T	22%	2.70	0.48	8.3%
	6T+6T/12Air/6T low-e	20%	1.60	0.28	8.3%
	6T+6T/12Argon/6T low-e	20%	1.20	0.21	8.3%
	6T+6T/12Argon/4/12Argon/6T low-e	20%	1.00	0.18	8.3%

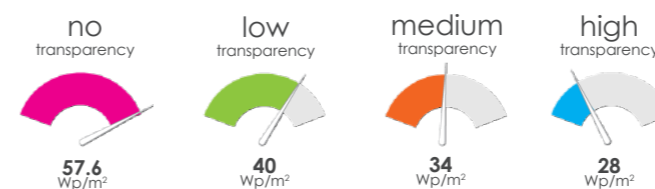
Notes: *These values are valid with minimum changes in thickness configuration, such as 4T+3.2+4T instead of 6T+3.2+6T, and 4T+4T, 8T+8T instead of 6T+6T.

**The thickness of the internal glass layer does not change the U value, so there are valid both 6T and 4+4.

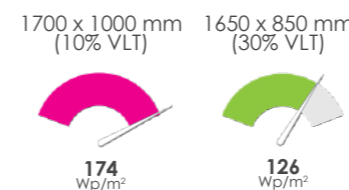
NOMINAL POWER

Nominal Power depends on the transparency-degree of the PV Glass and the solar cell density required by design. For instance, **crystalline Silicon glass shows a nominal power that usually ranges from 100 up to 180 Wp/m²**. Selecting the right balance between natural light and nominal power will help you better achieving your energy efficiency goals. For further information, please visit our **Technical Guide** in our website (http://onyxsolardownloads.com/docs/ALL-YOU-NEED/Technical_Guide.pdf) or contact us at info@onyxsolar.com.

Amorphous Silicon Glass



Crystalline Silicon Glass



CUSTOMIZE YOUR PV GLASS

If there is something that characterizes Onyx Solar®, that is flexibility in design. Our PV glass is 100% customized in shape, thickness, color, transparency-degree, size and finishes.


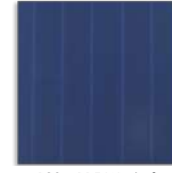




COLOR

Onyx Solar®'s glass, is not only aesthetic and efficient, but it also stands out thanks to its unlimited range of configurations and design options including transparency and colors.

Our Amorphous Silicon photovoltaic glass is laser-etched to remove thin lines of active solid cells; this is a process aimed to let the light pass thru the glass and gain transparency. The PV active material is black by nature (faces the sun) while the interior of the glass displays an aluminum-like color. Then, when we follow this process and laminate afterwards the glass using a colored interlayer (PVB), we get the color from both sides of the glass.

This is not however, the only process we follow to offer you a wide range of colors. Besides using colored PVB interlayers, we also follow other techniques to get to the desired color. We offer the following solid colors:


COLOR PALETTE HIDDEN PV

<p>WHITE</p>  <p>95 - 109 Wp/m² 8.8 - 10.1 Wp/sqft</p>	<p>POLAR WHITE</p>  <p>105 - 120 Wp/m² 9.7 - 11.1 Wp/sqft</p>	<p>LIME WHITE</p>  <p>75 - 86 Wp/m² 6.9 - 8.0 Wp/sqft</p>	<p>GREY</p>  <p>100 - 115 Wp/m² 9.8 - 10.6 Wp/sqft</p>	<p>POLAR GREY</p>  <p>125 - 143 Wp/m² 11.6 - 13.2 Wp/sqft</p>	<p>ANTHRACITE</p>  <p>115 - 132 Wp/m² 10.6 - 12.2 Wp/sqft</p>
<p>BLUE</p>  <p>100 - 115 Wp/m² 9.8 - 10.6 Wp/sqft</p>	<p>DEEP BLUE</p>  <p>140 - 160 Wp/m² 13.0 - 14.8 Wp/sqft</p>	<p>GREEN</p>  <p>110 - 126 Wp/m² 10.2 - 11.7 Wp/sqft</p>	<p>INTENSE GREEN</p>  <p>90 - 103 Wp/m² 8.3 - 9.5 Wp/sqft</p>	<p>CORAL BROWN</p>  <p>85 - 97 Wp/m² 7.9 - 9.0 Wp/sqft</p>	<p>MARBLE BROWN</p>  <p>100 - 115 Wp/m² 9.3 - 10.6 Wp/sqft</p>
<p>TERRACOTA</p>  <p>55 - 63 Wp/m² 5.1 - 5.8 Wp/sqft</p>	<p>CORTEN STEEL</p>  <p>50 - 57 Wp/m² 4.6 - 5.3 Wp/sqft</p>	<p>SAND</p>  <p>70 - 80 Wp/m² 6.5 - 7.4 Wp/sqft</p>	<p>OCHER</p>  <p>75 - 86 Wp/m² 6.9 - 8.0 Wp/sqft</p>	<p>CLAY</p>  <p>75 - 86 Wp/m² 6.9 - 8.0 Wp/sqft</p>	


* POWER DENSITY - CRYSTALLINE SILICON PV GLASS

FINISHES


GLOSS OR MATT




FRIT PATTERNS



METALLIC HINT



ANTI-SLIP

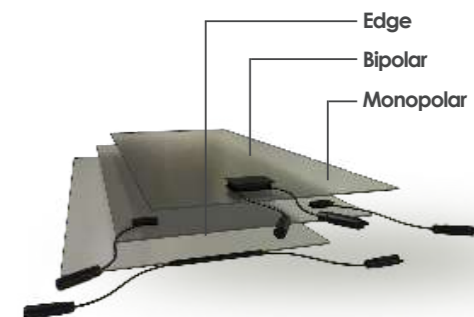



TYPES OF JUNCTION BOX

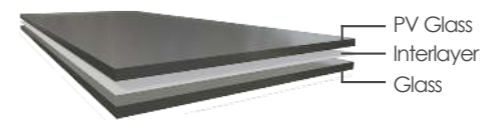
Electrical junction boxes are attached to the PV glass unit, either at the edge of the laminated glass, or in the rear lite of the composition.

Each PV glass is supplied with its own junction box. The junction box can be bipolar or monopolar. The bipolar is the most commonly used for PV glass. The monopolar junction box requires two units per module.

The photovoltaic glass units do not require framing system any different from that of the conventional glass. This allows the adaptability and multi-functionality as to where and how the PV glass is utilized.



THICKNESS



LAMINATED GLASS



THREE-PLY LAMINATED GLASS

SIZE & SHAPE

At Onyx Solar® we are flexible with regard to sizes, shapes and configurations. We personalize the modules, adapting them entirely to the specific requirements of each project. Onyx Solar®'s panes may be as large as 4000 mm x 2000 mm (157" x 79").

The largest photovoltaic glass in the market



OUR PHOTOVOLTAIC GLASS INSTALLATIONS ALLOW COMPANIES TO MEET 10 OUT OF 17 SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY 	2 ZERO HUNGER 	5 GENDER EQUALITY 	7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION 	13 CLIMATE ACTION 	15 LIFE ON LAND

FEASIBILITY STUDIES

Onyx Solar offers feasibility studies free of charge for clients interested in learning more about photovoltaic glass and how it will contribute to their buildings. The feasibility studies include comprehensive information about the product's economic and environmental impact on the project. Information such as product datasheets, specifications, energy output, CO2 emissions prevented, cost, ROI and payback time will be provided. In order to receive a report like this, the client should provide Onyx with just a basic set of drawings and project information.

In order to calculate the ROI and payback time of the project, Onyx Solar takes into account the cost of the PV Glass compared to the cost of that other alternative, conventional glass that would be installed otherwise, plus the cost of the balance of system (electrical installation). On the other hand, it also factors in the value of the energy generated over its lifespan, plus tax credits and incentives that may apply for the project.

ECONOMIC BENEFITS

For instance, the USA provides substantial tax credits and other incentives such as the Modified Accelerated Cost Recovery System (MACRS) which will boost the payback time of the project.

In addition to the incentives offered at Federal level, Onyx Solar provides information on state and local incentives if applicable.

This information is critical for clients and final users to understand the value proposition of photovoltaic glass, since it may be assessed as a multifunctional product that creates a new revenue stream for the owners: clean power for over 30-35 years.



PAYBACK TIME UP TO <1 YEAR



Also, it should be highlighted that investing in photovoltaic glass may be **more profitable** than investing in the stock market.

In the United States, the average return on investment of the Real Estate Investment Trust (REIT) expense 4.1% only, while the companies included in the S&P 500 index have gained a 2% in dividend only.

Given the average IRR that Onyx Solar's PV Glass provides to building owners, this technology represents a **great investment opportunity** in the long run.

COMPANIES DO BETTER WHEN THEY ARE SUSTAINABLE

Dow Jones Sustainability North America Index companies achieved a 20% higher returns than companies of the S&P Global BMI index.

This clean and innovative technology allows building owners improving their corporate image, since they will be perceived as a sustainability-conscious enterprise that cares for the planet. This will positively impact their bottom line and appreciate the **property's value**.

- Improve financial performance.
- Reduce operating costs.
- Improve reputation.
- Improve productivity .
- Improve employee retention environment consciousness.

WHAT DOES GREEN BUILDING MATERIALS CONTRIBUTE TO?

- 5 to 7% building's value increase.
- Occupancy rates increase by 3.5%.
- Rents increase by 3%.
- Improve lease tenancy.

Green building materials integrated into buildings reduce operating and maintenance costs by 8% during the first year and 14% in the fifth year, on average. The savings in HVAC consumption are remarkable.

It is reported that projects seeking LEED certifications or pursuing LEED standards consume 25% less energy and 11% less water than conventional non-ecological construction assets.

Source: World Green Building Council



The **financial performance of solar photovoltaic glass** is impressive compared to the profit offered by traditional rooftop solar panel systems. In fact, in the United States, the average payback period for these solar panel systems is 12.4 years. The return on investment and the internal rate of return (9.4%) is also less than the return generally obtained with photovoltaic solar glass projects.

ENVIRONMENTAL BENEFITS

Our feasibility studies are key to understanding the environmental benefits offered by our photovoltaic glass.



We calculate the amount of energy in **kWh/year** that the system will generate over its lifespan, as well as the CO2 emissions offset.

Along with this information, we will provide you a set of calculations that brings perspective to the value of the kWh produced: miles driven by an electric car with that energy, number of cars off the road, barrels of oil not consumed, and number of light-points fed by the energy generated.

For instance, an installation of **2,500 sqm of PV Glass** in the Netherlands can produce enough energy to feed up to **25,000 light-points** working four hours a day, for thirty-five years, which is remarkable considering the limited solar irradiation in the country.

That same energy would be sufficient to drive seven million kilometers with an electric vehicle, and avoid the consumption of 120,000 liters of fossil fuels.

Amazing, isn't it?



ONE METER ONE TREE

At Onyx Solar, we are proud to fight climate change with our initiative #OneMeterOneTree through which we will plant one tree for every m² of photovoltaic glass that we manufacture.



Our goal is to fight climate change on two decisive fronts:

- ✓ Preventing the emissions of CO₂ into the atmosphere with the installation of energy-generating photovoltaic glass.
- ✓ Capturing existing CO₂ from the atmosphere by planting trees.

We promote carbon capture with the **plantation of thousands and thousands of trees around the planet**, since trees are the most efficient absorption machine created by nature. Every sqm of photovoltaic glass fabricated by Onyx Solar plants a tree. We focus on especially devastated areas

Where the eco-system needs support to recover. **Places such as the Amazon, Indonesia and India are strategic zones for this initiative**, since these trees will not only absorb CO₂ from the atmosphere, but also provide fruits for those ones in need.



This initiative is free of charge for our clients, who will receive an **official tree plantation certificate**, showing the number of trees planted, the type of tree, plantation location, and pictures of the process.

Onyx Solar clients are twice as good for the planet!

APPLICATIONS

PERFECT INTEGRATION



SKYLIGHT



Skylights are an ideal application for photovoltaic glass. They usually count on a good sun exposure, which boost the kWh produced by the system.

Also, photovoltaic skylights **improve thermal indoor comfort**, since most of the UV and IR radiation are filtered out by the Silicon-based material (solar filter effect). In addition, Air and Argon spacers together with low-e coatings guarantee the best thermal performance for the application.

PV skylights combine both active and passive properties that improve the overall efficiency of the application. Semi-transparent PV glass reduces the need for artificial lighting, generates power, and provides thermal and sound insulation. In addition, it helps with delaying interior ageing.

CANOPY



A **photovoltaic canopy** constitutes a constructive solution which **combines energy generation, sun protection and shelter**. Depending on the type of canopy, the electricity yielded can be consumed in different ways: self-consumption for surrounding buildings, courtesy lighting, ad. box illumination, back-up systems, and also grid-connection options are available.

Design configurations are almost unlimited: one, two or multiple slopes, different tilts and orientations, multiple glass design options (silk-screening, ceramic frits, colors...)

PV glass on canopies can be supported using a variety of structural systems, including point-supported systems, U channels and skylight-like structures.

CURTAIN WALL



Curtain walls are a very popular application for photovoltaic glass in buildings. They allow owners to generate electricity from areas of the building they had never thought of. **Buildings become a real power plant, keeping their design appeal, aesthetics, efficiency and functionality.**

Both amorphous Silicon and crystalline Silicon glass can be used for curtain applications, and choosing one or another will depend on your design preferences, energy needs, and daylight requirements.

PV Glass for curtain walls comes frameless, and it can be assembled into any commercial system such as Kawneer, Schuco, OldCastle and others. From a mechanical perspective, the glazing contractor will take care of its installation, then the electrical contractor will interconnect the units (balance of system).

Different light transmittance levels are also an option. A typical curtain wall system can combine semi-transparent PV Glass for the vision areas, together with fully dark glass for the spandrel. Different solar cell technologies can also be combined. This strategy contributes to optimizing the energy yield from the elevation, while maintaining unobstructed views. It is very common to find curtain walls where the vision glass uses amorphous Silicon panels, and the spandrels crystalline Silicon glass.

VENTILATED FAÇADE AND ROOF

TEN ADVANTAGES OF VENTILATED PV FAÇADES

1. Electricity production.
2. Energy saving due to insulation properties (up to 40%).
3. Greater insulation performance.
4. Elimination of thermal bridges.
5. Thermal inner comfort.
6. Reduction of acoustic pollution.
7. Wall and roof protection.
8. Greater energy yield under low irradiation conditions.
9. Greater energy yield under high temperature conditions.
10. Attractive and innovative design.



Contemporary architecture keeps looking into the inclusion of innovative and energy-efficient materials within façade and roof design. Inspired by architectural needs, **Onyx Solar has designed a photovoltaic ventilated façade and roof system which provide undeniable aesthetics, great thermal performance, and a new source of free, clean electricity.**

The electricity generated by the system can be either injected to the grid, or it can be consumed right in the instant that it is generated.

The thermal barrier that they create can result in **energy savings up to 40% of the building's current demand.** Accordingly, both I.R.R. and payback time are unbeatable.

RAISED-ACCES FLOOR TILL FOR EXTERIOR APPLICATION

ANTI SLIP GLASS SURFACE



Onyx Solar has developed the first anti-slip, "walkable" PV roof tile. PV tiles allow building owners to install solar energy in rooftops, while preserving their habitability.

Traditional PV panels occupy a large space of the roof, thus reducing the the area available for amenities in buildings. In order to avoid it, the raised-access **PV floor system will be your fully walkable, anti-slip floor ally to increase the building's value while generating free and clean energy from the sun.**

PV floor tiles can be made both of amorphous Silicon and crystalline Silicon solar cells. They are UL410 compliant and intended for pedestrian traffic only, since they can withstand up to 400 Kg punctual load.

In addition, they come in standard dimensions beginning at **600 mm x 600 mm**, and they can be customized all the way up to **4000 mm x 2000 mm.**

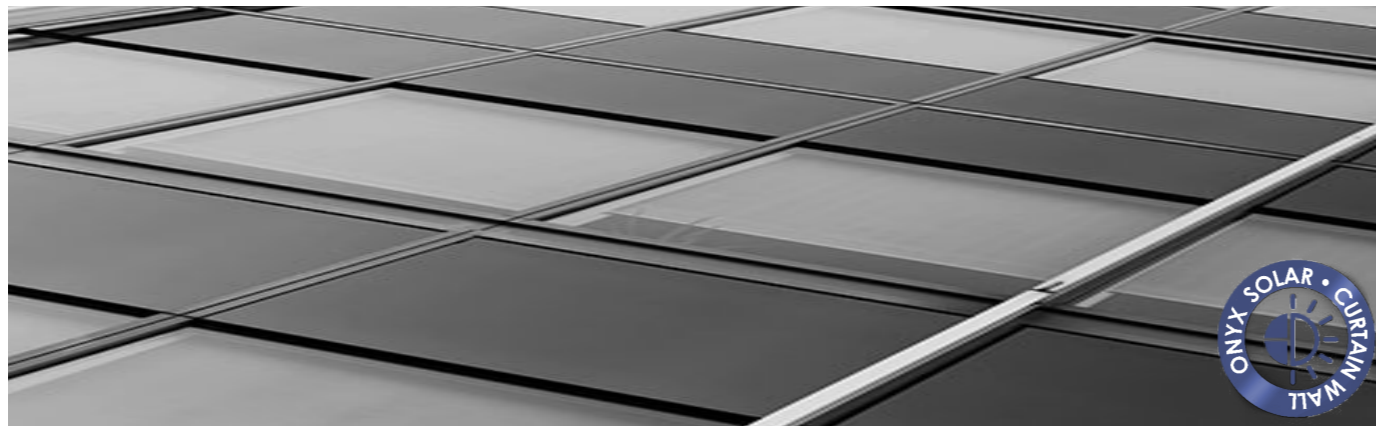
Our photovoltaic glass tiles for raised-access floor systems can be mounted on different systems. PVC and metallic pedestals are very frequently used; however, they can also be mounted on a beautiful IPE wood structure, and aluminium support systems, specially when working with long tile spans.

Finally, photovoltaic tiles can be paired with LED lights / backlit systems to provide courtesy lighting and a great design feature for any rooftop and deck

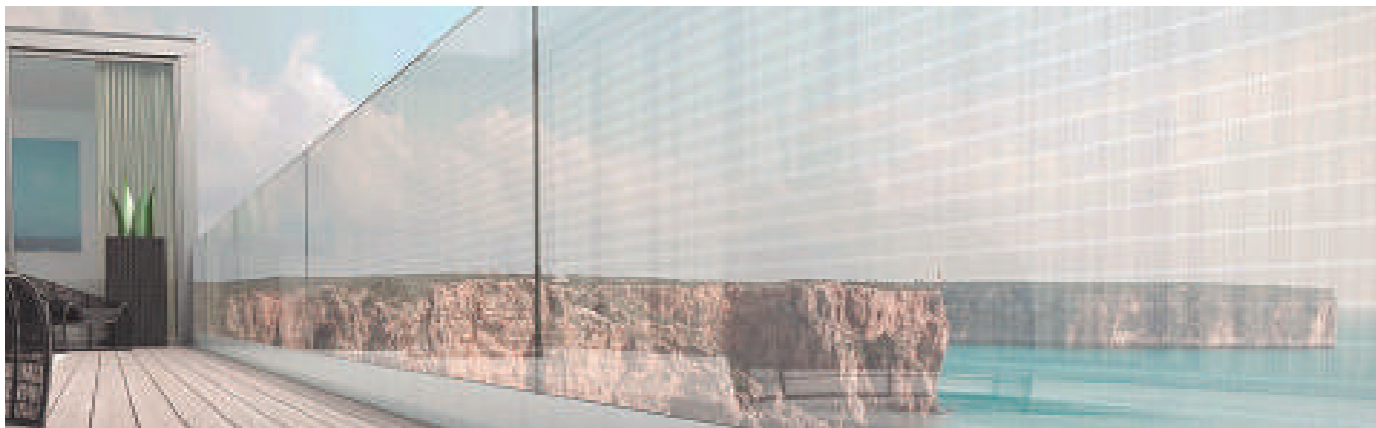
LOUVERS



SPANDREL



BALUSTRADE



Perfect integration into any solution

FURNITURE

Onyx Solar® is a pioneer in the development of a photovoltaic kit to enable outdoor furniture to generate clean, free energy from the sun. In this way, tables, canopies, benches, lamp-posts, floors and other items of outdoor furniture enable the recharging of electronic devices while saving the users' time and money, and preventing the release of CO₂ and other greenhouse gases into the atmosphere.

The photovoltaic kit developed by Onyx Solar® **consists of a photovoltaic glass module plus a micro-station where electricity can be stored.**

This micro-station comes with USB ports where mobile devices can be recharged, such as mobile phones, tablets and laptops. The PV Glass module offered with this kit comes in certain standard dimensions and different light transmittance levels and colors, and they are intended to be integrated into the furniture design, by the furniture manufacturer.





**SELECTED
PROJECTS**

BELL WORKS LABS HEADQUARTERS

PHOTOVOLTAIC SKYLIGHT



General Contractor: Structure Tone
Structural Engineer: LoufsED
Client: Somerset Development New Jersey

As a part of the complete revitalization of the two-million-square-foot former Bell Labs facility into an iconic mixed-use metroburbs located in Holmdel, N.J., Onyx Solar supplied Bell Works with **5,575m² (60,000 SqFt)** of amorphous silicon photovoltaic glass, to install the **largest-of-its-kind photovoltaic skylight in the USA.**

The PV skylight both naturally illuminates the complex while it generates free, clean electricity from the sun. It currently offsets approx. 60 tons of annual CO₂ emissions, drastically improving the building's energy efficiency and reducing its carbon footprint. As an example, the annual energy generated provides enough power for 100 electric vehicles to drive 6,840 Km per year.

Utilizing state-of-the-art technology, Bell Work's skylight features **24 different type of glass modules** from Onyx Solar to cover the multiple skylight opening of Eero Saarinen-designed architectural gem. Each glass panel will be comprised of amorphous silicon thin film photovoltaic (a-Si PV) active glass, laminated between two sheets of tempered glass. The **PV Glass offers a 20% light transmittance level (LT) and a great solar heat gain coefficient, allowing the building to offset HVAC needs while preserving its unique design.**

"At Onyx Solar we feel that we are giving back to a building that has witnessed the discovery of so many innovations, including the solar cell. Ralph and his team are taking on a great mission with Bell Works; congratulations on the efforts," said Diego Cuevas, Onyx's VP Business Development.



“Bell Works is already home to an extraordinary community of innovators, and it's our job to continue to innovate the building commensurately. People want a workplace that extends itself beyond professional needs one that stands for something beyond the cubicle walls. As Bell Works continues to attract some of the region's most forward-thinking companies, it is only fitting that it incorporates the latest in sustainable technology, all in a way that is both functional and attractive.”

Ralph Zucker, President of Somerset Development of Bell Works.

Originally constructed between 1962 and 1982, the building is revered for its role in spurring the development of some of the world's foremost inventions and research concepts, including the first practical solar cell. Furthermore, it was home to seven Nobel Prize award winners, among others.

Today, Somerset Development is transforming the building into a mixed-use 'metroburbs,' complete with offices, retail, dining, healthcare, recreation, and hospitality, and it is set to become a world-class center for entrepreneurship and innovation.



 Bell Works



TANJONG PAGAR

PHOTOVOLTAIC CANOPY

Located in the midst of Singapore's financial centre, **this 64-storey tower is the tallest building in the country**. Designed by **SOM**, the New York-based architecture firm, its construction was realised by the Korean multi-national company Samsung.

Onyx Solar® took part in this project with the integration of a large photovoltaic canopy spanning over **2,600 m² (28,000 SqFt)**. It was installed at the main building's entrance and its capacity is **125 kWp DC**. The project required a **total of 858 units of amorphous Silicon PV Glass with a 10% LT**, and each glass measured **2,456 mm x 1,245 mm (8.05 x 4.08 Ft)**. The installation produces approx. **125,810 kWh/year**, which feeds over 7,000 light-points in the building.

The integration of photovoltaic glass on this canopy project contributed to its **Greenmark** and the **Platinum LEED certifications**. Furthermore, the building received a **WAN AWARD** in the "Future Projects" category.



"At SOM we are committed to excellence, which translates to high-value innovative designs. We have the opportunity to influence positively the fundamental problems currently facing humanity. Promoting renewable energy and increasing the levels of energetic efficiency, at SOM we are able to collaborate effectively with diverse solutions in the struggle against climate change".

"We believe that sustainability inspires great architectural works. New, spectacular designs are emerging which have a minimal impact on the environment".



Best of What's New 2015

Onyx Solar®'s glass has been rewarded by the centenarian scientific dissemination journal Popular Science as the **Most Innovative Product of the year**, together with Tesla's Powerball batteries.



SOM

SOM is the architecture firm entrusted with the design of the Tanjong Pagar.

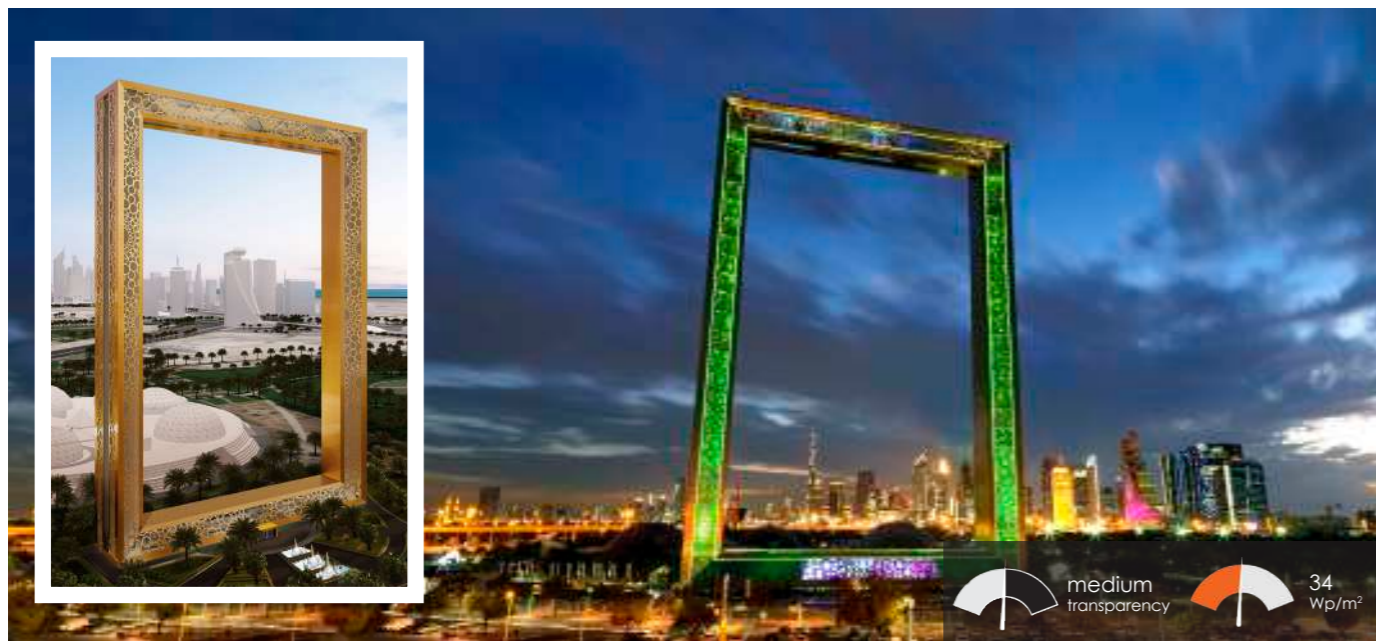
Located in the midst of Wall Street, SOM has designed buildings as prominent as the **Burj Khalifa** in Dubai, which at 828 metres (2,717 Ft) is currently the tallest building in the world, or the **One World Trade Center** in New York.

Over 15,000 buildings located in 50 countries bear witness to the awesome experience of this emblematic architecture studio.

General contractor: Samsung
Architect: SOM
Client: Tanjong Pagar

DUBAI FRAME

PHOTOVOLTAIC FAÇADE



The **Dubai Frame** is an impressive rectangular frame-shaped building, **150 meters tall (492 Ft) and 105 meters wide (344 Ft)**, located in the Zabeel Park in Dubai. Its strategic location provides to over 2 million visitors with spectacular views of the city's architectural jewels, framed on the horizon. It was considered one of the world's new attractions in 2015, and one of the most original skyscrapers ever.

Onyx Solar® participated in this project through the integration of **1,200 sqm (12,916 SqFt)** of **amorphous Silicon PV glass** into the building's facade. The project required approx. **2,500 PV glass panels** with dimensions **485 x 985 mm (1.6 x 3.23 Ft)**; the PV glass is a laminated, safety product with a yellow/gold finish, and a **20% see-through degree**. The total system size is **38 kWp DC**, which allows the building to offset a portion of its energy demand with clean, free energy from the sun.

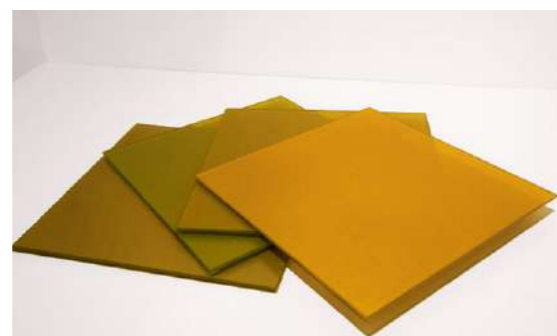
The PV Glass installed on this job represents a great example of flexibility in design, offering the client the color of their choice, and respecting the original design intent.

The amorphous Silicon product filters out UV and IR radiation while providing thermal comfort inside the building.

ONYX SOLAR®

“*The choice of using photovoltaic glass, which produces clean energy from the sun, is witness to a change of attitude in the government and to Dubai's approach to sustainability*”.

Abdullah Raffia, Dubai government engineering and planning.



Onyx Solar® has developed a new generation of coloured semi-transparent photovoltaic glass, encompassing a wide spectrum of shades, while maintaining the same efficiency as colourless photovoltaic glass.

Dubai Frame: 1st prize, ThyssenKrupp Elevator Architecture Award 2009.

“*The Dubai Frame features a sustainable structure, simple to build and maintain, and with incomparable aesthetic value. Dubai is a city replete with emblematic buildings, so instead of adding one more, we set ourselves the task of framing them*”.

Fernando Donis, Dubai Frame architect.

General Contractor: Al Rostamani
Architect: Fernando Donis
Client: Dubai Municipality

GIOIA 22

PHOTOVOLTAIC FAÇADE

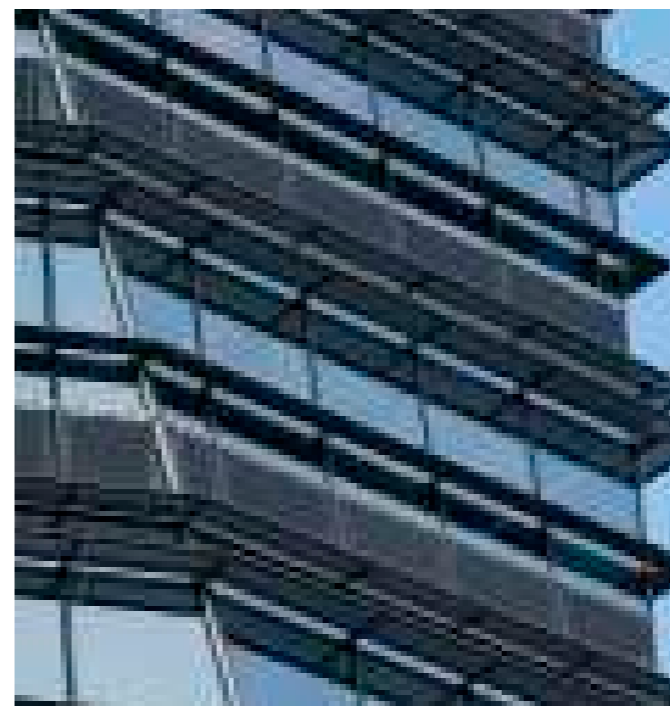

 PERMASTEELISA GROUP

Gioia 22 is a new, landmark office tower developed by COIMA and designed by international architectural firm Pelli Clark & Partners.

The building has become **one of the most iconic skyscrapers in Italy** and a **world benchmark** in terms of **energy efficiency**, thanks to its innovative design that incorporates unprecedented standards of technological innovation and environmental sustainability, such as **Onyx Solar's Photovoltaic Glass**.

Permateelisa Group partnered with **Onyx Solar** to develop the **Photovoltaic Façade** for this building, spanning 26 floors above ground and topping out at 120 meters. It is located in the heart of Porta Nuova Garibaldi, in Milan.

The **crystalline Silicon photovoltaic glass** fabricated by Onyx Solar was installed across the spandrel areas of the building, which account for **780 kWp DC**. This installation will generate much more power than what the building would have generated on the roof, since the area available for solar energy is much larger.



The PV spandrel glass totals 5,000 sqm and it is comprised of 2,000 individual units.

Gioia 22 is the **first building** of its kind designed and constructed according to **Near Zero Energy Building standards (NZEB)**.

The skyscraper, which **produces 65% of its energy needs** from renewable energy sources, aims to obtain **LEED Platinum® certification**.



“

“The original shape of the Gioia 22 tower is the result of the confluence of two urban fabrics, and at the same time the response to the need to optimize light and solar energy. The combination of these two factors has resulted in the singularity of a dynamic form capable of authentically expressing its particular placement within the Milan skyline”.

Gregg Jones, Design Principal-in-Charge for GIOIA 22 (Pelli Clarke Pelli Architects).



BEIT HAVERED

PHOTOVOLTAIC FAÇADE



Owner: Amot Investments
 Architect: Sasaki Associates
 Installer: Aluminum Construction

Onyx Solar has supplied its **new and innovative crystalline silicon photovoltaic glass with white digital printing** that has been installed as a photovoltaic façade in the Beit Havered building, located in **Givatayim**, which is part of the metropolitan area of **Tel Aviv, Israel**.

For this project, our new "Hidden PV" glass was installed as a cladding system in the façade of the building. This glass includes **solar cells hidden inside of its surface**. It has a clear appearance where solar cells are not visible at all, that is the reason why we call it "Hidden PV". We can produce it in 17 different colors, even white.

The installation has **608 m² (6,544 sqFt)** and is composed of **242 units of crystalline silicon photovoltaic glass** with several dimensions. Each glass has a **4T + 6T mm** thickness and includes a white digital printing that gives it its white appearance.



Beit Havered is a 6-story commercial and office building, with an area of 17,500 m² fully leased to Telephone. The building was totally refurbished to become **net zero energy** and to generate the energy it consumes. The building is renovated in accordance with the **LEED Platinum standards**.

The building is intended to become **the tallest building in the world that is zero-rated in terms of energy**.

This project is an excellent example of the capacity of our company to develop new and unique innovations for our customers, such as the new range of colored photovoltaic glass. The next generation of photovoltaic technologies incorporates a white material that attracts sunlight and increases the electricity generated, and without any doubt it is the present & future of sustainable buildings.



SCIENCE PYRAMID BUILDING

HEXAGONAL PHOTOVOLTAIC GLASS



The Science Pyramid, located in the Denver Botanic Gardens, is a pyramid-shaped building. Here, Onyx Solar® has integrated hexagonal crystalline silicon photovoltaic glass modules with a 100% custom-made design.

This pyramid shows visitors the principal ecosystems of Colorado and explores similar environments around the world. The illumination and vibrations within the pyramid are determined by the current weather conditions.



“ It has been great to work with Onyx Solar®. It was the only company capable of making the hexagonal photovoltaic glass we needed and of helping us with the design”.

Adam Tormohlen, Project Manager at GH Phipps.



ENR REGIONAL BEST 2015 PROJECTS
Engineering News-Record



Brian Vogt

Brian Vogt, CEO, Denver Botanic Gardens

“The pyramid’s façade features photovoltaic glass, which generates clean, free energy from the sun. This is perfect for two of our fundamental values: sustainability and transformation. We wanted to include photovoltaic glass efficiently, and at the same time attractively, and the result has been absolutely amazing”.

Diego Cuevas

Diego Cuevas – Business Development VP at Onyx Solar®

“At Onyx Solar® we are fascinated by projects which represent a challenge. They give us the opportunity to design and manufacture unique photovoltaic glass items”.

“The design and construction work executed have set these Botanic Gardens at the forefront of the most innovative gardens to visit in the country”.



William P. Babbington

Will Babbington – AIA, PE | Façade Performance Design Director at Studio NYL

“The fascination and appeal of Onyx Solar®’s photovoltaic solutions is generally due to their ability to perform three main functions: - Environmental resistance; they can withstand damp and UV rays; - Renewable energy / Energetic balance, the key goal for using photovoltaic technology in buildings; - Aesthetics; the façade is the face, the appearance, and the eyes of the building’s soul”.

Barton Harris

Barton Harris, Project Manager at Burkett Design

“So as to completely integrate the photovoltaic modules in the aesthetics of the ventilated façade, not only was the colour of the glass carefully chosen to match the colour of the surrounding modules, but its surface was coated with a similar sheen”.



DEWA R&D CENTRE

PHOTOVOLTAIC FAÇADE

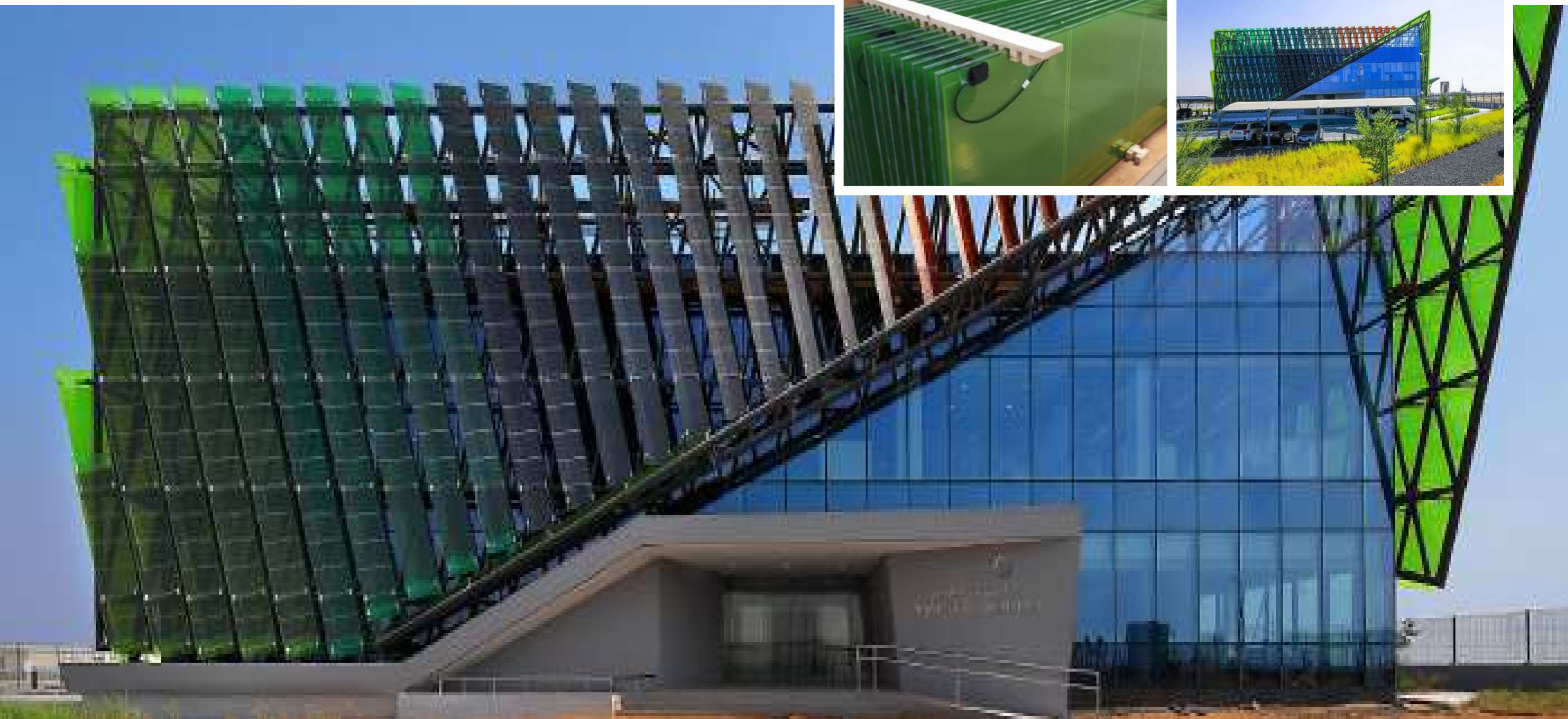
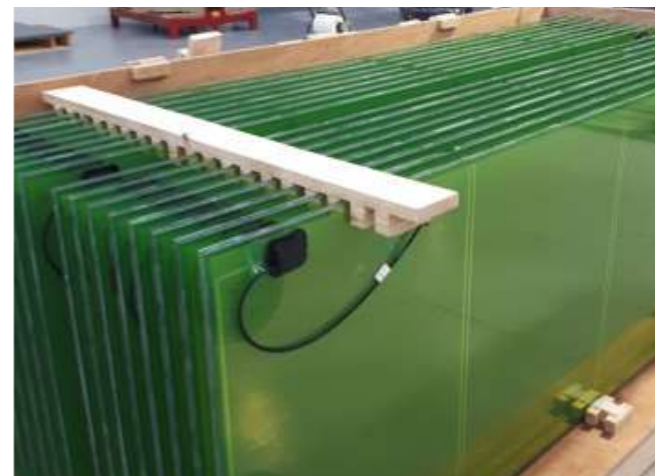
Onyx Solar® participated in the construction of the Dubai Energy and Water Authority's (DEWA) R&D Centre in Dubai, with the supply of 1,000 m² (10,764 sqFt) of semi-transparent colored photovoltaic glass.

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority



The four building building elevations incorporated photovoltaic glass as a louver-like system; amorphous Silicon solar cells with a high-transparency level and **multiple colors were chosen to create a unique**, sustainable and colorful envelope for the client. The main entrance canopies do also include photovoltaic glass to complete the entire envelope.

This project is a great example of DEWA's commitment to sustainability. The Dubai Electricity and Water Authority is a public entity whose objective is to provide adequate and sustainable supply of electricity and water to Dubai's population. DEWA also focuses on the promoting of energy efficiency and the use of renewable energy in the United Arab Emirates.



NOVARTIS CAMPUS IN NEW JERSEY

PHOTOVOLTAIC SKYLIGHT



General Contractor: Turner Construction
 Architect: Rafael Vinoly
 Client: Novartis Pharmaceutical

medium transparency 340 Wp

This innovative photovoltaic skylight, measuring **2,500 m² (26,900 SqFt)**, was installed by way of a second skin at the new headquarters of the **Novartis** Pharmaceutical Company in New Jersey, USA.

The skylight is comprised of **820** photovoltaic glass panel that measure **1,511 x 1,931 mm (4.95 x 6.33 Ft) on average**. Each one offers a power capacity of +/- **340 Wp**.

The PV glass was manufactured using **perforated crystalline Silicon solar** cells, which enable natural light inside the building. The skylight opens and closes for maintenance purposes.

The total system size is 295 kWp DC and it produces about **273,000 kWh** per year. This would feed, over **600 homes** yearly, and prevent the emission of nearly 185 tons of CO2 into the atmosphere.

Novartis, with over 120,000 employees, is a role-model corporation in sustainability worldwide, it holds a leading position among pharmaceutical companies in the Dow Jones European and World Sustainability Indexes.



“ Building awarded the title of **Best Sustainable Project in New York in 2014 by the most significant construction magazine worldwide, Engineering News-Record (ENR), of the McGraw Hill and Standard & Poor’s group**”.



Turner: construction, leadership and safety.

The influential magazine Engineering News Record (ENR) has once again awarded the U.S. company Turner Construction first place in the ranking of American general contractors due to its sales volume within the country.

In addition to the excellence of its work, Turner stands out due to its commitment to safety, having received the award for excellence in this field.

“The role played by Turner throughout the project has been decisive for its success, ensuring high-quality work, coordinating the many teams and being at the forefront of communications between all the parties”, says Teodosio del Caño, Chief Technical Officer of Onyx Solar®.

MIAMI HEAT STADIUM

PHOTOVOLTAIC SKYLIGHT



General Contractor: Skanska
Architect: DLR Group
Client: NRG



The new eastern entrance of the FTX Arena features an impressive 30,000 SqFt canopy that incorporate **14 circular skylights** made with **crystalline Silicon PV Glass** from Onyx Solar. It is called the Xfinity plaza and creates a unique amusement space for all fans to enjoy.

A total of **300 photovoltaic glass panels** were manufactured for this project, which produce approx. **34,500 kWh/year** and prevent the emission of **20 tons of CO2** into the atmosphere.

The arena became the first sports and entertainment center in achieving **LEED Gold Recertification**.



SKANSKA



“The HEAT group is proud to be a leader in the sustainability movement, both in our industry and in our beloved city”.

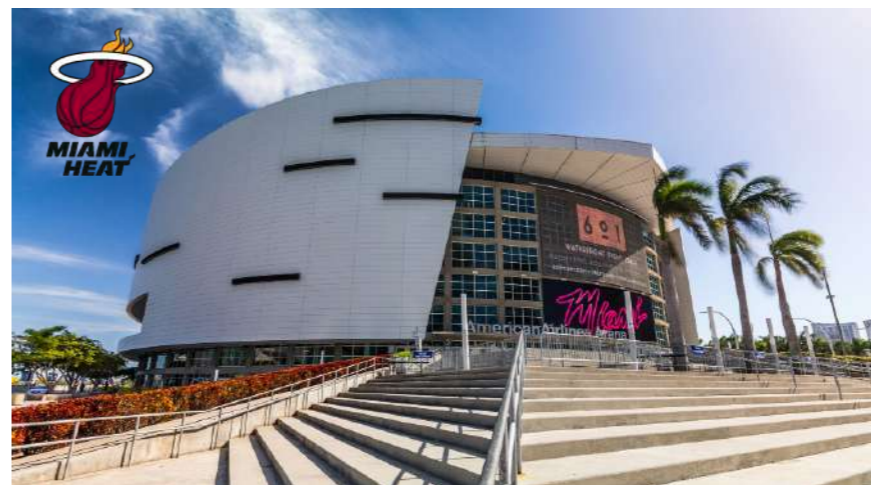
Eric Woolworth, HEAT Group Business Operations President

“Achieving the LEED Gold is a fantastic climax to our efforts over the last five years to act in an environmentally responsible manner, which has a positive effect on our community and on our planet”, Eric adds.



UP TO 6 LEED POINTS FOR IN-HOUSE RENEWABLE ENERGY GENERATION

In order to reduce the environmental and economic impact associated with the use of fossil fuels, the LEED certification system offers up to 6 points for the in-house generation of 12% of renewable energy.



On-site renewable energy generation	Points
3%	1
4.5%	2
6%	3
7.5%	4
9%	5
12%	6

MCDONALD'S FLAGSHIP RESTAURANT

PHOTOVOLTAIC SKYLIGHT



Architect: Ross Barney Architects
 Glazing Contractor: SuperSky
 Electrical Contractor: American Helios
 Client: McDonalds

McDonald's has just unveiled its Global Flagship located on the West side of Disney's Themed Park at Buena Vista Drive, Orlando, Florida. The opening of this restaurant shows the company's firm commitment to sustainability and energy efficiency, since it became the first Zero-Energy Building for McDonald's in the country.

Onyx Solar supplied crystalline Silicon, laminated safety glass for this lanai application, which allows clients to enjoy the dining experience outdoors. It provides good shade and thermal comfort, while maintaining a connection with the sky thanks to the solar cell density selected by the client. Inside the restaurant, LCD displays address all the environmental and sustainability features incorporated into the building, as a way to educate future generations.

Solar energy plays a key role in the pursuit of this goal since the restaurant installed 1,765 m² (19,000 SqFt) of traditional solar panels on the roof and drive-thru canopy; and **465 m² (5,000 Sqft)** of photovoltaic glass units on the outdoor porch skylights. These allow for the building to produce 679,000 kWh/year combined.

However, these are not the only sustainability and energy-efficient measures deployed. Ross Barney Architects designed the building to be naturally ventilated, and its windows operate with sensors that make them close automatically when air conditioning is required. Also, an impressive lush garden wall featuring their corporate logo helps absorb additional CO₂.



Clearly, this is the way to go moving forward, as McDonald's plans to prevent 150 million metric Tons of CO₂ emissions by 2030, following its Science Based Target Initiative to reduce greenhouse gas emissions, which launched in 2018.

Onyx Solar designed and manufactured the PV Glass panels installed on the outdoor porch. They are made of two layers of 1/4" fully tempered glass, where the interior lite comes in a light grey color. The average light transmittance achieved is 36%, which boosts the indoor-outdoor connection by letting additional light into the porch dining area.

This is an installation of 192 units of 291 Watt/unit crystalline silicon glass with a gray finish, which means a total installed power of 55.80 kWp. Each unit contains 66 mono-crystalline Silicon solar cells embedded in the glass. It measures **2,057 x 1,117 mm (6.8 x 3.8 Ft)** and it is UL1703 listed.



I&M BANK

PHOTOVOLTAIC SKYLIGHT



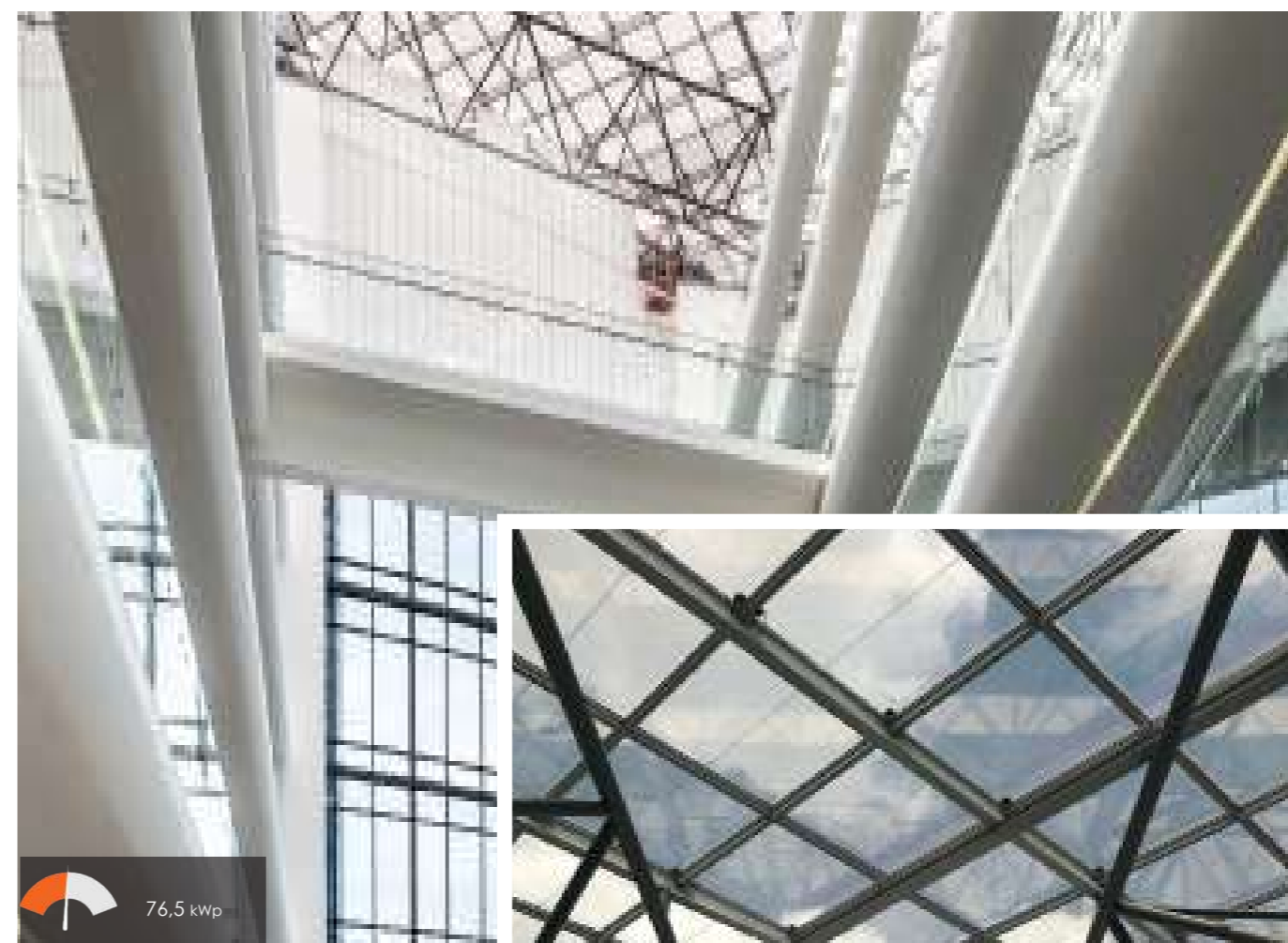
Final client: I&M Realty Limited
 Architect: Planning Systems Services
 Constructor: Betts Townsend Taylor
 Structural Engineering: Bell Associates
 Façade: Sutherland

The largest photovoltaic skylight in Africa is already a reality. It is part of the new I&M Bank headquarters in Nairobi, Kenya.

It is comprised of **2,200 m² (23,680 sqft)** of amorphous Silicon photovoltaic glass with different degrees of transparency (low and medium transparency) and several dimensions to meet the project's design requirements.

The PV skylight acts as a watertight enclosure plus as a solar collector; it is estimated that it will generate approx. **3,342,503 kWh** of clean energy for 35 years. This will be enough energy to illuminate **6,558 light points** working 4 hours a day during 35 years.

The nominal power installed reaches **76.5 kWp**, and the annual clean energy production will help offsetting 85 tons of CO₂ emissions per year.



76,5 kWp



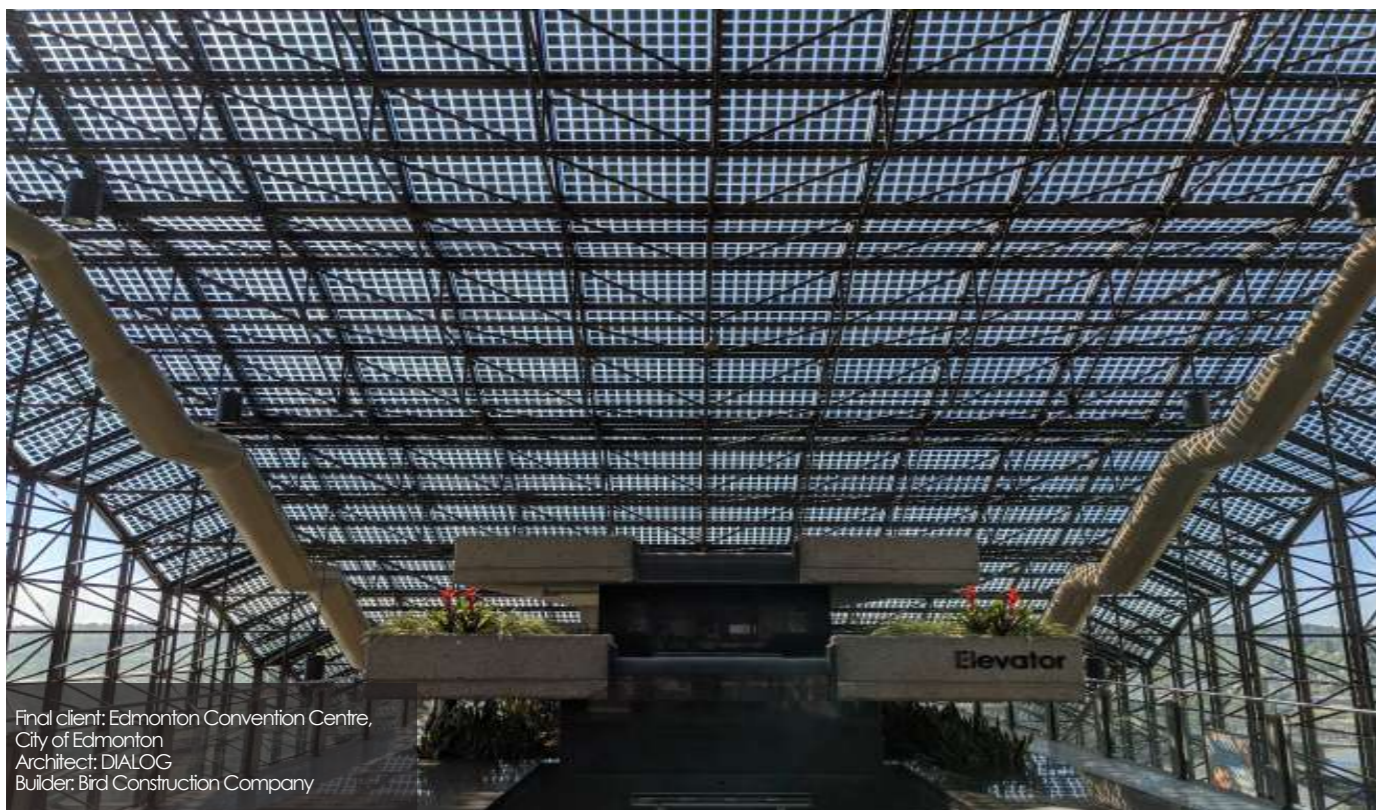
“

We have a huge skylight... basically, this is a glass roof. . In this case, it (solar power harnessing technology) is embedded in the skylight, so you still get the full clarity, you can see the sky; but at the same time, it is generating power for you so it is called Building Integrated Photovoltaic glass roof ”.

Shameer Patel, General Manager of Strategy and Transformation at I&M Bank.

EDMONTON CONVENTION CENTER

PHOTOVOLTAIC SKYLIGHT



Final client: Edmonton Convention Centre,
City of Edmonton
Architect: DIALOG
Builder: Bird Construction Company

The city of Edmonton, one of the most forward-thinking on sustainable practices locations in Canada, moved forward with the rehabilitation of the Edmonton's Conference Center, which was due for a major renovation.

Onyx Solar supplied the city with crystalline Silicon, laminated insulating photovoltaic glass units, to replace the entire existing atrium, which had insulation issues due to conventional aging of the existing glass.

The project was complex in its execution, since the make-up of the PV Glass had to be engineered to fit the existing metal structure and accommodate over 125 different types of glass, with different dimensions, shapes, and cell layout. This upgrade allows the building to produce approx.. 227,000 kWh/year, which drastically reduces the O&M costs for the city, together with the improved thermal insulation.

The successful delivery of the project demanded a perfect coordination between the architectural team (Dialog Design), the PV consultant (Gordon Howell), the mechanical installer (Flynn Group of Companies), the electrical installer (Kuby

Renewable Energy), BIRD Construction as the GC and Onyx Solar. Several in-person meetings took place in Edmonton to ease the project kick-off and guarantee a perfect communication between all trades.

The lower end of the atrium features the so-called OCULUS, a large circular area that displays a poem in morse code. The poem verses are formed by the solar cells layout, which was carefully designed to comply with the 1% Arts Program of the City. The author of the poem is Canadian laureated poet E.D. Blodgett, and it reads the following:

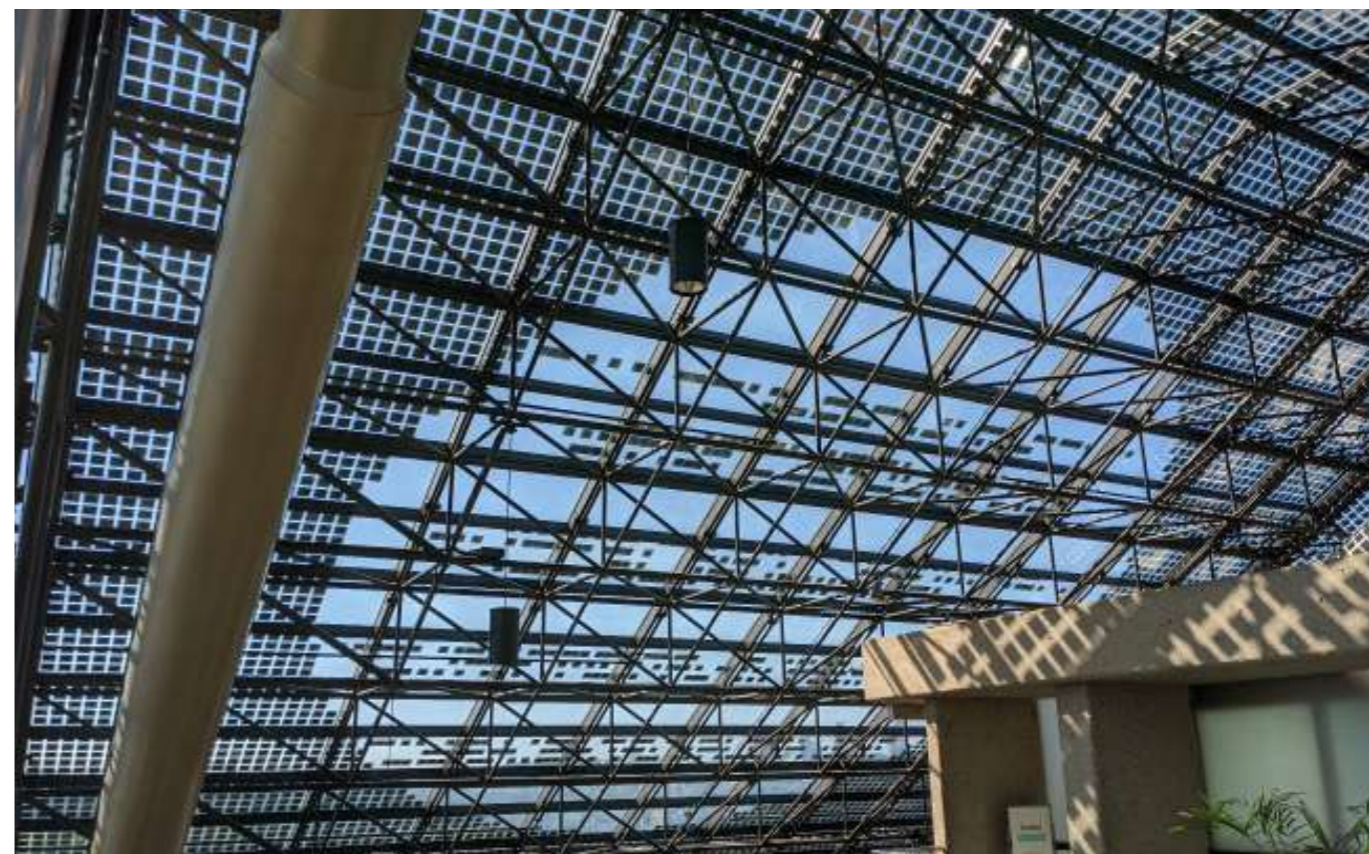
"Beginnings just appear so like a drowsy eye.

Suddenly awake where a river wells up

Uncoiling from the ice where snug beside the land

It lay dreaming at our feet in quiet sleep."

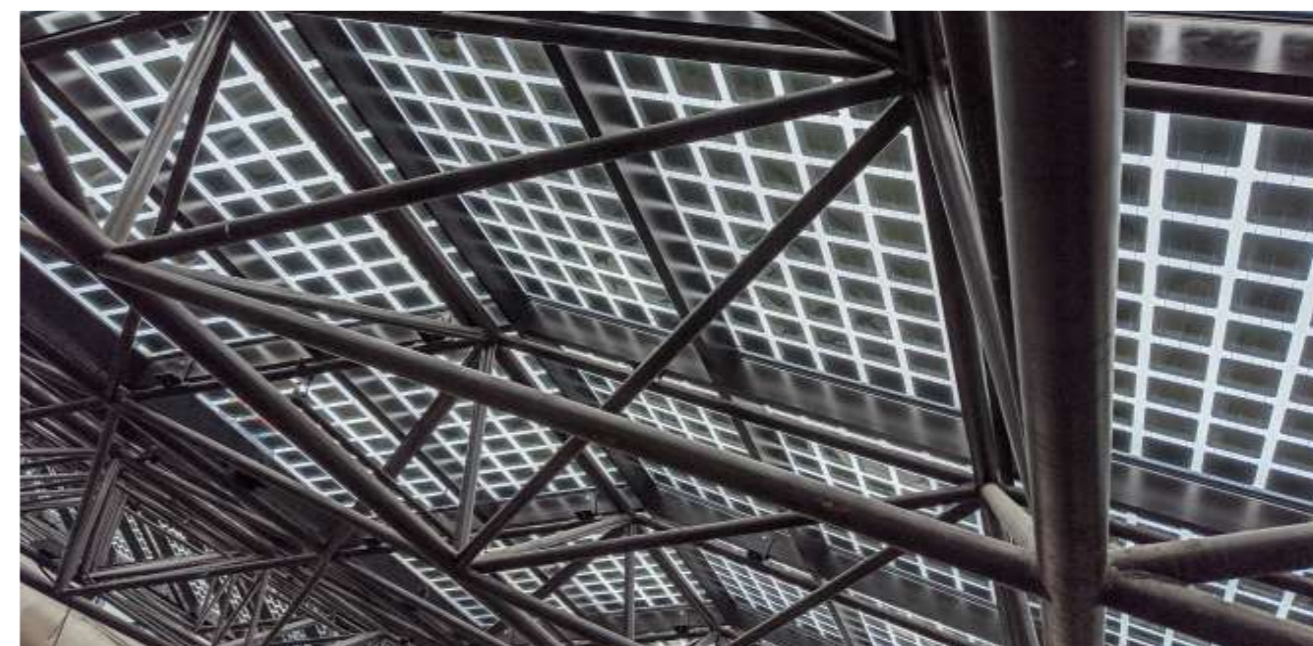
The poem is legible from left to right from insidewithin the atrium, but the visual appeal extends outside and across the valley.



Not only does the installation help position Edmonton as an attractive destination for sustainable events, it encouraged us, our clients and our guests to set loftier goals that support the future of our industry and environment"

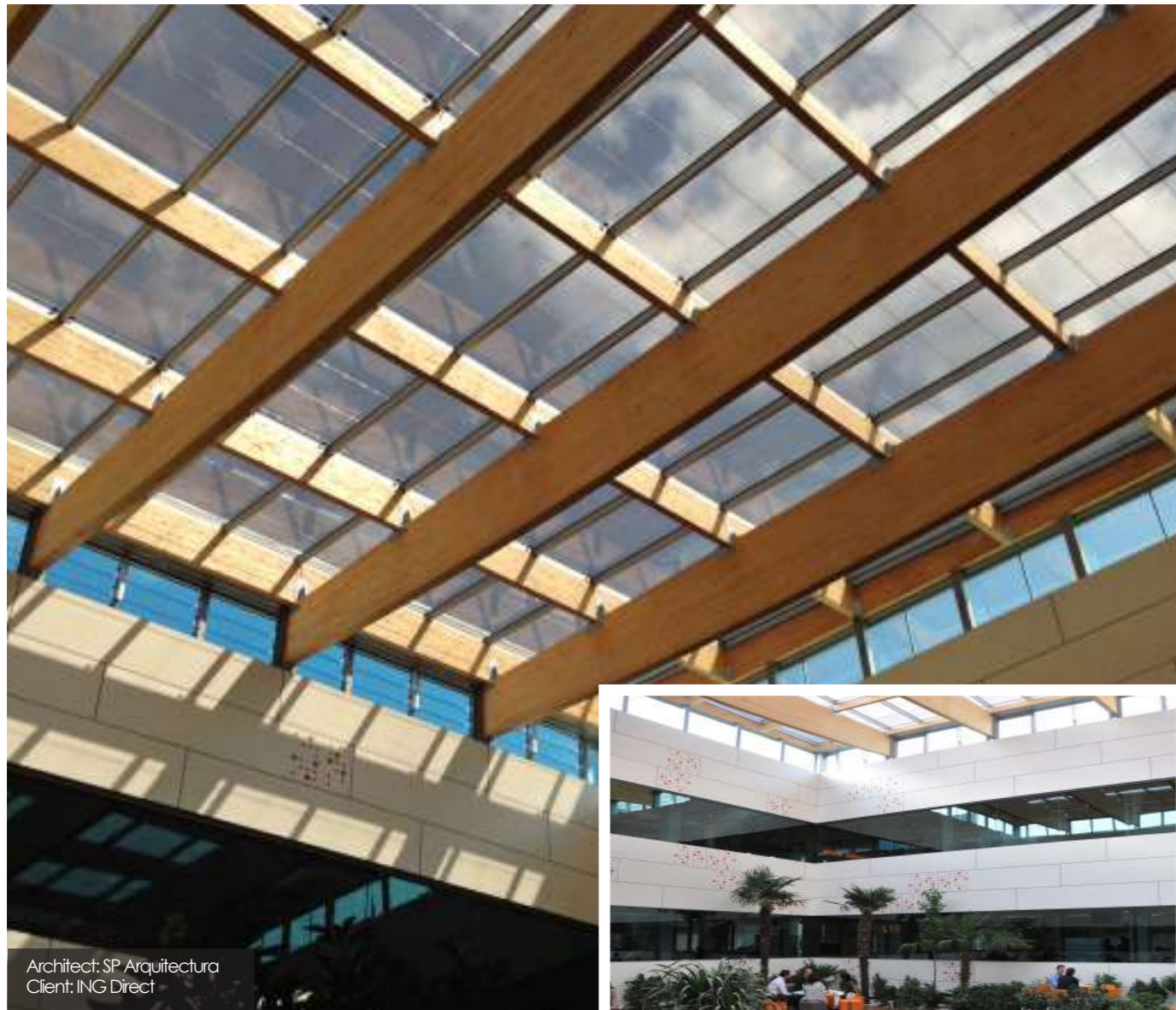
Melissa Radu, Sustainability Manager of the Edmonton Convention Centre.

The City of Edmonton and its Mayor, Don Iveson, are members and leaders of one of the leaders of the **Global Covenant of Mayors for Climate & Energy**, a global coalition of municipal pioneers committed to fight climate change. All member Mayors acknowledge the importance of decreasing CO₂ emissions in their respective cities, and encourage the incorporation of innovative technologies and solutions to decrease greenhouse glass emissions. More than 10,000 cities from 60 countries around the world have committed to the Pact, representing 320 million people.



ING DIRECT BANK

PHOTOVOLTAIC SKYLIGHT



ING, the largest online bank in the world, pledged their commitment to Onyx Solar®'s technology with the integration of a photovoltaic glass skylight in the central garden of their headquarters in Las Rozas, Madrid.

The skylight, with a surface area of over **200 m² (2,152 SqFt)**, is comprised of 78 amorphous silicon glass modules with a **semi-transparency degree of 20%** and dimensions of **2,560 x 1,176 mm (8,4 x 3.85 Ft)**.

This skylight has a power capacity of **7 kWp** and is capable of generating nearly **13,000 kWh** of clean, free energy yearly, thus preventing the release of almost 9 tons of CO₂ into the atmosphere while supplying over 700 lights throughout the building.

Besides energy generation, the PV Glass units filter up to **99% of ultraviolet radiation and 95% of infrared light**. Also, they offer a very good solar factor, which promotes natural light while preventing heat transfer. **Onyx Solar's average SHGC ranges from 20% to 40%**, depending on the transparency of the product.



“With the photovoltaic glass modules in the skylight, we managed to exploit all the energetic potential of this area, while providing our garden with a pleasant atmosphere”.
“This project represents our firm commitment to both the natural environment and sustainability. We get important energy savings, use our resources responsibly, and promote sustainable architecture through innovation in design”.

Juan Carlos Castillo, ING Bank General Services and Security Director.



UNIVERSITY OF VALLADOLID LUCIA BUILDING

PHOTOVOLTAIC SKYLIGHT AND CURTAIN WALL



General Contractor: UTE San Jose - CYM Yañez
Architect: Francisco Valbuena
Client: Valladolid University

The LUCIA building, a University of Valladolid Applied Research Center, became the **most sustainable building in Europe and in all the northern hemisphere** back in 2015 thanks to its energy-efficient design and architectural composition.

The building features two photovoltaic atriums made of amorphous Silicon photovoltaic glass, as well as a curtain wall area with the same technology. The PV Glass is a laminated, insulating product with a low-e coating and an argon spacer to improve the thermal performance of the building. It generates 5,550 kWh/year and prevents the emission of 3.7 tons of CO₂/year.

LUCIA stands out as a paradigm of energy efficiency and sustainable architecture, since it **saves up to 60% of the building's energy demand**. For this reason it achieved the LEED Platinum Certificate, with 98 points, plus 5 leaves in Green Certification, the 2015 ENERAGEN Award and the third Mediterranean Sustainable Architecture category prize, among others.

“The LUCIA building has been declared the most sustainable building in the northern hemisphere and the second worldwide, according to the LEED Platinum certification”



Onyx™ has been a preferential technological partner in the development of the project, executing a highly innovative solution in the form of photovoltaic skylights, highly attractive systems from the point of view of sustainable construction and LEED certification”.

Francisco Valbuena, Valladolid University Technical Architecture Unit Director.



The LUCIA building is devoted to laboratories and research centres. The strategies employed are based on a painstaking architectural bioclimatic design; the use of renewable energy throughout (biomass, solar photovoltaic and geothermal-intensive), criteria for the reduction of power requirements, special attention to other matters such as water treatment, vegetation and waste management, and with a particular focus on social aspects. The building has achieved excellent financial results, and optimal results in energy saving and zero CO₂.



SAN ANTON MARKET

PHOTOVOLTAIC SKYLIGHT



Whenever you visit Madrid, you should stop by San Anton Market to taste Spanish fresh "tapas and drinks". While enjoying your time there, please look up the skylight to see a beautifully integrated **amorphous Silicon photovoltaic glass**; if no one tells you, you would probably think that's a conventional glass, since it looks like it.

However, this skylight that integrates **168 sqm (1,808 SqFt)** of PV Glass generates up to **7,700 kWh/year**, helping the market address their electricity bills better. **It also promotes natural light inside the building and thermal indoor comfort**, which is key for customer retention and farmers/vendors wellbeing.

Amorphous Silicon PV Glass **filters 99% UV radiation and 95% IR radiation**, which makes it an ideal product for applications like overhead enclosures providing shelter to visitors at all times.

The building, which prevents the emission of **5 tons of CO2 per year** thanks to this installation, was named a reference project in sustainability by the European Commission.

OFFICIAL PARTNER OF THE EUROPEAN COMMISSION 2010



Onyx Solar® was selected as an Official Partner of the European Commission for "Sustainable Power for Europe" for the installation of the photovoltaic skylight at the San Anton Market.

Official Partner

MALAGA'S PORT AUTHORITY

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has provided supplied crystalline Silicon photovoltaic glass to Malaga's Port Authority, to create unique Photovoltaic Skylight that would set a precedent in sustainable architecture for Malaga's public infrastructure.

The installation counts on **200 Sqm** of PV Glass totaling 20 kWp.

Onyx Solar fully customized the product to fit the complex skylight take-off; this service is extremely important when dealing with renovation projects, where the PV Glass needs to fit within an existing support system. No matter if your project requires rectangular, triangular and any other trapezoidal unit, Onyx Solar can fabricate fully functional units that will meet your project needs.

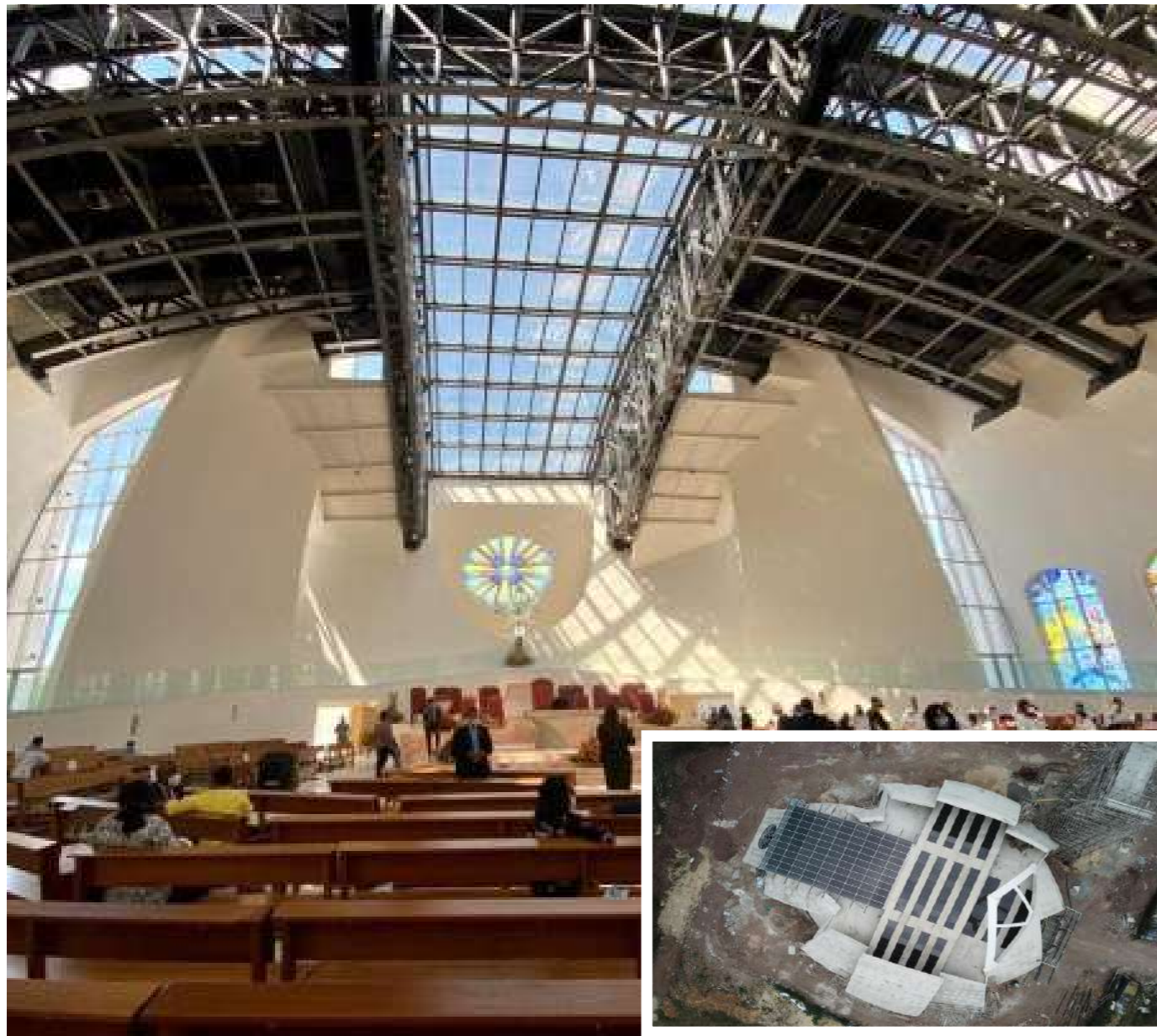


This project required nine different types of glass, ranging from **2,580x920 mm** to **2,700x1,320 mm**. The triangular units glasses are measure **1,251x1,256 mm (base-height)**.

The PV Glass was fabricated with a medium solar cell density, spreading out the solar cells to allow natural light passing through the glass.

BAYAGUANA BASILICA

PHOTOVOLTAIC SKYLIGHT



The Sanctuary Cristo de Los Milagros in Bayaguana is a work conceived for the Christian pilgrimage and attraction to the Monte Plata province.



This new construction incorporates a large photovoltaic skylight made of amorphous Silicon photovoltaic glass, which helps the Basilica decreasing its O&M costs thanks to the energy generated and the controlled natural light that enters the Basilica; it features a Holy Cross shape.

It is a modern, contemporary design whose structure was engineered to withstand earthquakes and other natural phenomena.

The Sanctuary serves as a Temple for pilgrims and parishioners to pray to the Holy Christ of the Miracles, preserving the essence of its former facility.

Faith, tradition, and technology come together in this new project in the Dominican Republic.



 medium transparency
  34 Wp/m²

The skylight spans **617 m² (6,641.33 SqFt)** and it is comprised of 251 **amorphous silicon glass panels**. They measure **2,560 x 1,176 mm (8.4 x 3.85 Ft)** per unit, and offer a 20% light transmittance level.

The nominal power installed reaches **21.6 kWp** and the system will generate approx. **32,300 kWh** of clean, free energy yearly, thus preventing the release of almost 21 tons of CO₂ into the atmosphere.

This PV Glass design filters up to 99% of ultraviolet radiation and up to 95% of infrared radiation. This, together with the light transmission offered by the PV Glass, promotes thermal inner comfort for its visitors.

HIGH-END RESIDENTIAL

PHOTOVOLTAIC SKYLIGHT



Architect: Costa Brown Architecture

This high-end residential house is located in Tiburon, overlooking San Francisco's Bay with expansive, privileged views. This small town of only 9,000 inhabitants, counts on multiple high-end residential constructions which have great potential for energy-generation onsite, helping them offset the expensive electricity rates in California

Onyx Solar® was engaged by the design team to supply **amorphous Silicon photovoltaic glass** units for the rehabilitation of the house's roof. The roof used to be a conventional, solid one with conventional PV panels on top. Its design prevented the owners from enjoying expansive views to the bay area and therefore, they decided to move forward with a glazed atrium to enclose their indoor pool.

The PV Glass is supported on curved glulam beams as a primary structure, and aluminum purlins/rafters for the substructure. The junction boxes with the wires are rear-attached to the glass, and located right on top of the glulam beams to hide them better.



The total installed power reached **6.5 kWp** which supplies the building with approx. **10,595 kWh/year**. A total of 72 pieces of PV Glass were manufactured for this canopy.

"The visual effect of the photovoltaic glass modules is surprising. The clients are delighted with this product". Ken Lin, architect at Costa Brown Architecture.

LUMEN SHOPPING CENTRE

PHOTOVOLTAIC SKYLIGHT



Architect: Enrique Ruiz Gutierrez

Client: Lumen



Lumen Shopping Center in Mexico DF counts now on the largest PV skylight in the country. A total of **2,300 sqm (24,700 SqFt)** of PV Glass were supplied by Onyx Solar in order to building this energy-generating, sunshade skylight structure.

Architect Enrique Ruiz Gutiérrez played a key role in the definition of this innovative, sustainable solution for the shopping center, which controls direct solar radiation in an optimal manner for visitors to enjoy fresh air outdoors.

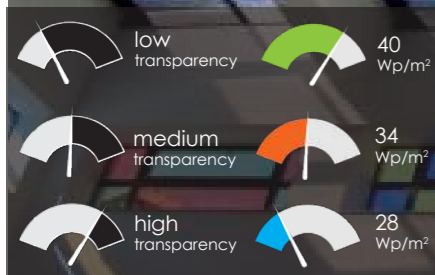
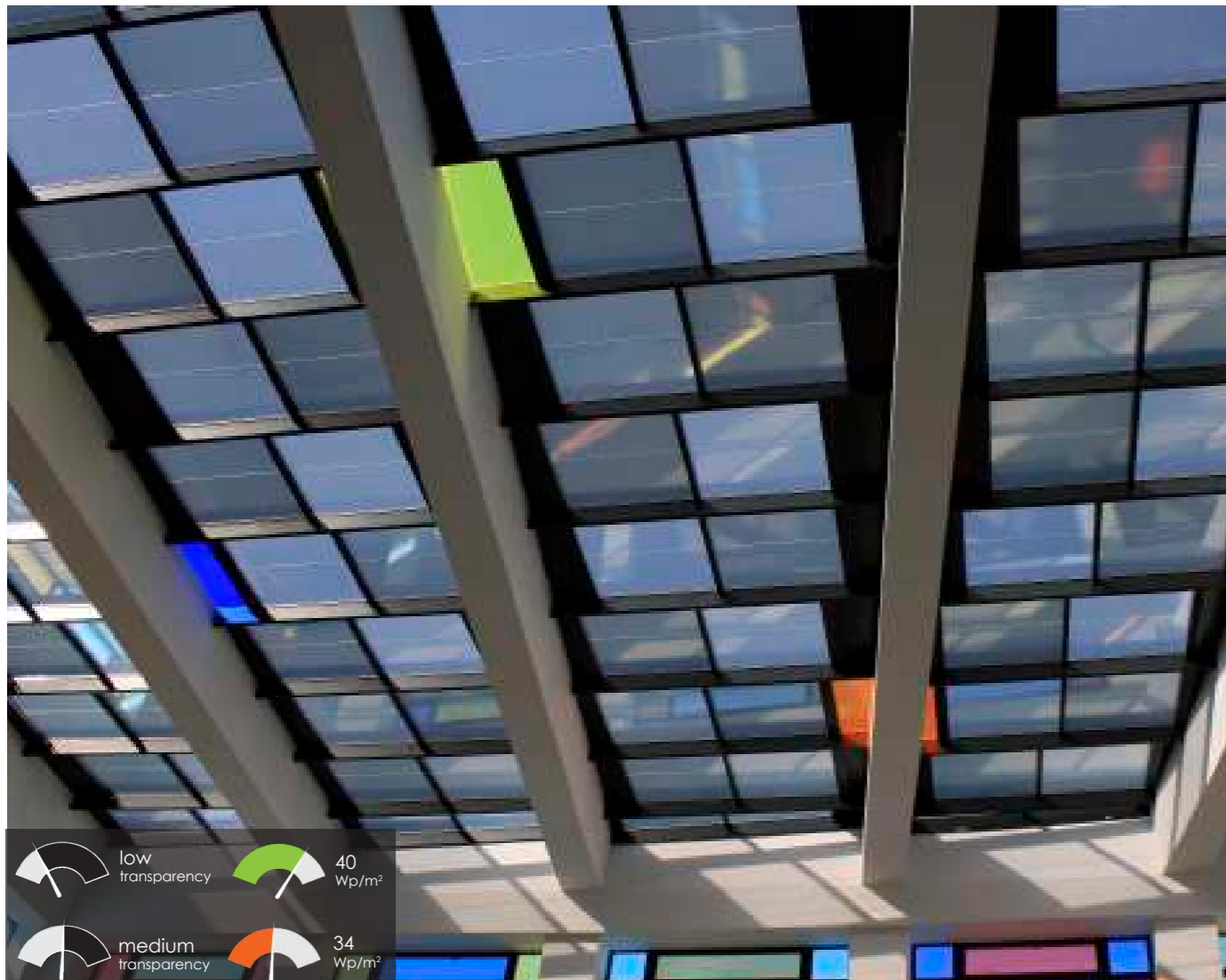
Onyx Solar® iOnyx Solar fabricated 800 PV Glass units made of poly-crystalline Silicon solar cells. Each glass unit measures **1,510 x 1,900 mm (4.95 x 6.23 Ft)** and the total system size reaches 258 kWp. Given the optimal sun exposure of the application, the PV Glass generates over 347,000 kWh/year, feeding 19,800 light-points non-stop, and avoiding the emission of 233 tons of CO2 into the atmosphere..

“ It is no secret that many American cities have grown at the cost of the environment; therefore the only way to alleviate the damage caused is by using Onyx Solar's® photovoltaic materials in construction”.

Mauricio Vazquez Vela, CEO of BIPV MEXICO,
Official Distributor for Onyx Solar®

HISTORICAL MARKET

PHOTOVOLTAIC SKYLIGHT



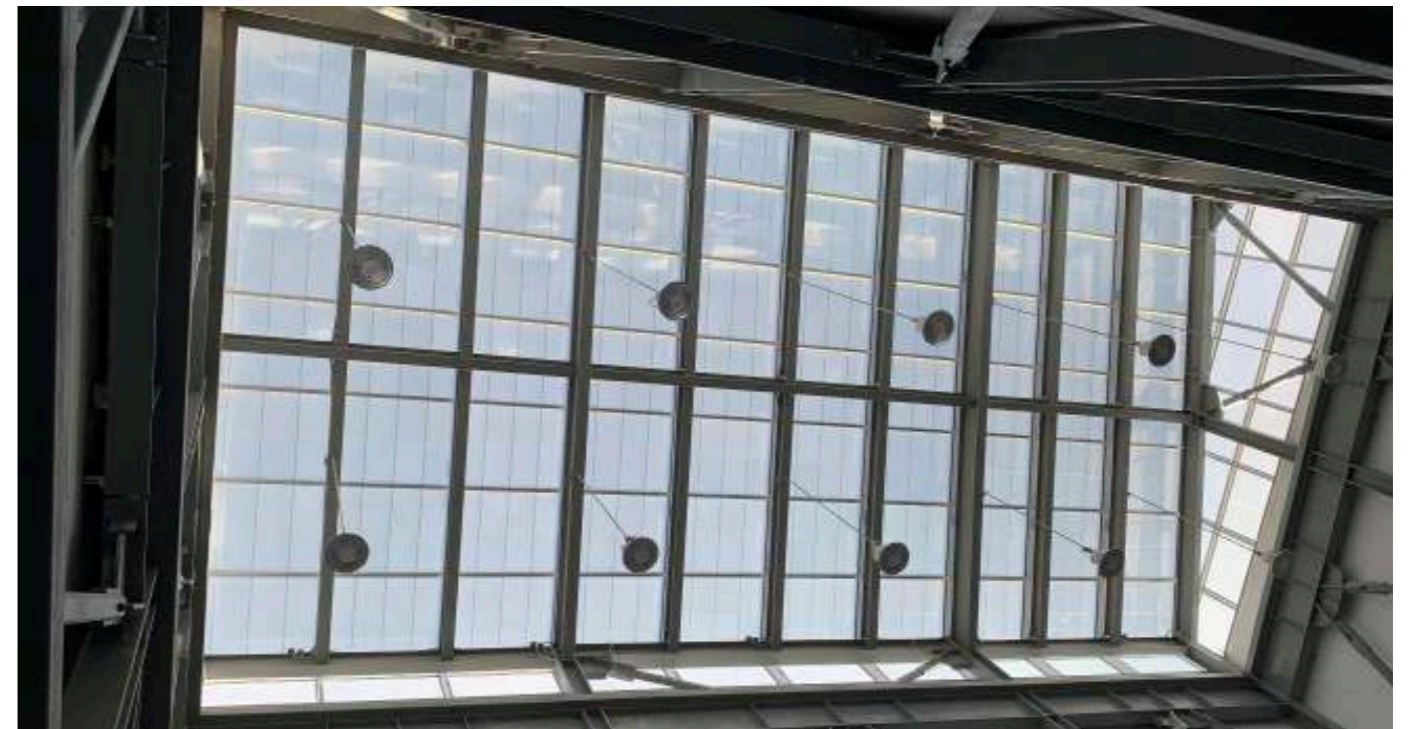
Bejar's historic food market in Salamanca has become a great example for the rehabilitation and historic preservation projects. The skylight that encloses the interior courtyard was replaced by a brand-new photovoltaic skylight combining three different light-transmittance level amorphous Silicon glass.

A total of **176 m² (1,894 SqFt)** combining **10, 20 and 30% LT** glass units bring a unique look to this project, inspired by Piet Mondrian.

The system installed **6.7 kWp**, producing **9,000 kWh/year** while preventing **6 tons of CO₂** emissions yearly.

US NATIONAL NUCLEAR SECURITY ADMINISTRATION

PHOTOVOLTAIC SKYLIGHT



The new National Nuclear Security Administration (NNSA) complex in Albuquerque, New Mexico, shifted the dialog from Nuclear to Solar by installing a photovoltaic glass skylight on its renovated facilities.

The client selected amorphous Silicon insulating glass units to install 8 kWp DC while providing natural light inside the building space.

Given the location of the project, the glass make-up counts on a **16 mm (31/50")** Argon spacer and a low-e coating to adapt the thermal performance of the PV Glass to the local heat conditions.

Onyx Solar worked with KMA Architecture and SouthWest Glass going from rendering to reality, ensuring a smooth communication between the trades involved in the project.

Established by Congress in 2000, the National Nuclear Security Administration (NNSA) is a semi-autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science.



OMBÚ ACCIONA

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has supplied its **photovoltaic solar technology** to be part of the refurbishment where it has been installed as a skylight solution for the new facility of **ACCIONA**, called 'Ombú Building' and located in the district of Arganzuela, Madrid, Spain.

Together with architecture studios **Foster + Partners** and Ortiz. León Arquitectos, ACCIONA has carried out a **comprehensive rehabilitation of this industrial building** to turn it into a unique office complex with the highest standards of sustainability, social impact and energy efficiency

The installation has **140 m²** and it is composed of **31 low transparency amorphous silicon glass units** with measures 3,376x1,198 mm, 3,376x1,203 mm and 3,376x1,212 mm. Each module has a glass configuration of 6+3+6 mm and a **16 mm argon chamber** to provide additional thermal and acoustic insulation.

The building meets the European Commission's standards for **"Near Zero" Energy Buildings** and is pre-certified to **LEED Platinum standards**.

Foster + Partners

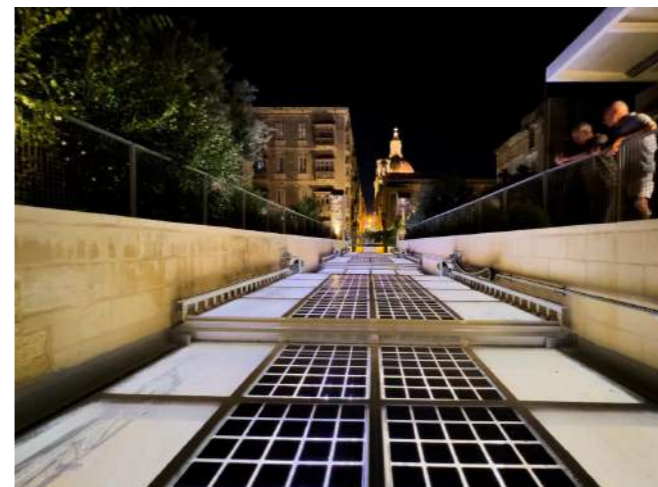
VALLETTA DESIGN CLUSTER

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has supplied its crystalline silicon photovoltaic glass that has been installed as a **photovoltaic skylight** in the Valletta Design Cluster, located in Valletta, Malta

The installation is composed of **42 units of crystalline silicon photovoltaic glass** with 2 different measures: 1,087x978 mm and 1,111x978 mm. Each glass has a **low iron tempered glass frit** and a **12 mm air chamber**, that will improve the thermal and acoustic isolation of the building.



The Valletta Design Cluster is located in a **refurbished XVII old abattoir**, one of the earliest buildings of that city declared **World Heritage by UNESCO**.

The rooftop garden is to the public as a community space for relaxation and amusement purposes. Everyone is allowed to come to the garden and enjoy the views and the nature while contemplating our incredible solar photovoltaic skylight located there.

ESSEN'S OLD CUSTOMS

PHOTOVOLTAIC SKYLIGHT



The building, which dates from the early 1900's, served as a prime transshipment warehouse and a border station between the Belgium and the Netherlands back in the days

The building has now been fully retrofitted and it has become a center for **sustainability**. It has counted on Onyx Solar for the supply of photovoltaic glass to renovate the existing skylight.

The 750 m² (8,070 SqFt) skylight incorporated **440 amorphous Silion PV Glass units with a 20% LT level**. They will provide the building with 600 MWh of clean energy and prevent the emission of 400 tons of CO₂ into the atmosphere, during its lifespan.



Contractor: Vosselmans
Client: Autonoom Gemeentebedrijf Essen



Rangeroolds will enjoy the benefits of **750 m² (8,070 SqFt)** of transparent photovoltaic glass that will be installed as a skylight and curtain wall. Thanks to this installation of the Vosselmans contractor, this building will generate **600 MWh** and prevent the emission of more than **400 tons of CO₂** into the atmosphere.



AZURMENDI RESTAURANT

PHOTOVOLTAIC SKYLIGHT AND CURTAIN WALL



Azurmendi Restaurant has not only obtained the **LEED Gold** Certification but was also named the **Most Sustainable Restaurant in the World in 2014**.

The project, with over **200 m² (2,152 sqft)** of photovoltaic glass integrated in the curtain wall and skylight, is considered to be one of the most outstanding photovoltaic integration solutions in Europe.

The **low-emissivity (or low-e) glass** installed made of amorphous silicon solar cells and features a **semi-transparency degree of 20%**. This design promotes natural light and filters **99% of ultraviolet radiation and 95% of infrared light**, thus preventing the aging of interiors and providing thermal indoor comfort for its guests.

Togehter, the PV skylight and the curtain wall account for **21 kWp** and generate approximately **16,500 kWh** per year, while preventing the release of **11 tons of CO₂** into the atmosphere.

Located in the Biscayan town of Larrabetzu, this **three-stars Michelin restaurant** by Eneko Atxa ranks among the best 50 restaurants worldwide. Congratulations, Eneko!



“ **Most Sustainable Restaurant in the World in 2014.** ”



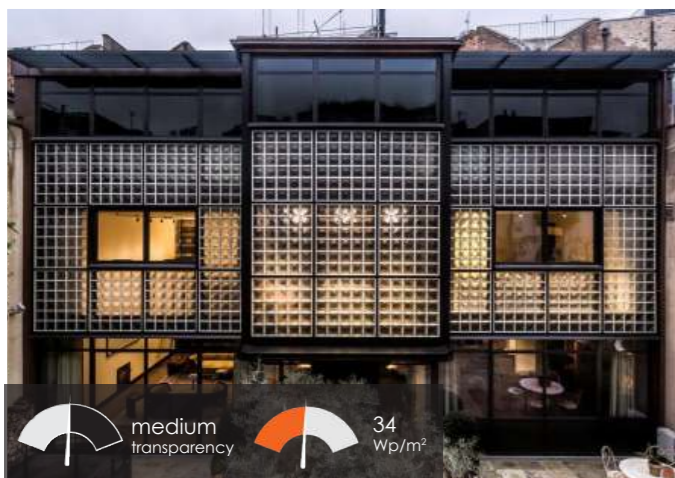
medium transparency 34 Wp/m²



General Contractor: PROIEK
Architect: Naia Eguino
Client: Azurmendi Restaurant

EGLON HOUSE

PHOTOVOLTAIC SKYLIGHT



Client: The Modern House
 Architect: Chassay + Last
 Structural Engineers: Symmetrys
 Interiors: Russell Sage Studio

The exclusive neighborhood of Primrose Hill in North London features the Eglon House a magnificent modernist house designed by Russell Sage that has been fully renovated and is out for sale asking **£21M**.

Eglon House incorporates a **photovoltaic skylight** in the building's upper floor, allowing natural light inside the building and controlling brightness. Each PV Glass measures 1,100 x 3,000 mm and its nominal power is 154 Wp.

The skylight glass was mounted on goes to aluminum frames that are supported by a primary, exposed steel structure.

KIRK KAPITAL HQ

PHOTOVOLTAIC SKYLIGHT



Kirk Kapital is primarily a business and investment company whose origins date back from 1932. They are experts in wealth management and long-term investments. Between 1932 and 1934, Mr. Ole Kirk Kristiansen, carpenter, created and launched a range of toys made of wood which turned out to be **LEGO**.

Located between the Vejle Fjord and Vejle city centre, Denmark, is the first building designed entirely by artist **Olafur Eliasson**. Rising out of the water, forges to striking new connection between Vejle Fjord and the city center.

Formed by four intersecting cylinders, the building stands twenty-eight meters tall (ninety-two feet) from the water.

Onyx Solar participated in the construction of the new headquarters of this company where **innovation and sustainability** were two priorities. The photovoltaic glass was integrated on top of the roof, creating circular structures fitted with anti-slip crystalline Silicon PV Glass

A total of **446 glass units** were required for the project, including different shapes and sizes to create the circular form.

The PV Glass is fully opaque since it incorporates a 100% coverage ceramic frit on surface #4 (rear side of the glass), and the total system size is **51 kWp**, which produces approx. **40,600 kWh/year**



Architect: Olafur Eliasson
 General contractor: Jarton
 Client: Kirk Kapital



LE PETIT ÉCHO DE LA MODE

PHOTOVOLTAIC SKYLIGHT



 low
transparency
  40
Wp/m²

Onyx Solar® took part in the refurbishment of historic building *Le Petit Écho de la Mode* in cooperation with SPIE, a French company devoted to the design, construction, operation and maintenance of energy facilities.

Located in the picturesque town of Châtelaudren, Brittany - France, the building renovation **preserved Eiffel's essence with its metal structure**. In fact, the building is a National Heritage site in France.

A photovoltaic skylight, made of low-emissivity (or low-e) glass with a **semi-transparency degree of 10%**, enables this facility to generate over **42 kWh** per square meter per year. This solution eases the entry of natural light and improves the building's energy efficiency, which helps with reducing the Culture Centre's electricity bill and HVAC energy demands.



General Contractor: SPIE
Client: Le Ieff communauté

ALZIRA TOWN HALL

PHOTOVOLTAIC SKYLIGHT



This photovoltaic skylight, integrated into the Town Hall of Alzira in Valencia, consist of **115 m² of amorphous silicon photovoltaic glass** modules, with a semi-transparency degree of 10% (LT).

The skylight facilitates the penetration of natural light inside the building, decreasing the need for artificial light and preventing the greenhouse effect thanks to its optimized **solar factor (g) of 29%**. This is ideal for climate zones such as Valencia.

The installation yields over **7,200 kWh** yearly and prevents the of almost **5 tons of CO₂** each year. The total system size is **5.1 kWp**.

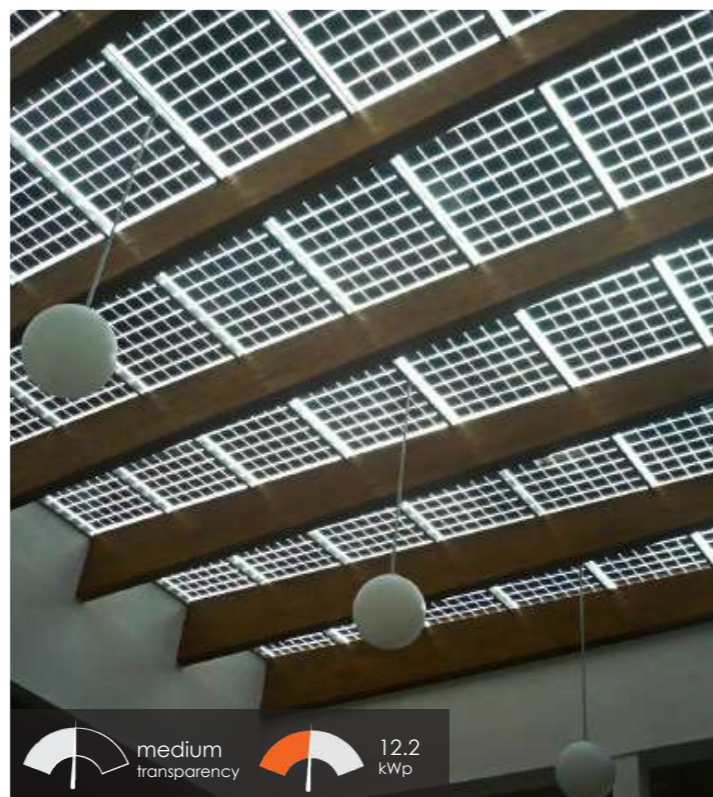

 low
transparency
  40
Wp/m²

CONIL TOWN HALL

PHOTOVOLTAIC SKYLIGHT



General Contractor: DANIANA
Client: Conil Town Council



medium transparency 12.2 kWp

The Town Hall of Conil in Spain has become a more modern and sustainable building with the installation of a **90 m² (969 SqFt)** **crystalline Silicon**, photovoltaic Skylight.

The PV Glass offers a double glazing unit configuration plus a low-e coating, so to improve the thermal insulation of the installation. It also allows natural light inside the building since it offers an average of **25% LT**.

The total system size is **12.20 kWp** and it produces approx. **19,000 kWh/year**, which is enough energy to feed **1,100 LED light-points working 8 hours a day**

PALMA PORT AUTHORITY

PHOTOVOLTAIC SKYLIGHT



General Contractor: Acciona
Client: Port Authority of Mallorca



medium transparency 34 Wp/m²

Installation of a photovoltaic skylight as part of the renovation of the Balearic Port Authority building in the Port of Majorca.

Onyx Solar supplied **180 m² (1,937 sqFt)** of **low-e amorphous Silicon PV Glass** for this skylight, which provides thermal and sound insulation to the building and helps preventing the greenhouse effect.

Each PV Glass panel measures **2,200 mm x 1,300 mm (7.22 x 4.26 Ft)** and feature a **degree of semi-transparency of 20%**. This glass design helps with controlling natural light inside the building by filtering UV and IR radiation, which improves indoor comfort.

The system generates approx. **8,700 kWh per year**, powering **500 light-points** working 4 hours a day. It also prevents the emission of **6 tons of CO₂** into the atmosphere every year.

Acciona is a leading multinational corporation with renewable energy, water and infrastructure projects in multiple countries.

CENTER FOR NOVEL THERAPEUTICS

PHOTOVOLTAIC SKYLIGHT



Architect: PERKINS + WILL
Client: University of California

The **University of California**, San Diego is one of the top 15 research universities in the world. Located on the Western edge of the University's Science Research Park, the new Center for Novel Therapeutics seeks to support the successful formation, funding, and growth of private biotech companies.

This University brings the pharmaceutical industry into its campus, giving entrepreneurs and corporations more access to the university's market-worthy research and advancing public-private collaboration.

The **new building**, spanning 110,000 square meters is aimed mainly at start-ups engaged in research and development of therapeutics, diagnostics, and interventions with a focus on cancer.

Onyx Solar supplied the **amorphous Silicon PV Glass** required for the project; it is a laminated, insulating safety glass product with a **20% LT**, which filters UV and IR radiation.



The building was designed by **Perkins + Will**, and it became a **LEED® Gold Certified construction**. We are proud of our participation in this project and contribution to LEED certification and growth of private biotech companies.

ALCALÁ 33

PHOTOVOLTAIC SKYLIGHT



Alcala 33 in Madrid is a historic building dated from 1900; it has recently been renovated and the new design incorporated a photovoltaic skylight by Onyx Solar.

The PV Glass design provides unobstructed views, natural light, and UV and IR filter, besides free and clean energy for the owners of this condo.

The client decided to move forward with **amorphous Silicon glass**, since it would **look like a conventional architectural glass** and blend well with the original design intent.

Each piece of PV Glass measures **2,438 mm x 1,160 mm** and it comes with an air spacer.



CUYAHOGA COMMUNITY COLLEGE

PHOTOVOLTAIC SKYLIGHT



Cuyahoga Community College's Western Campus STEM Center achieved **LEED Gold Certification** thanks for the outstanding design led by Weber Murphy Fox Architects.

This **64,000 SqFt** campus consists of laboratories, classrooms, offices and common areas for the students to enjoy. It is a STEM Center (Science, Technology, Engineering and Maths).

In order to achieve LEED Gold, the design team worked on a forward-thinking, sustainable design that would both decrease the energy use in the building while generating power onsite.

Stormwater management systems, white roofs, LED lightings, and building-integrated photovoltaics are some of the strategies followed by the architects.

Onyx Solar supplied **crystalline Silicon PV Glass** for the central atrium of the building. It is a laminated, insulating, safety glass product which provides outstanding thermal insulation while controlling natural light. The PV Glass generates approx. 33,000 kWh/year, which provided the client with important points in the Energy and Atmosphere LEED category to achieve LEED Gold.



NEYA HOTEL

PHOTOVOLTAIC SKYLIGHT



Onyx Solar designed, manufactured and supplied the amorphous Silicon photovoltaic glass panels specified in this historic building renovation in Porto, the Neya Hotel.

The PV skylight is made of laminated, insulating glass units with dimensions **(1,245x2,456 mm and 1,245x1,849 mm)**.

The total system size is **8.5 kWp**, which will allow the hotel to feed up to 634 LED light-points every year, and decrease their O&M costs.

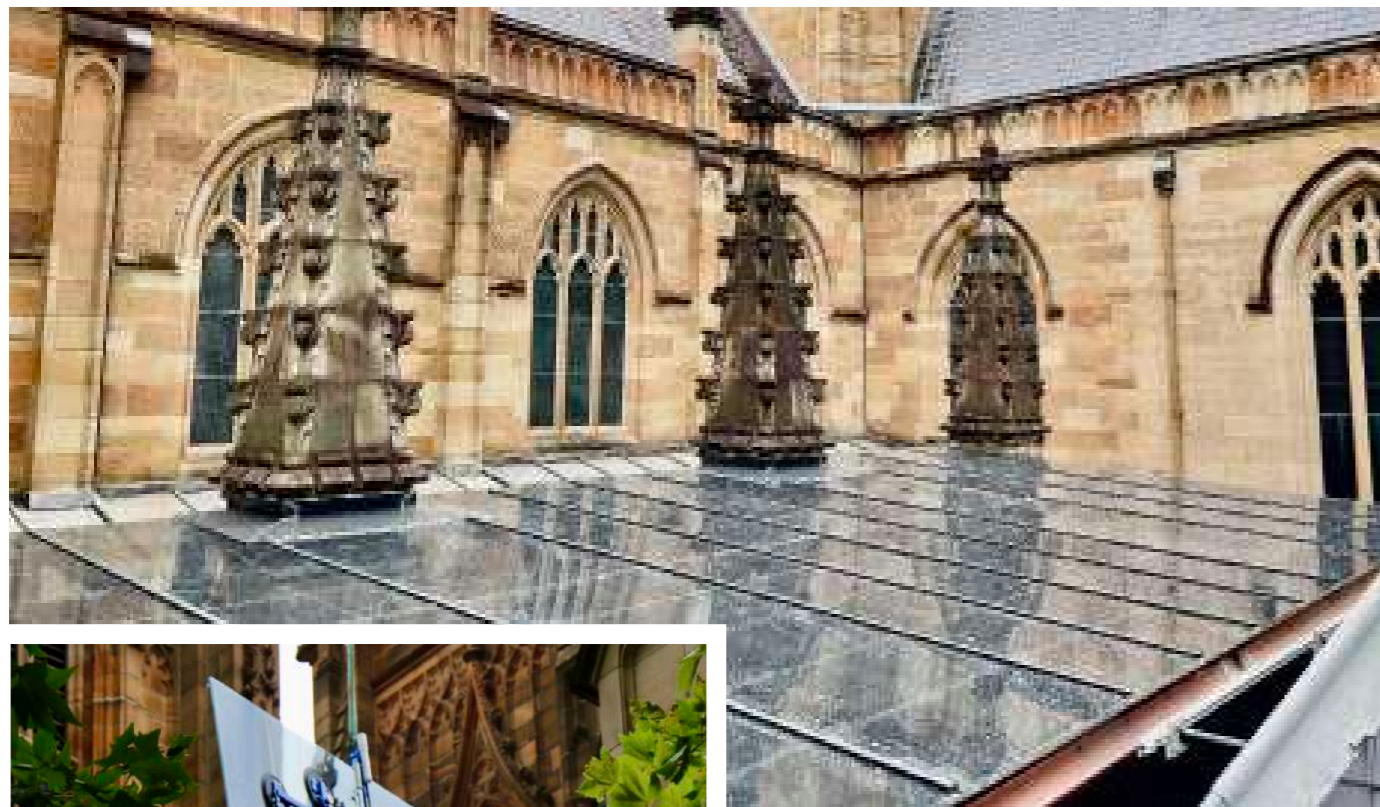


The hotel is located in the **Porto's Ribeirinha area**, just 5 minutes away from the airport, and overlooking Douro River.

The hotel was a historic Convent called *Madre Deus de Monchique convent*. The building renovation preserved the original architecture of the abbey and other historical artifacts.

ST ANDREW'S CATHEDRAL

PHOTOVOLTAIC SKYLIGHT



This iconic cathedral is the oldest one in Australia. Its life began in 1817 when Francis Greenway led the design of a magnificent cathedral to be known as the Metropolitan Church. This Gothic Revival cathedral was completed in 1868 and consecrated on St Andrews Day of that year.



Onyx Solar successfully supplied the photovoltaic glass required for the renovation of the existing atrium, which demonstrates how historic preservation and contemporary technology can go together hand in hand.

This installation is made of amorphous Silicon PV Glass which was custom designed to fit the existing frames of the atrium; the dimensions of the product range from **1,496x2,268 mm to 1,597x3,007 mm**.

The PV glass was installed over the courtyard between the Cathedral and the adjoining Chapter House building, and it is expected to generate 3,300 kWh /year. It will provide shade and shelter, while filtering UV and IR radiation.

ST. CLARA LIGHTHOUSE

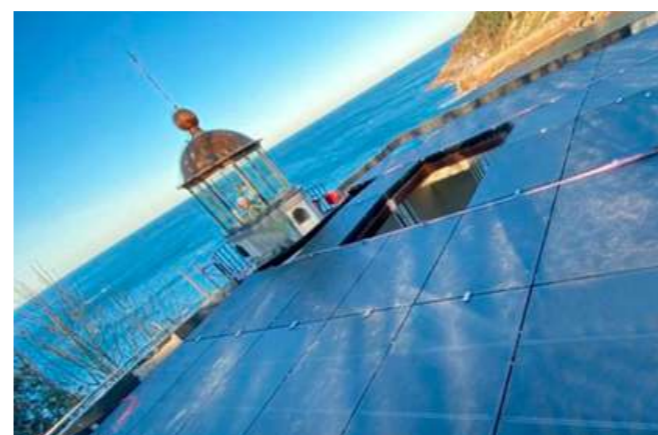
PHOTOVOLTAIC SKYLIGHT



Onyx Solar has participated in the historic refurbishment of Santa Clara's Lighthouse, located in San Sebastian, Spain. . In particular, Onyx Solar supplied the PV Glass required for the new skylight, made of **amorphous Silicon solar cells**.

Despite it is a small project, it is a very iconic one since this is the first time a photovoltaic glass is integrated into a lighthouse anywhere in the country. It turns out compulsory to count on salt-corrosion proof products when dealing with such a salty environment.

Each piece of glass measures **1,609 mm x 1,243 mm**, and it comes with an anti-slip treatment on its exterior surface so to ease walkability.



The PV Glass also features a 16 mm air spacer to meet the U-value required by the design team.

Built in 1864, Santa Clara's Lighthouse is located in Santa Clara Island, within La Concha Bay in the Cantabrian Sea, close to the city of San Sebastian, Basque Country, Spain. It has a focal height of 53 meters, and a support height of 10 meters. It has been closed since 1968, and thanks to a comprehensive renovation led by San Sebastian's City Council, this unique building will soon reopen its doors and serve as a tourism attraction.

VILLA FLORESTINE

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has completed its first project in the Principality of Monaco. It is a 48 m² Photovoltaic Skylight made of **Crystalline Silicon photovoltaic glass**, totaling **5,5 kWp**.

The photovoltaic glass take-off required nine different glass dimensions, and several product thicknesses. It is a double glazing unit with an argon spacer and a low-e coating.

This skylight is part of the renovation of Villa Florestine, an iconic building that houses the employment office of the Government of Monaco.

The skylight will generate **6,959 Kwh/** year, enough energy to power **397 light-points** within the building.



Client: Government of Monaco
Mechanical / electrical installer: La Fonderie de Monaco
Architect: NMI atelier d'architecture / Monaco

KUKULLAGA STATION

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has replaced the existing glass roof at the Kukullaga-Etxebarri metro station in Bilbao with photovoltaic solar glass.

A total of **133 double-laminated, diamond-shaped glass units**, featuring **35 different sizes** will provide users with an innovative, sustainable experience in the building. It is a walkway-type building built in 2017, 2017; however the existing glass' lack of sun control properties, made it compulsory to replace it, since workers were suffering from high temperatures and extremely discomfort while in the building.

Onyx Solar's crystalline Silicon glass eliminates the greenhouse effect by providing good shade (high solar cell density) and reducing light transmittance.

The system nominal size is **72 kWp**, and it will feed up to **3,500 light-points**, which will drastically decrease O&M costs.

NORTHSHORE PLAZA II

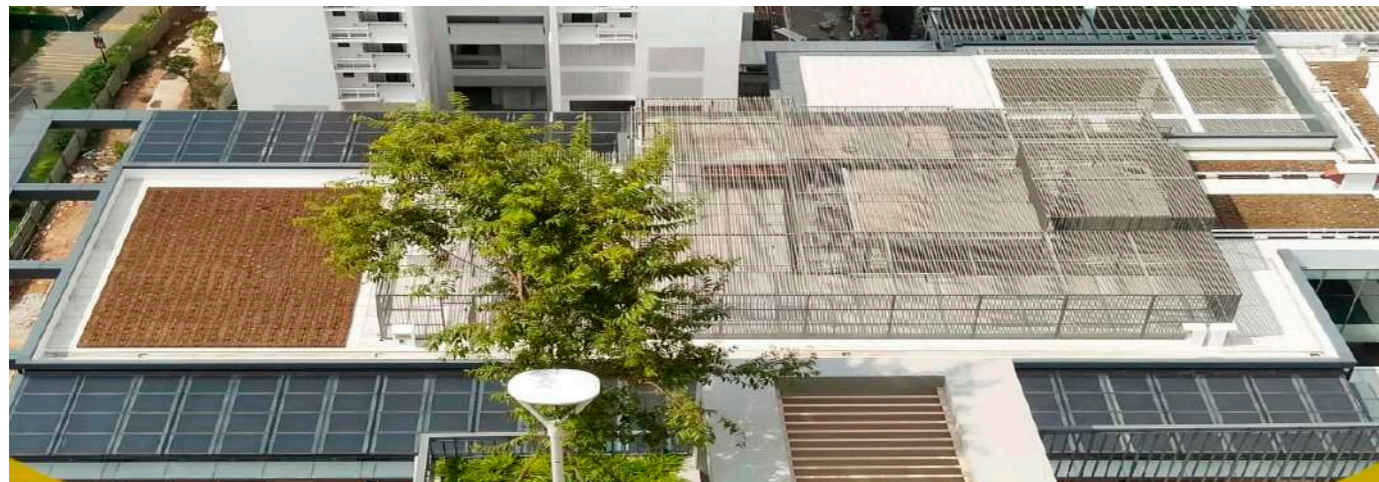
PHOTOVOLTAIC SKYLIGHT



Onyx Solar has provided photovoltaic glass to build the Skylight of Northshore Plaza II, located in the heart of **Northshore District in Punggol Eco-Town**, North-East Region of **Singapore**.

The installation is composed by **198 mono-crystalline silicon photovoltaic glasses** with a PV glass configuration of 4+4 mm and a **12 mm air chamber** to provide additional thermal insulation. The **transparency degree is 34 %**. 168 glass modules measure 1,592x1,408 mm and the rest have different dimensions to perfectly adapt to the requirements of the building.

The project has been developed by **The Housing & Development Board (HDB)**, Singapore's public housing authority.



CABRILS SPORT CENTER

PHOTOVOLTAIC SKYLIGHT



Onyx Solar has provided photovoltaic glass integrated as a photovoltaic skylight for the refurbishment of the sport center roof of Cabrils, a municipality next to **Barcelona**, Spain

The installation has exactly **272 m²**, and it is composed of 160 monocrystalline silicon photovoltaic glass. With a glass configuration of **4T+4T mm**, each glass unit has 60 monocrystalline solar cells of 6" and a **19 % transparency degree**.

This municipal sport center will soon be a basketball court, among other uses of the citizens. The building's roof is designed in such a way as to **optimize energy performance** (both orientation and inclination).



CITY HALL OF LINARES

PHOTOVOLTAIC SKYLIGHT



Client: Regional Government of Andalucia
 Architect: Andres Lopez Fernandez
 General Contractor: Procyr

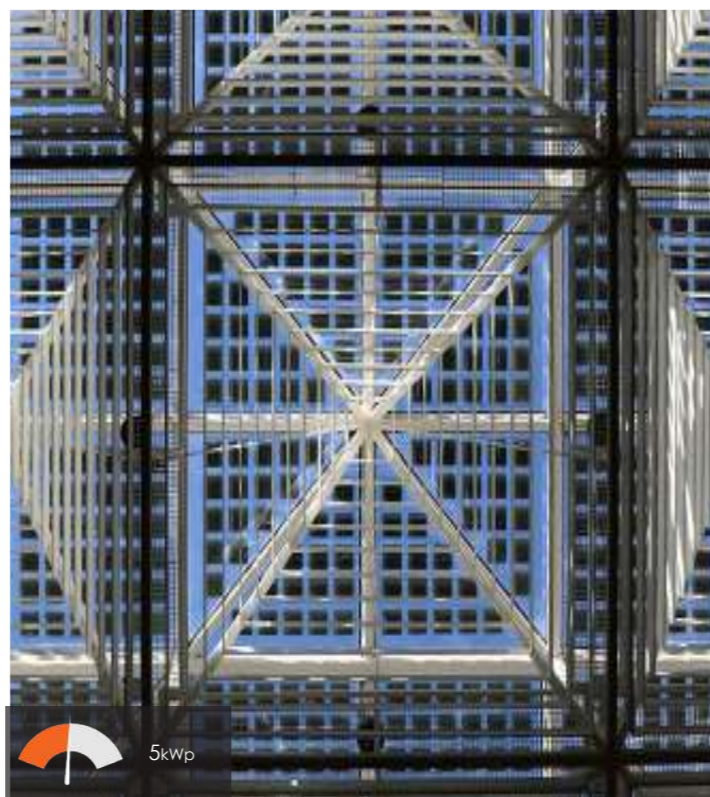
This photovoltaic installation has been completed for the City Hall of Linares, Jaen, where photovoltaic glass has replaced the existing conventional glass on the main building's atrium.

Built in the 19th Century, this City Hall is a landmark place to visit in Jaen. The renovation project has preserved its original nature and architecture.

Onyx Solar was tasked with the fabrication of rectangular and triangular photovoltaic glass using crystalline Silicon solar cells; each glass had different dimensions to fit the existing frame.

The project totaled **80 sqm (861 sqft)**, reaching **5 kWp**. The energy generated by the glass will be used to feed up to **408 light-points** running 4 hours a day for 35 years. 118 tons of CO₂ will be offset with this project

48 units of poly-crystalline silicon IGUs have been installed. The PV Glass configuration includes an air spacer with a low-e coating, and it leaves some clear areas to improve daylighting.



5kWp

COLLÈGE ELSA TRIOLET

PHOTOVOLTAIC SKYLIGHT



9,5 Wp/m²



This 1979's construction, the old Elsa Triolet Institute, has incorporated Onyx Solar PV Glass on its reconstruction. The project, located in France, now counts on a 100 sqm (1,076 SqFt) photovoltaic skylight made of crystalline Silicon solar cells.

Each PV Glass unit offers 124 Watts and measures **1,600mm x1,000 mm**. It comes with a 16 mm argon spacer and a low-e coating to improve its thermal performance too.

This skylight, which will generate about 300 MWh of energy, energy over its lifespan, will prevent the emission of 200 tons of CO₂ into the atmosphere.



General Contractor: Conseil Departamental des Vosges
 Architect: Carignies-Canonica
 Client: Collège Elsa Triolet Capavenir Vosges

CHANCERY LANE

PHOTOVOLTAIC SKYLIGHT




Located in the heart of **London's legal district**, this building of nearly 10,000 m² is a renowned project executed by the **McLaren Construction Group**.

The building, consisting of 9 stories of modern offices owned by Harwood Assets Limited, features a **130 m² skylight** fitted with Onyx Solar's photovoltaic glass.

The project's objective was to optimize the production of clean power while preventing structural modifications to the building. For this reason, Onyx Solar® was the best choice, since it provides protection against the sun and generates power while improving the skylight's aesthetics.

The PV Glass was made using amorphous Silicon solar cells and it features a 20% visible light transmittance. In addition to providing clean power onsite, also provides natural light, ultraviolet and infrared radiation filter, and permanent protection against London's climatic conditions.

NATIONAL GARDEN

PHOTOVOLTAIC SKYLIGHT



The **National Orchid Garden** located in **Singapore** enjoys clean energy thanks to Onyx Solar's technology. This project belongs to the **Singapore Botanic Gardens, a UNESCO World Heritage Site**.

This photovoltaic skylight consists of 56 crystalline Silicon PV Glass panels. They are a laminated, insulating safety glass product suitable for overhead applications.

The glass make-up includes an air spacer to provide thermal and sound insulation, which also improves indoor comfort, much needed in this location.

The light transmittance of the PV glass was carefully selected at 60%, which is critical to allow orchids to grow naturally.

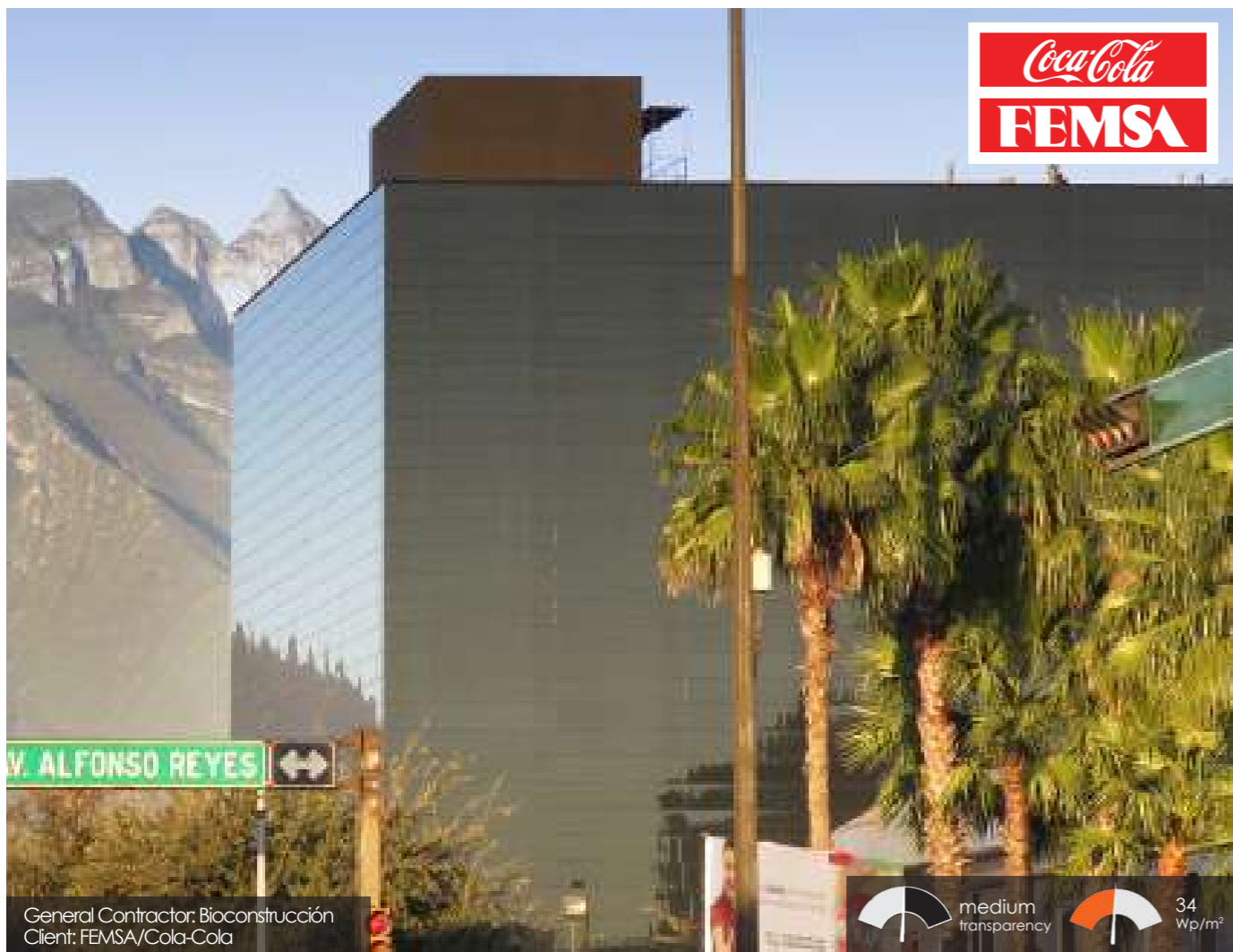
The project required Onyx Solar to fabricate 15 different glass dimensions and trapezoidal units to meet the complex geometry of the existing metal frame.

The **National Orchid Garden** is home to 60,000+ orchid, and it is located in the highest hill in the Singapore Botanic Gardens, which is the only tropical garden worldwide to be named a **UNESCO World Heritage Site**.

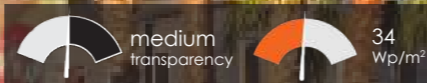


COCA-COLA/FEMSA HEADQUARTERS

PHOTOVOLTAIC FAÇADE



General Contractor: Bioconstrucción
Client: FEMSA/Cola-Cola



Before



Before



“ Working on this project with Onyx Solar® has been a rewarding experience. Both companies took on the challenge to execute Mexico’s first photovoltaic glass façade in record time, and the result has been extremely satisfactory. When we work with top-notch specialised companies like Onyx, success is guaranteed ”.

Alfredo de la Rosa, Manager of Internal Civil Works at FEMSA.



Onyx Solar® supplied its photovoltaic glass to Femsa Headquarters in Monterrey, the largest Coca-Cola bottler worldwide.

The project consisted of a second skin façade installation made of amorphous Silicon photovoltaic glass. It required 370 large units of PV Glass from Onyx Solar, combining both fully opaque and semi-transparent panels following the façade design.

The photovoltaic glass installed at Femsa HQ generates approx. **17,200 kWh/year** and prevents the emission over **11 tons of CO2 into the atmosphere.**

PV Ventilated Façade systems offer an optimal efficiency performance, since they provide important energy savings coming from the improved envelope and the natural air ventilation flow created, plus the energy generated by the glass. Buildings using these systems can potentially save up to 40% of their energy demand, if installed properly.

Coca-Cola and Femsa are both committed to meeting the Sustainable Development Goals by the UN.

ICSE EDUCATIONAL CENTER

PHOTOVOLTAIC FAÇADE



Cient: Las Palmas University



This innovative building located in Las Palmas de Gran Canaria, Spain, made it to achieve LEED Platinum by the US Green Building Council.

It is home to the Canary Island's Higher Education Institute, and the building counts on a beautiful glass cladding that incorporated Onyx Solar's **amorphous Silicon PV Glass** on vertical fins.

The PV Glass fins are almost three meter tall and half a meter wide (**9.8 x 1.64 Ft**), and it comes with a transparency degree of 20%, despite it looks opaque from the exterior.

The fins generate free and clean power for the institution, at the same time that they provide good shade and natural light inside the building. Also, they prevent heat gain inside the building thanks to its optimized solar factor (g), ideal for warm climate zones.



 medium transparency
  34 Wp/m²



PFIZER-GENYO LABS

PHOTOVOLTAIC FAÇADE



This project features a spectacular double skin façade made of amorphous Silicon PV Glass by Onyx Solar. It combines glass with different light-transmittance levels, which creates a unique pixelated-like façade.

The PV glass accounts for a total of **550 m² (5,920 SqFt)**, which provides the building with a **19.30 kWp solar system**. This translates into **32,000 kWh/year** of clean and free energy for the client, enough energy to offset 19 barrels of oil every year.

The façade provides the building with brand new aesthetics and an enhanced thermal insulation, thanks to the natural air ventilation flow created between the solid wall and the PV Glass. Together with the energy generation provided by the PV Glass, this project helps with decreasing the O&M costs of this R&D center for genetic diseases.



BURSAGAZ HQ

PHOTOVOLTAIC FAÇADE



Bursagaz, one of Turkey's main gas suppliers, inaugurated its new headquarters building in the city of Bursa, which achieved **LEED Gold Certification**.

Onyx Solar® supplied the amorphous Silicon PV Glass installed on the facades of the building, creating a second-skin façade concept that blends well with the original architectural intent.

The PV façade consists of **315 photovoltaic glass** panels with dimensions measuring **500 mm x 700 mm (1.6 x 2.3 Ft)** each, and it was fabricated with a **20% transparency level**. The nominal power capacity installed reached 4.1 kWp, which provides the building with 3,400 kWh/year.



Bursagaz the main distributor of natural gas in Bursa, a city in Turkey with an average population of 1.5M inhabitants. The company was incorporated back in 2008 and it currently ranks #3 in its industry. Innovation and sustainability are among its foundational pillars.

THE BLACK BOX

PHOTOVOLTAIC FAÇADE



The Black Box.

The Black Box is how we call our corporate headquarters building in Avila, Spain. Here is where our interdisciplinary team of architects, engineers, physicists, and marketing and sales team gather every day to innovate in the field of solar energy and the built environment. Here is where we develop the building materials of the 21st Century.

The Black Box used to be an office building with solid concrete exterior walls and punch windows, which we retrofitted using a PV rainscreen cladding system made of amorphous Silicon photovoltaic glass.

Here we combined both fully opaque PV Glass for the solid areas of the façade, and also 20% LT PV Glass to clad the façade at the punch window level.

In total, we installed 4.3 kWp DC, which gives us 12,685 kWh/year of clean, free power. Also, we offset 9 tons of CO2 every year.

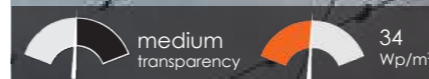
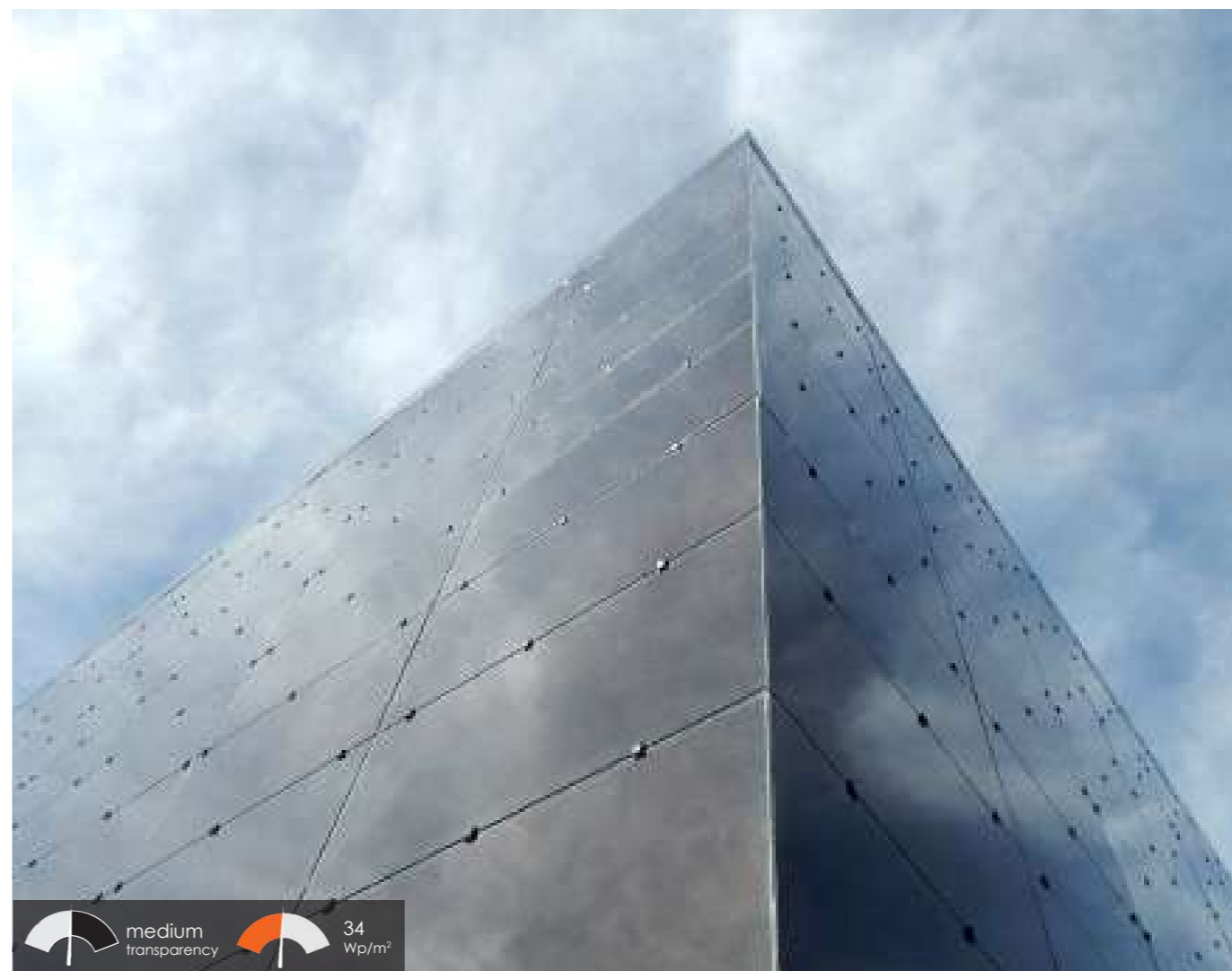
In order to further improve the thermal performance of our building, we added a mineral insulation which helps us saving up to 53% of our electricity bill.

At Onyx Solar, we lead by example.



“There is no better way to analyze the performance of our products than installing it in our own premises. Our photovoltaic façade served as a proof of concept while it provided our building with a brand new look. Our multi-functional building envelope is now much more efficient, which ultimately decreases our O&M costs. The passive and active properties that it brought to our building exceeded our expectations”.

Angel Gallego, Onyx Solar® Senior Architect and designer of the Black Box.



PEDIATRIC CANCER

PHOTOVOLTAIC FAÇADE



Onyx Solar has supplied its **amorphous silicon photovoltaic glass** that has been installed as a photovoltaic façade system in the new Pediatric Cancer Center of the San Joan de Deu Hospital, located in the city of **Barcelona, Spain**.

The installation has **193 m²** and it's composed of 94 medium transparency amorphous silicon glass with **4 different colors** and multiple dimensions and configurations of **4+3+4 mm** and **6+6 mm** in both active & inactive glasses to provide shade and an aesthetic appearance to the building and to meet perfectly the needs of the architecture and the client.



The **Pediatric Cancer Center** is a new center devoted to the treatment and investigation of different kinds of children's cancers which is able to take care of more than 400 patients per year with a highly specialized team and new generation equipment.

NOVADECI CONVENTION CENTER

PHOTOVOLTAIC FAÇADE



Onyx Solar has supplied its **amorphous silicon photovoltaic glass** that has been installed as a photovoltaic ventilated façade in the Novadeci Convention Center, located in **Quezon City, Philippines**.

The installation has **288 m²** and it is composed in total of **365 units of photovoltaic glasses**. Each glass unit measures **1,245x635 mm** and has a glass configuration of **3 + 4T mm**. They also include a black rear frit that gives it an opaque appearance.



Novadeci is an important office and commercial building and convention center located in Quezon City that hosts different kinds of activities and events.

The building is property of Novadeci, a real estate company founded in the Philippines in 1976.

CYPRUS UNIVERSITY

PHOTOVOLTAIC FAÇADE



Cyprus International University's Science and Technology Center is a new construction, state-of-the-art facility that generates clean power onsite through the largest photovoltaic façade installed in the country to date.

The building is an R&D center that focus on cancer, genetics, food chemistry and robotics. It became a national reference in sustainable innovation.

Onyx Solar supplied over 1,000 m² (10,760 SqFt) of amorphous Silicon glass with dimensions 1,245 mm x 1,849 mm each, featuring a 30% visible light transmittance (VLT), and installing a total capacity of 21.4 kWp.

This project demonstrates the university's leadership in innovation and provides example for the students to learn from it.



DIAGONAL 525

PHOTOVOLTAIC FAÇADE



Diagonal Avenue 525 in Barcelona, Spain, is a commercial property located in the heart of the financial district, and it is owned by Colonial SOCIMI Real Estate. The building is worth 37 € million, and its design includes a photovoltaic sunshade system made of crystalline Silicon PV Glass by Onyx Solar.

The sunshades are mounted horizontally over a second skin façade; they face south, so they provide critical sun control to the building, at the same time that they produce clean, free energy for the client.



THE GENERAL

PHOTOVOLTAIC FAÇADE



The architect, C.Kairouz, specified amorphous Silicon photovoltaic glass with a low light transmittance level. He proposed stock dimensions at 1,245 mm x 1,849 mm (4.08 x 6.06 Ft) to be installed as a railing system on the north elevation.

The total system size is 5 kWp, which will help the building with covering the energy consumption of the mechanical equipments in the common areas

The building was shortlisted for the Design et al's International Design and Architecture Awards 2018.



The General is the first residential project in Melbourne, Australia that incorporates Onyx Solar's photovoltaic glass on its facades. Its design has been purposed to promote sustainability and minimize the energy consumption of the building

CAJASIETE BANK

PHOTOVOLTAIC FAÇADE



Cajasiete Bank in Santa Cruz de Tenerife, Canary Islands, counts on a complete new building look thanks to the prominent rainscreen cladding system installed on its southwest façade with Onyx Solar's photovoltaic glass.

The façade required **202 m² (2,174 SqFt)** of crystalline Silicon PV Glass, which can be easily seen from the building surroundings; this façade reminds Cajasiete clients how sustainable the bank is, since crystalline Silicon solar cells are easily recognizable by the general public.

The PV Glass make-up is made out of two lites of 8 mm laminated safety glass, which embeds 6" solid solar cells and provides natural light inside the building (the average light transmittance is as high as 55%).

Since this is a renovation project, Onyx Solar had to fabricate the PV Glass to fit the existing framing system. This required Onyx to perforate the PV Glass on its corners, so that it could be mounted on the existing spider fitting system.

Despite most of the PV Glass is regular, there are a total of 54 irregular, trapezoidal units. The total system size is **18 kWp**.



CASTLE LANE

PHOTOVOLTAIC FAÇADE



Onyx Solar has completed a new project in the heart of London, 300 meters apart from Buckingham Palace.

The building, called Castle Lane Building, incorporated a ventilated façade system made of **crystalline Silicon PV Glass**.

The project goals included the maintenance of an opaque look for the building's facade, making it stand out from the rest of building materials. The PV glass comes with a black color ceramic frit treatment on surface #4, and it produces a great amount of **clean power to its owners**.



 no transparency

GAS BARBASTRO

PHOTOVOLTAIC FAÇADE



Gas Barbastro in Huesca, Spain, has completed the rehabilitation of its headquarters building with the installation of a photovoltaic façade made of crystalline Silicon PV glass by Onyx Solar.

The building was due for a complete façade renovation in order to improve its thermal performance. Huesca is one of the coldest cities in Spain in winter, and high efficiency envelopes are much needed in order to keep HVAC costs as low as possible.

The façade required a total of **143 m² of PV Glass**, with a nominal power of **23 kWp** all together. Each PV glass measures **1700 mm x 1000 mm** and comes with **60 high-efficiency solar cells** each.

It is expected that the installation will offset about 60% of the building energy bills over the next years.

About Gas Barbastro's Building:

The building used to be an old ham drying warehouse which Gas Barbastro bought back in 1997. It would become their primary site for business, from where they would supply piped gas to the town, carry out maintenance services, and supply as well as repair household appliances.



BALENCIAGA STORE

PHOTOVOLTAIC CURTAIN WALL



Client: Kering Group

Photovoltaic glass is not only sustainable, but also fashionable. Balenciaga, one of the most prominent luxury fashion brands in the world, installed a photovoltaic curtain wall on its flagship store in the Miami Design District. It consists of hurricane-resistant photovoltaic insulating glass units made of crystalline Silicon PV solar cells. Kering Group, its parent company, is a market leader in innovation and design, seeking to decrease its worldwide carbon footprint from its stores.

BALENCIAGA
K E R I N G

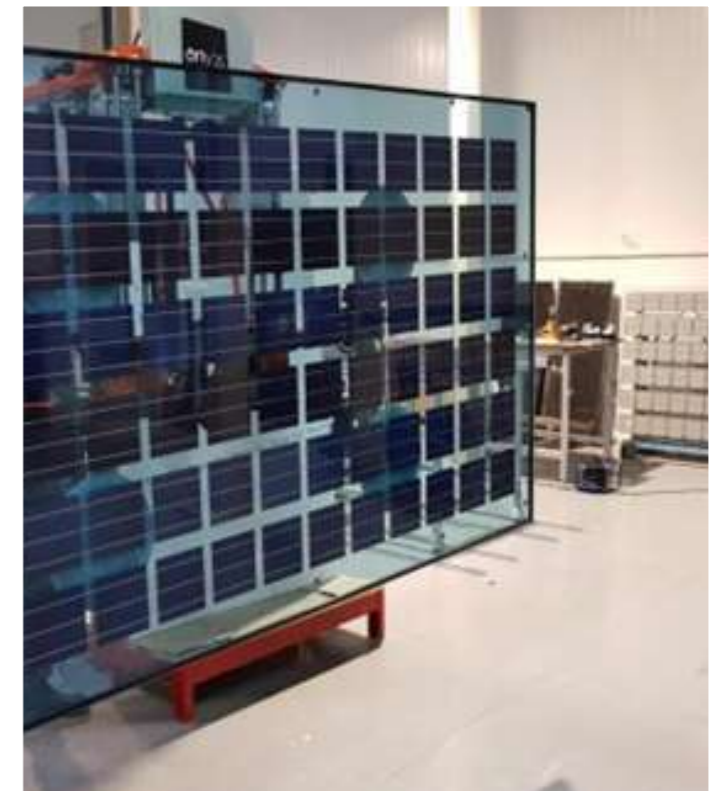
“ *More than ever I am convinced that sustainability can redefine business value and drive future growth. As business leaders we all have a crucial role to play and I worked with the CEOs of our luxury Maisons to embed sustainability across our activities while developing this next important phase of our sustainability strategy”*

François-Henri Pinault,
Chairman & CEO, Kering



The polycrystalline PV glass installed at Balenciaga's flagship in the Miami Design District comes in a pale blue color that provides the storefront with a very fashionable look. It is a hurricane-resistant double glazing unit, with a 1/2" Argon spacer and a low-e coating for superior thermal performance. The solar factor has also been optimized so to obtain a perfect balance between efficiency, daylight and renewable energy onsite.

Each PV glass panel is **2,804x1,388 mm and 2,808x1,413 mm (9.19x4.55 Ft and 9.21x4.64 Ft)**, with a nominal peak power of 338 Wp. The system generates over 7,700 kWh/year.



WASHINGTON UNIVERSITY

PHOTOVOLTAIC CURTAIN WALL



The University of Washington's Life Science Building incorporates 650 m² (7,000 SqFt) of amorphous Silicon vertical fins, which provide both shade and energy generation at the same time.

The building was designed by renowned Perkins+Will and constructed by Skanska USA, and its main focus is on biological research studies.

These PV fins are the first-of-its-kind in the USA and they are made of amorphous Silicon solar cells that capture the sunlight and converts it into clean electricity.

They are all-glass, semi-transparent, letting 20% visible light to pass thru the fin.

Each fin consists of a three-ply laminated, tempered glass, and it offers 3.15 Watts per square foot. They are frameless and were installed vertically, perpendicularly (90 degree angle) to the curtain wall. Concealed junction boxes and wires do perfect the architectural design.

The project design targeted LEED-NC Platinum Certification, and the deployment and usage of clean energy sources were a primary objective of the University's Climate Action Plan for Sustainability.

The building has received several design and environment awards

SKANSKA

Perkins&Will

While conventional glass or metal fins help the building from a passive standpoint, photovoltaic fins pay a multi-functional approach:

- 1.They work as a sun control device, helping decrease HVAC needs. The South elevation of the building is set to receive high solar radiation in summer and the photovoltaic fins will help shading the building and thus reducing the heat transfer.
- 2.They work as windbreaks in winter, boosting the insulation of the building.
- 3.They diffuse light and control glare, contributing to more comfortable daylight conditions.
- 4.Their solar cell coating filters 99% UV radiation, mitigating the interior's aging.
- 5.They generate free and clean electricity, decrease the building's carbon footprint, and contribute to LEED Certification. Also, they perform under low-light conditions.
- 6.They aesthetically blend with the rest of the architectural design. They do not look like traditional PV panels, but like conventional glass fins.



The PV sunshades are great for shading the building, keeping it cold during summer, and generating power from the other angle".

Devin Kleiner, Senior Project Architect at Perkins + Will.



TWIN CITY TOWER

PHOTOVOLTAIC CURTAIN WALL

Twin City Tower by HB Reavis, one of the largest developers in Central Europe, is an iconic tower that sits on a newly created business center in Bratislava, providing high-quality, high-efficient office and retail space.

The façade incorporated amorphous Silicon photovoltaic glass by Onyx Solar. In total, 192 PV glass units were installed, reaching a nominal size of 25 kWp.

The PV Glass provides an optimal thermal insulation to the building thanks to the argon spacer and low-e coating applied on the PV Glass. It is fully opaque and blends architecturally with the rest of the façade elements. The building was constructed by Skanska.

Founded in 1887, Skanska is one of the world's leading construction and project development companies. It is very active in its home Nordic markets, as well as other European countries and North America. Skanska's motto is to build for a better society



Property Developer:

hbreavis
General Contractor:
SKANSKA

BREEAM[®]
Excellent
★★★★

CULVER CITY CREATIVE

PHOTOVOLTAIC CURTAIN WALL



low transparency 40 Wp/m²

Culver City Creative, also known as C3, is an award-winning creative office building that emphasizes volume and flexibility with a highly customizable modern design by Genster, the largest architectural firm in the world.

C3 offers 26,143 m² (281,400 SqFt) of unique creative office space to be inspired, be inventive and most importantly, be original. It fits the needs of westside media, technology and entertainment, as well as emerging high-growth tenants looking for a collaborative, high-energy campus environment. TikTok, headquartered in this building, is one of its most renowned tenants.

Engulfed by the Silicon Beach wave, home to the world's most forward-thinking companies, C3's location blends a surrounding tech workforce with desirable distinct residential communities. It is just a few minutes away from the Culver City Transit Center and Metro Expo Line, as well as at a walking distance to the recently renovated Westfield Culver City Mall.

The building integrated a **PV curtain wall** by Onyx Solar, which spans **743 m² (8,000 sqFt)** and it comprised of **24 different sizes amorphous silicon PV glass**.

This architectural solution will generate **30,976 kWh** and will prevent the emission of 20,754 Kg of CO₂ into the atmosphere every year.



HEINEKEN BREWING FACTORY

PHOTOVOLTAIC CLADDING AND CURTAIN WALL



Client: Heineken Mexico

"The greenest beer factory of the world will feature Onyx Solar's PV glass".

Onyx Solar's transparent photovoltaic glass has been installed both in curtain wall and cladding structures across the new facility that Heineken has built in Meoqui, Mexico.

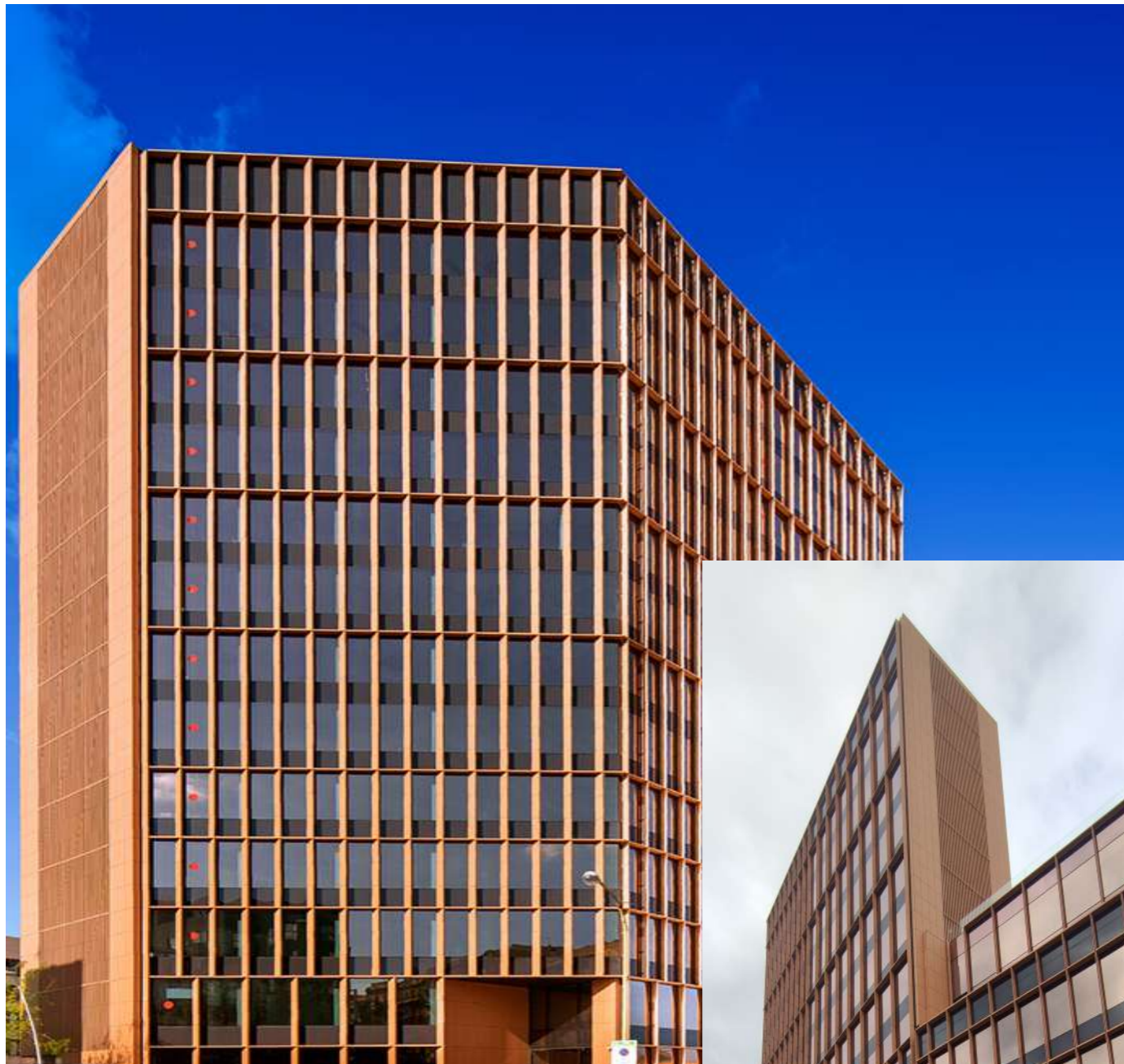
The new plant is able to fabricate up to producing 5 million hectoliters per year, and was designed to be the greenest factory in Mexico.

The client requested Onyx Solar to fabricate PV colored glass, following their corporate image. Green and red color PV Glass was supplied accordingly, and installed on curtain walls and facades, cladding the building in "sunshine". The energy generated by the photovoltaic glass is not only used by the building equipment itself, but also by Heineken's commercial electrical vehicles, which recharge on solar energy.



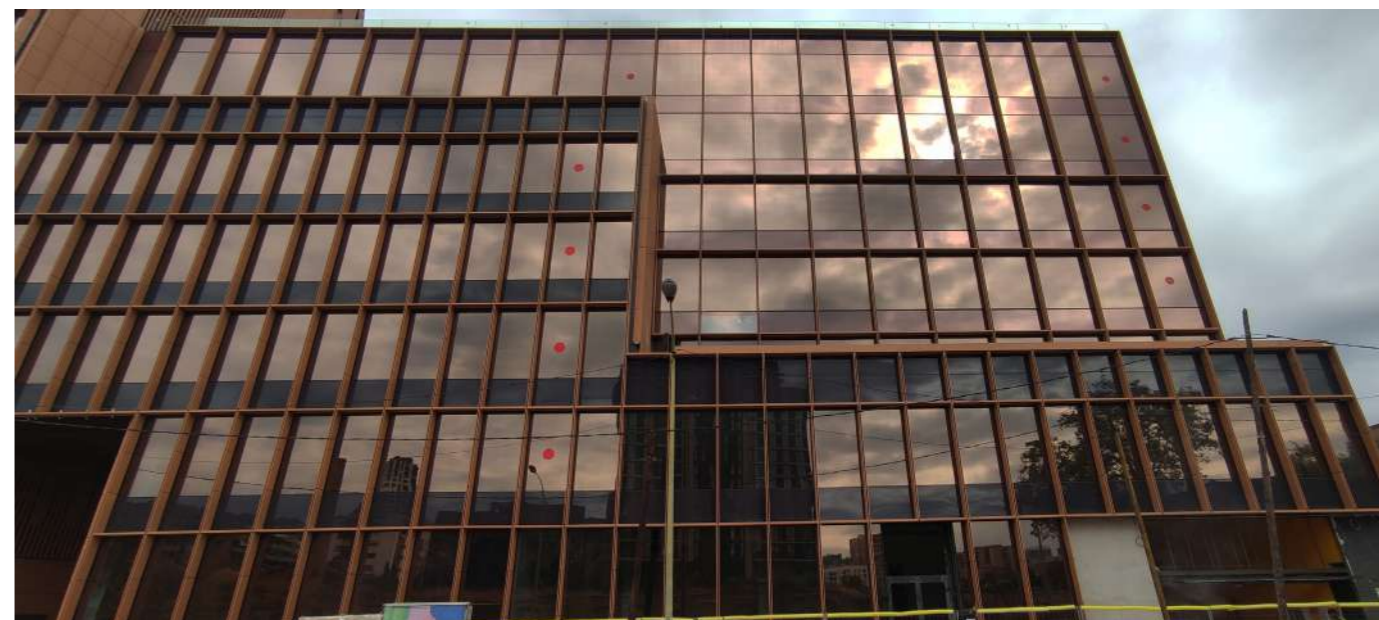
SMART BUILDING

PHOTOVOLTAIC FAÇADE



Onyx Solar has supplied its **amorphous silicon photovoltaic glass** that has been installed as a photovoltaic facade in the **spandrel areas** of the SMART building, located in the city of **Barcelona, Spain**.

The installation has **948 m²** and is composed of 641 units of amorphous silicon photovoltaic glass with several dimensions. Each glass has a **4T + 3.2 + 4T mm** thickness that includes a **color frontal frit that gives it a colorful appearance** and the finishing, optical and structural qualities required in the project.



SMART building is a new concept of an office building that has 24,600 m² and counts with **LEED Platinum, Wiredscore and WELL Gold certifications** thanks to its sustainable and innovative design. The building is located in the technological district 22@, the main technological and digital hub of Barcelona

The building is property of **Meridia Capital**, the leading Real Estate and investment company in Spain. It will be administered by **BNP Paribas Real Estate**, one of the most important international Real Estate service consulting firms. The installation of our photovoltaic glass has been carried out thanks to the invaluable collaboration of **GARCIA FAURA**.



REGENT'S CRESCENT

PHOTOVOLTAIC CURTAIN WALL



Net Zero London 2030 is now closer with a new iconic residential building, Regent's Crescent, installing a photovoltaic façade made of crystalline Silicon PV Glass.

The project consists of 186 m² (2,003 SqFt) of south-facing PV Glass that comes with a grey color front glass, meeting the design criteria and client's aesthetic preferences. Each glass panel is made of two lites of 1/4" tempered glass, and is 2.6 meters tall. It was installed as a rainscreen cladding system using L brackets and an aluminium subframe system.

LARSEN & TOUBRO BUILDING

PHOTOVOLTAIC CURTAIN WALL



Multinational Larsen & Toubro has become an Onyx Solar client with the installation of a photovoltaic curtain wall made of amorphous Silicon PV Glass.

The building is located in **Kancheepuram** (next to Chennai), **Tamil Nadu, India**, and it is an industrial facility with expansive office space.

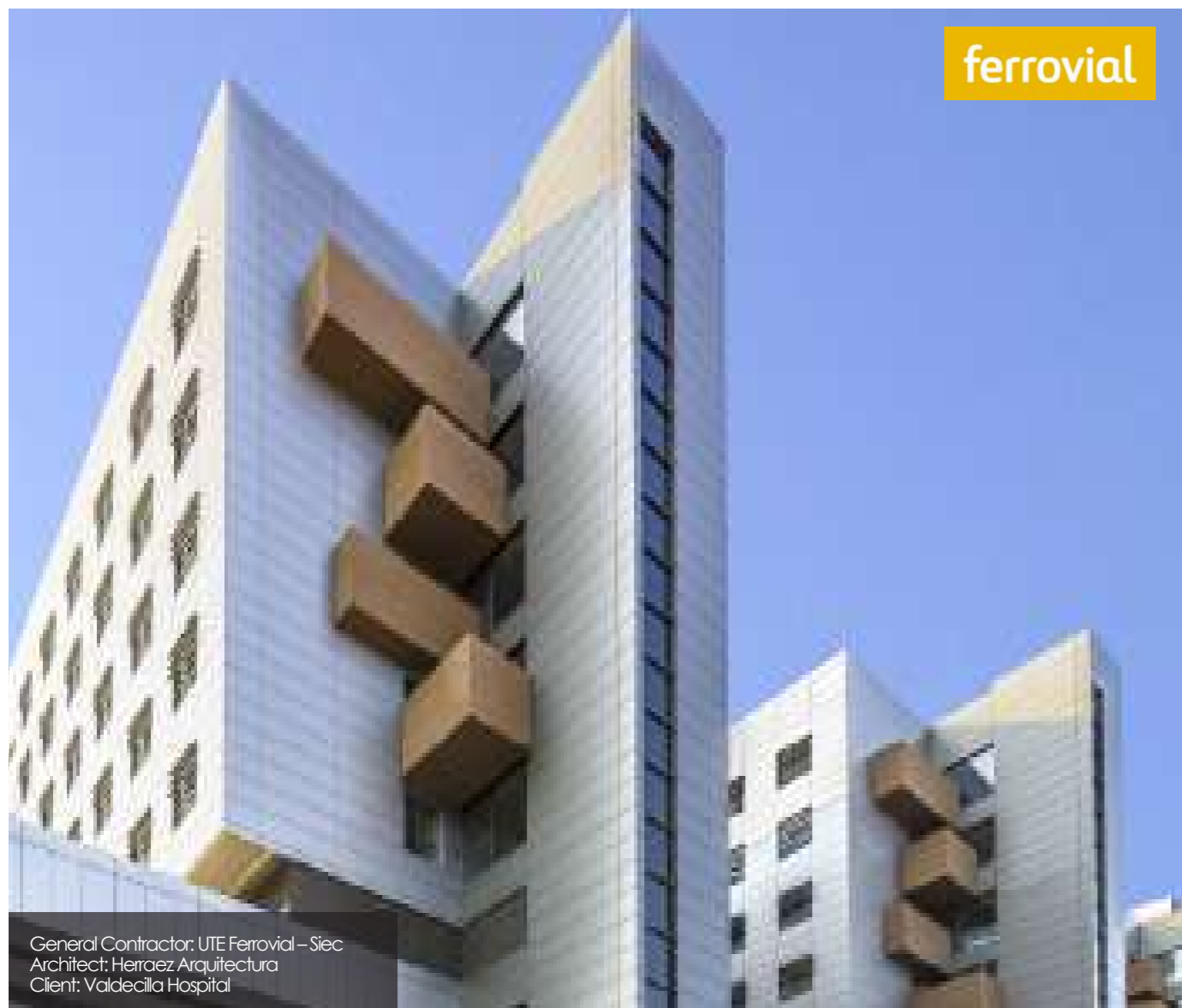
The PV installation covers 300 m² (3,239 SqFt) of façade area, using the 10% light transmittance PV Glass by Onyx Solar. The take-off was a complex one, combining regular, rectangular units and trapezoidal ones. The regular ones measure 1,849x1,245 mm and 2,456x1,245 mm, two of the most standard stock dimensions by Onyx, which optimizes the project's cost-benefit.

Kancheepuram frequently faces temperatures over 40 degrees Celsius (104°F), which makes it compulsory to install high-performing products from a thermal standpoint. The PV Glass supplied by Onyx Solar came with an argon spacer and a low-e coating for this reason.



VALDECILLA HOSPITAL

PHOTOVOLTAIC CURTAIN WALL



General Contractor: UTE Ferrovial – Siec
Architect: Herraiz Arquitectura
Client: Valdecilla Hospital

High efficiency PV Glass for the refurbishment of Marques de Valdecilla Hospital in Santander.

Back in 2013, the famous hospital underwent a complete façade renovation project in order to improve its energy-efficiency and sustainability. It installed fully opaque, crystalline Silicon photovoltaic glass by Onyx Solar on its curtain walls. Each glass measures **1,870 mm x 1,399 mm (6.13 x 4.59 Ft)**, and offers **383 Wp per unit**. In total, the building installed 26.5 kWp, which help the client reduce its HVAC expenses.

Onyx Solar worked with Ferrovial on this project, the main contractor of the project together with Siec.

Ferrovial employs over 69,000 professionals worldwide and has presence in over 25 countries. It belongs to prestigious sustainability indexes such as the Dow Jones Sustainability Index: "At Ferrovial we are totally committed to reducing the environmental impact of all our activities; therefore we use the best technologies developed for this purpose".

MUNICIPALITY BUILDING

PHOTOVOLTAIC CURTAIN WALL



This public building in **Kyrenia, Cyprus**, has installed amorphous Silicon photovoltaic glass on its curtain walls, becoming a more sustainable office space and becoming a benchmark project for other public institutions to follow in the country.

The total area of integration is about **300 m2 (3,230 SqFt)** and the client selected a product with stock dimensions by Onyx Solar, which made it even more affordable to moving forward with this innovative applications. Each glass measures **1,245 mm x 2,456 mm (4' x 2')**, and provides clean, free energy, thermal, and sound insulation to the building.

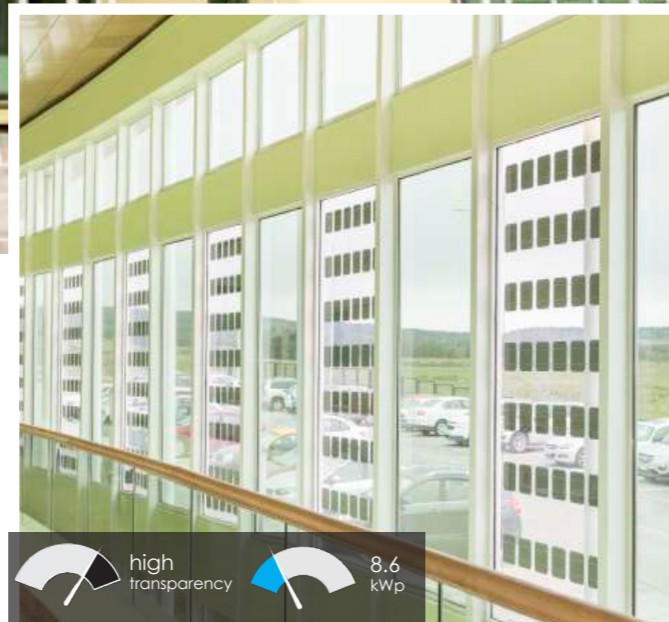




PUNTA ARENAS HOSPITAL

PHOTOVOLTAIC CURTAIN WALL



General Contractor: Salfa Corp
Client: Magallanes Health Centre



 high transparency  8.6 kWp

300 LED light-points working 4 hours a day will be fed by this installation.

Crystalline Silicon solar cells perform very well on vertical applications in locations such as Punta Arenas, Chile, one of the southernmost cities in the world. There, sun radiation is very horizontal, and the solar cells receive tons of direct sunlight when laid out on a vertical setting.



Onyx Solar partnered with SalfaCorp to design, manufacture and supply high-quality crystalline Silicon PV insulating Glass units for this project. The PV curtain wall produces over 5,000 kWh/year and offers an average 70% light transmittance level. This helps decreasing the need for artificial lighting a lot.

Buildings like this play a key role in teaching stakeholders how solar energy has evolved, and how it can be incorporated into building envelopes, since this type of design is easily recognizable and regarded as a contemporary solar energy device.

GOVERNMENT BUILDING

PHOTOVOLTAIC CURTAIN WALL



 medium transparency  34 Wp/m²

This curtain wall, installed in Malta, is made of low-e amorphous Silicon photovoltaic glass modules with a 20% degree of **semi-transparency**, enabling natural light and unobstructed views. This type of glass filters out **99%** of the ultraviolet radiation and up to **95%** of infrared radiation. Its Solar (g) Factor is between **5% and 40%**, depending on the degree of semi-transparency. This is a perfect value to prevent the greenhouse effect.

In this case, the glass incorporates an air spacer that provides a superior thermal performance.

The system size is **3 kWp** and it required **124 different types of glass** to make it work with the existing conditions



IETU BUILDING

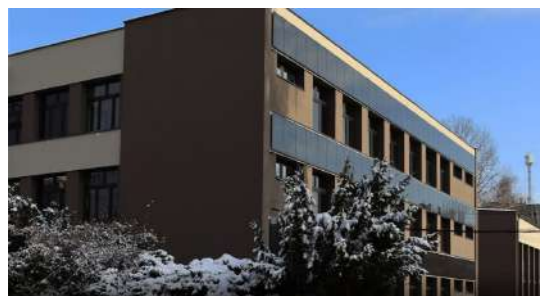
PHOTOVOLTAIC CURTAIN WALL



Onyx Solar has supplied its **crystalline silicon photovoltaic glass** that has been installed in the IETU building, located in the city of **Katowice**, in the south of **Poland**.

The PV glass was installed in the **spandrel areas** of the building, between the floors of the headquarters of IETU (Institute for Ecology of Industrial Areas) institution.

The installation has **113 m²** and it is composed of 98 units of Crystalline Silicon Photovoltaic Glass with 2 different measures of 1,240x865 mm & 1,240x991 mm.



Each module has a glass configuration of 4T + 4T mm and features a black rear frit that brings the glass a black appearance and turns it completely opaque

IETU (known as Instytut Ekologii Terenów Uprzemysłowionych in Polish) is an independent research institute acting under the Minister of Climate and Environment.

FRÖLUNDA KULTURHUS

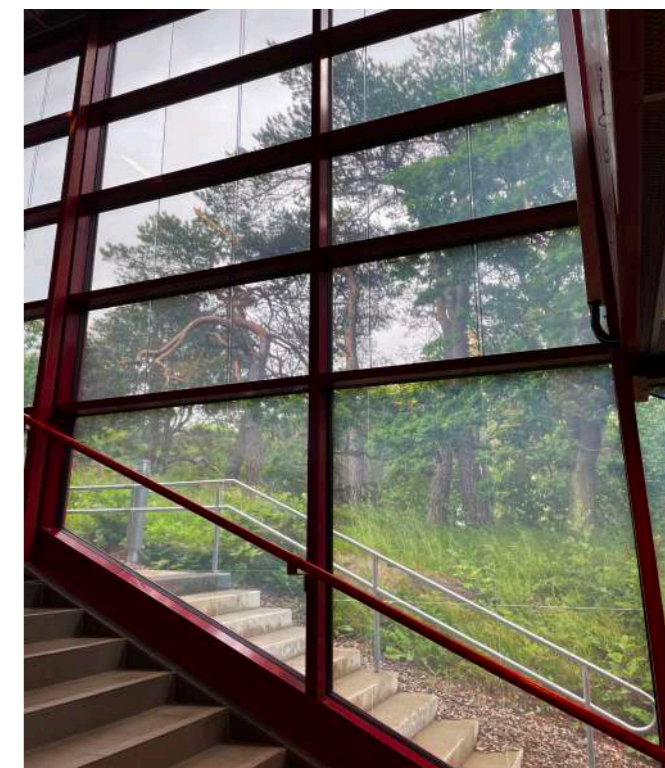
PHOTOVOLTAIC CURTAIN WALL



Onyx Solar has supplied its **amorphous photovoltaic glass** to be part of a one-of-a-kind-project remodeling where the innovative technology was installed as a curtain wall solution in the Frölunda Culture House located in the city of **Gothenburg, Sweden**.

The installation has **251 m²** and it is composed of exactly 161 amorphous silicon glass units with a glass configuration of 4+3+4 mm.

The **customization work** in this particular project has been complex: the PV glass has been designed and manufactured in **more than 60 different sizes** to perfectly adapt to the demanding size and shape requirements of the existing building.



All glass modules feature **4 mm tempered glass Low-E** to minimize the passage of infrared and ultraviolet light, without affecting visible light transmission. It also has a **double 18 mm argon chamber** for **additional thermal and acoustic insulation**, preventing the entry of cold from the outside and maintaining a comfortable temperature.

ELIPSE TOWER

PHOTOVOLTAIC FAÇADE



Onyx Solar's glass has been installed on the façade of 15-story high, luxurious Elipse Tower in Santo Domingo, Dominican Republic. The façade spans **336 m²** and it is made of amorphous Silicon photovoltaic glass in a black color.

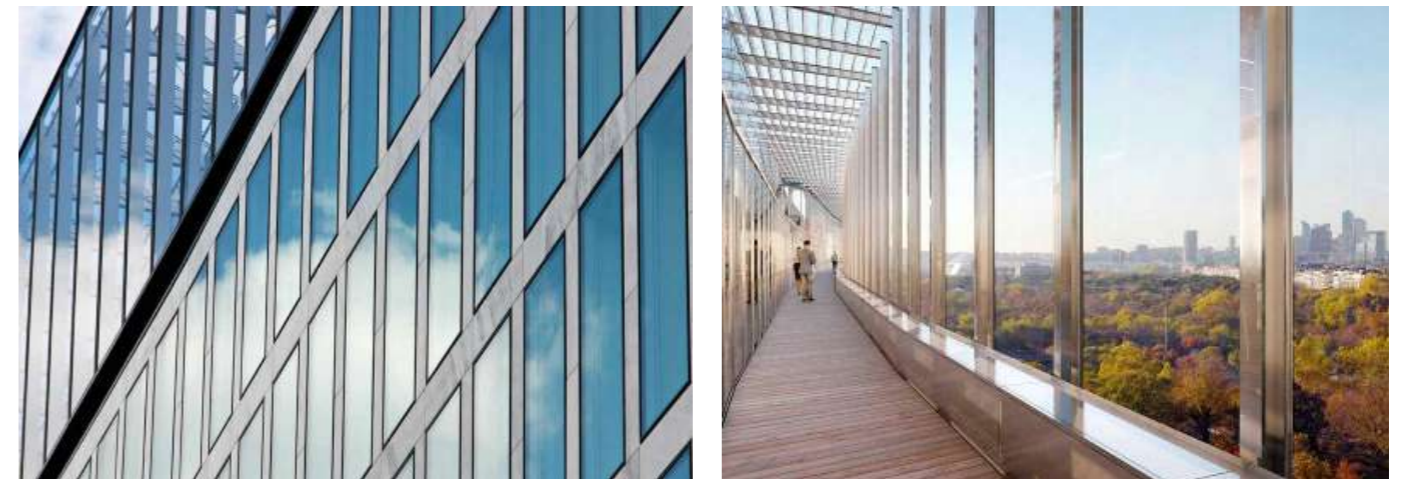
The PV Glass take-off combined two different types of panels with sizes **989x1621 mm** and **989x720 mm**, and it comes with an air spacer for thermal insulation.

The building now produces 279,422 kWh/year thanks to this installation, offsetting 187 tons of CO₂ into the atmosphere. It stands 70 meters tall and it is located in the heart of downtown Santo Domingo.



FREEDOM PARIS

PHOTOVOLTAIC FAÇADE



Onyx Solar's photovoltaic glass has been installed at Freedom Building located in the famous Admiral Bruix Avenue in Paris, France.

The installation covers a total area of 313 m² of façade, located at the penthouse level of the building.

The technology selected was amorphous Silicon glass with a 20% light-transmittance level, which allows the client to enjoy unobstructed views while generating clean, free power from the sun. The PV Glass prevents the emission of 40 tons of CO₂ per year.

This 17,500 m² building was originally designed by PCA Architecture and it is distributed across a garden level, ground floor, and nine floors above ground.

This rehabilitation project aims to update the building and meet current building standards, becoming an energy-efficient, brand new office building.

ENGLISH CENTER SCHOOL

PHOTOVOLTAIC FAÇADE



El "Centro Ingles" bilingual school in Puerto de Santa María, Cádiz, has installed an amorphous Silicon curtain wall using a total of 262 pieces of laminated, insulating photovoltaic glass units.

The glass offers a medium light transmittance level (20%), which allows natural light to pass through the curtain wall and to preserve unobstructed views.



The photovoltaic installation is part of the renovation project called "Looking to the Future" which aims to bring to the building energy-efficiency measures, onsite renewable energy and other innovative sustainability features. The new space counts on large classroom space and common areas.

ROYAL COMMISSION FOR YANBU

PHOTOVOLTAIC CURTAIN WALL

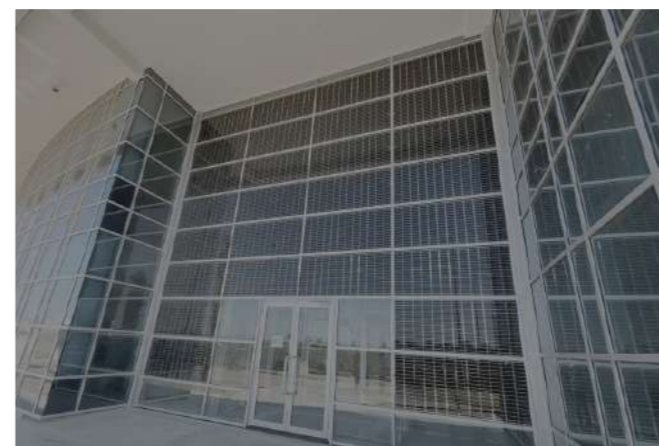


Yanbu's Environmental Safety and Control Department Building (ESCD) in Saudi Arabia has installed a photovoltaic curtain wall using PV Glass from Onyx Solar.

The installation incorporates **57 m2 of crystalline Silicon**, laminated insulating PV Glass panels specifically engineered for this project.

The air spacer infill is **16 mm thick**, so that thermal and sound insulation are guaranteed in an extreme climatic zone like this one.

The PV Glass is located at the main building's entrance, so that it can be highly visible for all stakeholders. The Center is devoted to monitoring and improving the quality of air and water in the region, as well as to manage solid waste and pollution.



KRINGSJÅ SKOLE

PHOTOVOLTAIC FAÇADE



Educational institutions have become authentic pioneers in the adoption of clean technology that can boost their energy-efficiency performance at the same time that it can teach students about the technologies of the future.

"Kringsjå Skole", a 280 student school in Oslo counts now on an innovative photovoltaic curtain wall made of crystalline Silicon PV Glass.



Four different colors have been combined in this application, which demonstrates students of all ages how solar energy has evolved from the early days of conventional solar panels.

The PV glass' double glazing configuration provides a U-value of 0.6 W/m².K, which is ideal for a cold climate such as the Norwegian.

The installation reached 2.8 kWp, and it will avoid the emission of 35 tons of CO₂ into the atmosphere. Also, it provides tons of natural light thanks to its 44% light-transmittance level.

EXCELDOR

PHOTOVOLTAIC FAÇADE



Onyx Solar has completed a photovoltaic project at the new Distribution Center of Exceldor, the Canadian leader in processed food, located in **Quebec, Canada**.

Amorphous Silicon Photovoltaic glass was supplied for its installation on a **curtain wall** application, covering the main building's entrance.

The client installed **54x Onyx Solar PV Glass panels** covering a total area of **54 m²**. Each glass measures **1,245 mm x 1,849 mm**, and offers a **medium light transmittance level (20%)**.

The building consists of a steel structure with a conventional foundation. The building offers several amenities such as a huge freezer made of 3 blasts, a zone for fresh produce, a loading/unloading dock containing 18 doors, a mechanical room, and office spaces.

UNION CITY STATION

PHOTOVOLTAIC CANOPY



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

Onyx Solar® took part in the refurbishment of Union City's high-speed multimodal station near San Francisco, which installed an impressive drop-off canopy made of crystalline Silicon photovoltaic glass by Onyx Solar.

The canopy required almost **800 pieces of laminated**, safety glass with a make-up of 5/16" over 5/16" fully tempered glass.

Each PV Glass panel measures **1,805 mm x 1,137 mm (5.92 x 3.73 Ft)**, and offers 172 Watt/unit.

The total system reached **172 kWp** which convert into **174,280 kWh/year**. This is enough energy to offset **120 tons of CO2** into the atmosphere every year.

The glass features a white color ceramic frit on surface #4 (interior) which partially covers the shape of the solar cells screen print on its reverse side, endowing the interior of the canopy with an elegant, uniform design.

This glass was custom-made for this project, and tested UL 1703, which guarantees the quality of the product and compliance with national standards and regulations.



“ Onyx Solar® was the only company capable of meeting all the requirements for the design of the project, and providing a solution of exceptional quality while working under difficult conditions, with a tight budget and short delivery schedules”.

Ivana Micic, ROMA Design Group.

This photovoltaic canopy was Onyx Solar®'s first large project in the United States and a benchmark project for others to follow. For this reason, it was featured in the cover page of renowned "Glass Magazine" published by the National Glass Association.

The station, included in the Bay Area Rapid Transit (BART) system, operates five lines over 167 km (103.7 miles), and has 43 stations in four counties. This system carries over 320,000 passengers daily, placing it in fifth position of those most used in the United States.

HEWLETT PACKARD

PHOTOVOLTAIC CANOPY



This installation has been executed at the new HP's **3D Research and Development Center** located in Barcelona, Spain.

This is one of the largest and most advanced centers for digital printing worldwide.

This new 50,000 m2 center will be focused on printing engineering and 3D product development.

HP's sustainability agenda aims to cut down on CO2 emissions coming from its operations and facilities, and therefore, products like the ones offered by Onyx Solar can greatly contribute to these goals.

This project consisted of the installation of a photovoltaic canopy made with high solar cell density glass, so to provide shade and generate the most energy possible.

Each PV Glass measures approx **2,890x730 mm** and it covers **a total area of 1,000 m2**.

The total system size reached 138 kWp, enough for the client to offset a good portion of its daily energy consumption



SYDNEY COAL LOADER

PHOTOVOLTAIC CANOPY



The Old Coal Loader in North Sydney has been retrofitted to become a Center for Sustainability, which now counts on an Onyx Solar photovoltaic glass installation.

Onyx Solar engineered and fabricated 64 extra-large photovoltaic glass units for the client, to be installed on a canopy structure using a spider fitting system.

Each piece of glass measures 3,100 x 1,744 mm (10.17 x 5.72 Ft) and comes with a nominal power of 626 Wp/unit. The PV glass is frameless, and its support system provides a clear look through the glass, while the canopy itself provides shelter and shade for visitors all over the world.

MOHAMMED VI UNIVERSITY

PHOTOVOLTAIC CANOPY



General Contractor: Safaralec
Architect: Ricardo Bofill y Elie Mouyal
Client: OCP/ Mohammed VI University

This photovoltaic canopy is almost 600 m² (6,458 SqFt), and it was installed at the entrance of the Mohammed VI Polytechnic University. The pergola endows the complex with an area where users may walk between buildings while enjoying a pleasant, refreshing shade, which is highly needed in locations such as Morocco, where temperature can be extremely high.

For Onyx Solar®, this project posed a manufacturing challenge and an important record due to the size of the PV Glass and the efficiency required for the project.

The PV glass was custom-engineered and counts on 144 crystalline Silicon solar cells per unit, which make up for a total 626 Watt/unit rating.

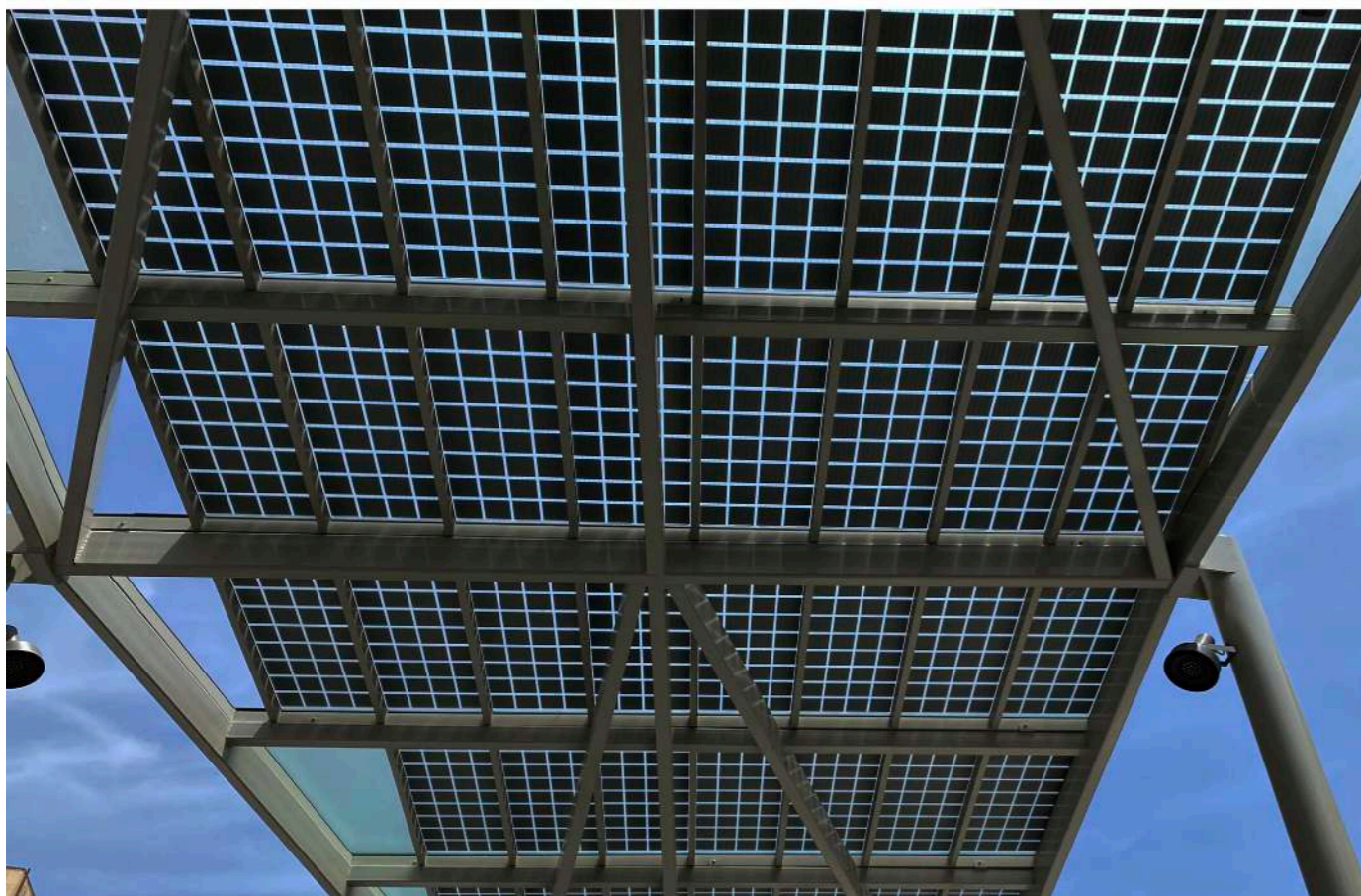
The canopy produces about 135,000 kWh/year and prevents the emission of 100 tons of CO₂/year.

This project was penned by two well-known architects, **Ricardo Bofill** and Elie Mouyal, who preserved the spirit of the Arab latticework in their design. **JACOBS**, a world leader in the provision of engineering and construction services, was tasked with the construction of the canopy.

The Mohammed VI Polytechnic University is located half an hour away from Marrakesh. This project was Onyx Solar's first in Morocco and is included in the "Green Cities" development plan by the Moroccan state group OCP, the largest phosphate exporter worldwide. The new city covers a surface area of 1,000 hectares and features extensive greenfields.

PLAZA CIUDAD DE BRUJAS

PHOTOVOLTAIC CANOPY



Onyx Solar has supplied its **crystalline silicon photovoltaic glass** that has been installed as a photovoltaic canopy system in the Plaza Ciudad de Brujas, a renowned square located in the center of the city of **Valencia**, in **Spain**.

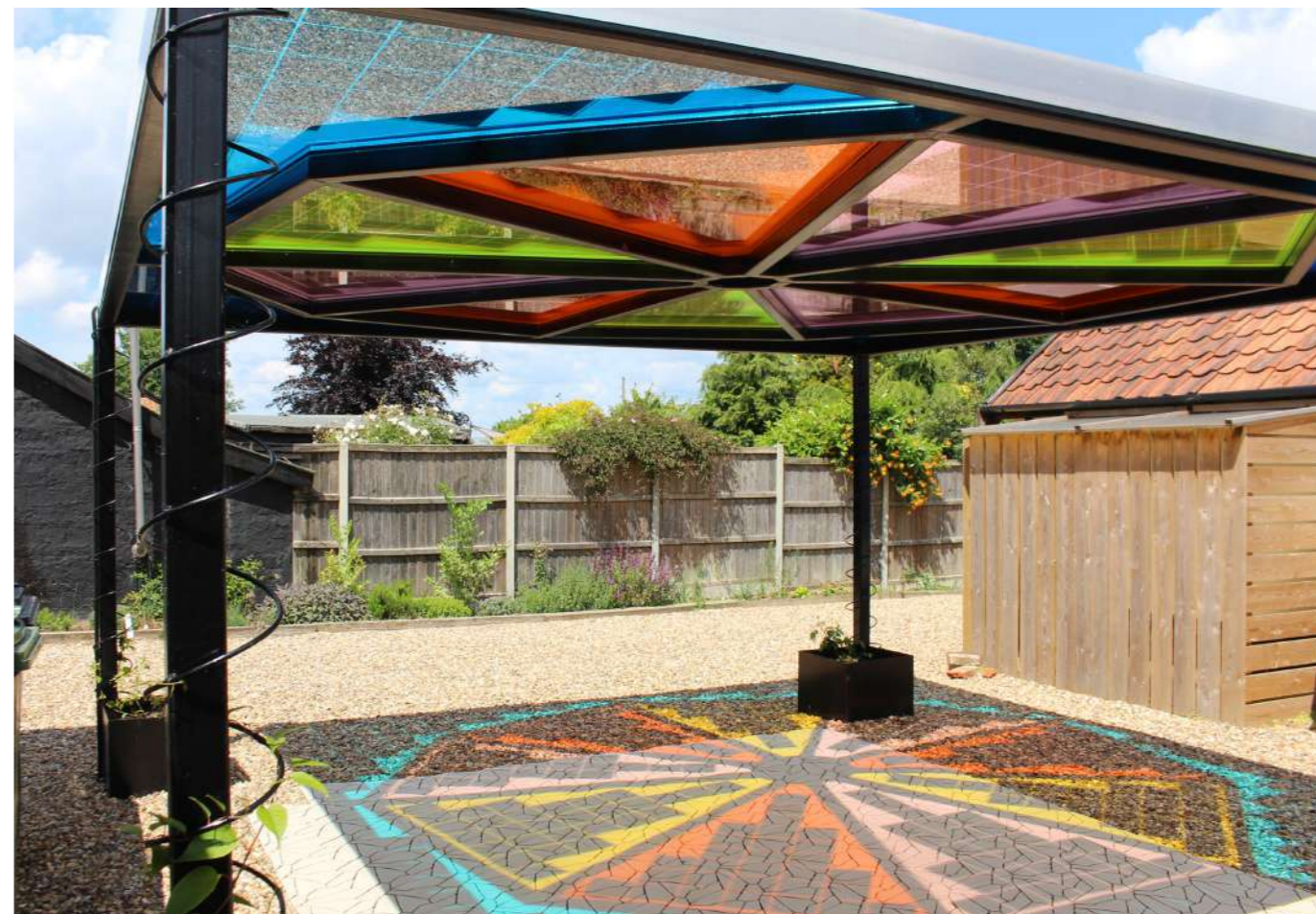
The installation has **197 m²** and it is composed of 151 units of crystalline silicon photovoltaic glass with 8 different measures ranging from 1,646x720 mm to 2,436x720 mm. Each module has a glass configuration of **6T + 6T mm**.

The canopy is placed in the square called "Ciudad de Brujas" (city of Brugge in English), an **historic square in the center of the historic city of Valencia**.



COLOURED CANOPY

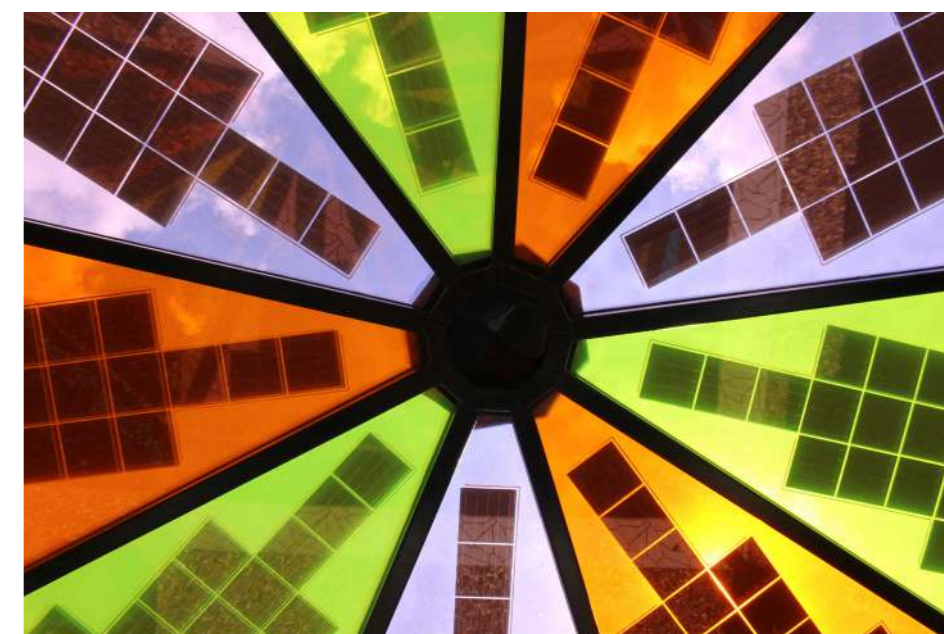
PHOTOVOLTAIC CANOPY



Onyx Solar has supplied its **crystalline silicon photovoltaic glass** that has been installed as a photovoltaic canopy system in a private house in **Norwich**, in the **United Kingdom**.

This canopy is made up of 3 different sizes of **trapezoidal mono-crystalline glasses** with a **coloured PVB layer** inside that bring a colourful appearance. It has been provided 9 trapezoidal coloured glass units of 1,400x1,847 mm and 4 trapezoidal blue glass units of 2,554x1,457 mm (installed in the corners of the structure).

Each PV glass units also incorporates a **12 mm air chamber** that improves the thermal comfort of the users while generating clean and free energy that will reduce the energy bill of the house.



ALGARVE PRIVATE RESIDENCE

PHOTOVOLTAIC CANOPY



The Algarve in Portugal, a high-end touristic area in the south of the country, has become a top holiday destination for many European and American travelers. It receives, 3,000 hours of sunlight a year.

There, Onyx Solar's photovoltaic glass uses all that sunlight to provide clean and free electricity to the residential building whose owners decided to install a **PV canopy** made with our glass.

The installation covers an area of **48 m² and reaches 4.8 kWp**. Its payback time is less than three years.

The energy generated by the canopy will be used to feed the building's needs, and it will offset **150 tons of CO₂**.



US EMBASSY OF JAKARTA

PHOTOVOLTAIC CANOPY

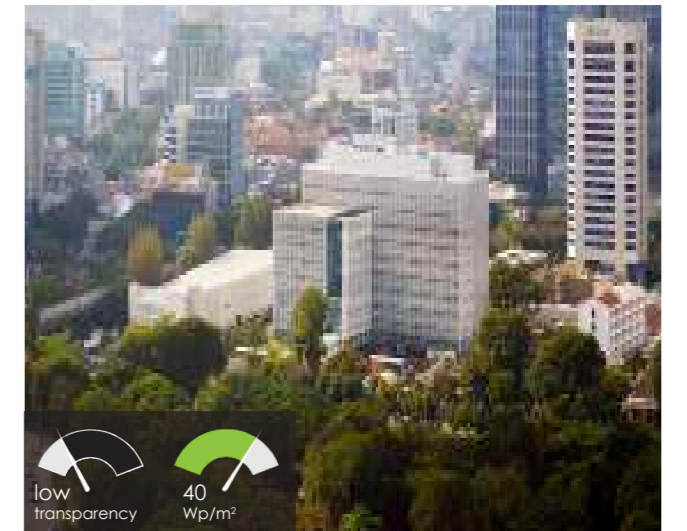


Client: U.S. Department of State - Bureau of Overseas Buildings
 General Contractor: B.L. Harbert International
 Partners: Page

Designed and built by renowned BL Harbert International, this new state-of-the-art, **4,366 m² (47,000 SqFt)** complex incorporates a photovoltaic canopy made with Onyx Solar's amorphous Silicon semi-transparent glass.

Each glass offers a **10% VLT and filters 99% of harmful UV radiation**; the total system size is 9.4 kWp, and it will help reducing the building's carbon footprint while decreasing its electricity bill.

The embassy in the historic center of Jakarta, surrounded by National Government offices, and it provides workspace for approx. 1,300 employees, who enjoy the benefits of green building practices.



SYNOVO BUILDING

PHOTOVOLTAIC CANOPY



Onyx Solar has supplied its crystalline silicon photovoltaic glass that has been installed as a photovoltaic canopy in the new building build-in 2021 of the pharmaceutical company Synovo located in **Tübingen**, a city in the south of **Germany**.

The installation has **148 m²** and it is composed of 57 monocrystalline silicon photovoltaic glasses with **8 different measures 100% customized** to the existing metal structure.

The longest reached 4 meters long!



This is an excellent example of the adaptability of our company to our client's needs, since we are able to manufacture **the longest photovoltaic glass in the market (4,000 x 2,000 mm)**.

Synovo GmbH is a drug discovery company with a primary focus on inflammation and innate immune processes. This is a leading pharmacology and biomedicine company that are continuously innovating to find new medicines and treatments against different diseases.

This project wouldn't be possible without the inestimable collaboration of **Onyx Solar Germany** and Reiner Mack, our distributor and local partner for the German market.

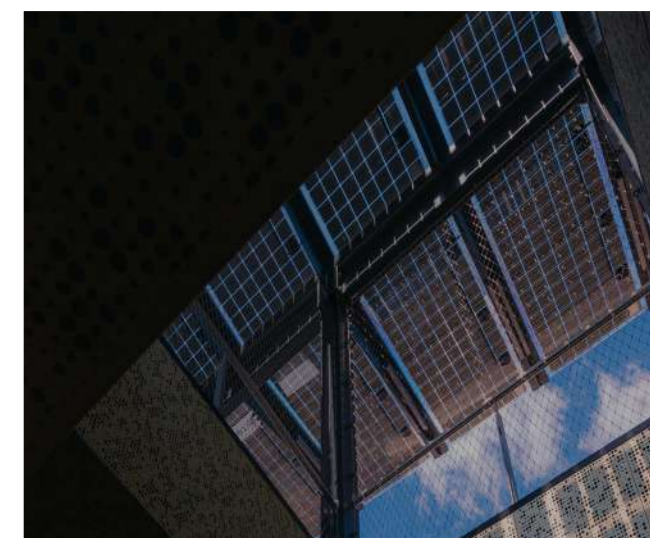
RAILWAY STATION

PHOTOVOLTAIC CANOPY



Onyx Solar has supplied its innovative solar technology to be part of a one-of-a-kind-project where photovoltaic glass was installed into a canopy in the Como Railway Station located in **Sydney, Australia**.

The installation has **87 m²**, and it is composed of **32 crystalline silicon photovoltaic glass units** with a glass configuration of **6T+6T mm** and different measures.



The station is now sustainably powered with solar energy during the day thanks to the PV glass system that provides a reliable, clean source of power and increases the resilience of Transport for NSW's energy supply. Besides, **it filters out the harmful UV & IR rays**, enhancing the passenger experience.

Opened in 1885, Como Railway Station is located on the Illaware line, serving the Sydney suburb of Como. It has transformed into a **beautiful and unique modern facility** that caters for **sustainability and aesthetics**.

TONY GALLARDO PARK

PHOTOVOLTAIC CANOPY



Client: Tony Gallardo Park
Architect: Romera y Ruiz Arquitectos

Tony Gallardo's Park has counted on Onyx Solar to supply 30 pieces of photovoltaic glass to be installed on a newly designed sustainable canopy.

The PV Glass is made of crystalline Silicon solar cells and measures 1,800 mm x 900 mm. The total system size is 5.3 kWp.

Park visitors can now enjoy the comfort of a shaded area, which prevents the heat island effect while providing shelter and clean energy to anyone that visits it.



COMPUTECH CITY

PHOTOVOLTAIC CANOPY



Client: Computech City
Architect: Process Architecture



CompuTech City is one of the most important IT infrastructure management and service companies in Florida. Its new headquarters building, located in Lakewood, near Orlando features a cantilevered canopy that surrounds the building's roof.

The project consists of a PV canopy with 200 units of crystalline Silicon laminated, safety glass panels

Each glass measures 1,641 x 989 mm (4.08 x 2.08 Ft).

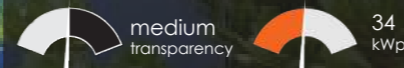
Onyx Solar's PV glass is not only aesthetically pleasing but also highly efficient thanks to the clean, free power that it generates.



HAWAII PRIVATE RESIDENCE

PHOTOVOLTAIC CANOPY

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



This photovoltaic canopy, made of crystalline silicon glass, is located in Hawaii, where a high-end residential building enjoys all its environmental and efficiency benefits.

The canopy is made of **320 PV glass panels** made entirely to measure for this project. Such panels consist of two layers of 5/16" tempered, laminated safety glass, measuring **1,943 mm x 1,016 mm (6.37 x 3.33)**.

The total installed power capacity reached **34 kWp**, which turns into **58,000 kWh** year, enough power to feed **3,300 lights-points** working four hours a day, and to offset **38 tons of CO₂** emissions.

Also, The glass features a dot-pattern ceramic frit on surface #4 (interior) which provides superior aesthetics and an optimized suncontrol effect.



RANCHO SANTA FE RESIDENTIAL

PHOTOVOLTAIC CANOPY



The Onyx Solar PV Glass has been installed on the terrace of a high-end residence in Rancho Santa Fe, California. Particularly, a photovoltaic canopy made of crystalline Silicon PV Glass provides shade and clean power to the owners of this elegant construction.

The system totals 4.6 kWp and it will generate about 205,000 kWh over its lifespan, enough energy to provide the client with a good bill discount.

The PV Glass comes in a laminated composition, 5/16" over 5/16" fully tempered glass, and there are a total of six different glass dimensions, ranging from 1,600 mm x 914 mm to 2,896 mm x 914 mm).

The PV Glass was designed to combine a good balance between shade and output, and therefore it counts on a medium solar cell density, where all solar cells come close at string level, and there is a significant distance between cell strings.



SUSTAINABLE PLANET ADVISORS

PHOTOVOLTAIC CANOPY



Sustainable Planet Advisors, one of Onyx Solar's official partners in Spain, completed the installation of a photovoltaic canopy made with crystalline Silicon photovoltaic glass.

This is a demonstration/showcase project that will allow their customers understand how a PV canopy looks and works.

Each PV Glass measures 1,700 mm x 1,000 mm and it is made of two plies of 5/32" tempered glass. In total, the installation reaches 2.5 kWp, a good size for a demo project.

The project is located in Artana, Spain, where Sustainable Planet Advisors are headquartered. The company focuses on the clean energy space, providing renewable energy sources and energy-efficiency assessments for clients interested in becoming more sustainable while decreasing their reliance on fossil fuels.



VILLA KAUST UNIVERSITY

PHOTOVOLTAIC CANOPY



Thuwal is a small village 80 km North of Jeddah in the Kingdom of Saudi Arabia. Its University, King Abdullah University for Science and Technology (KAUST) has installed three photovoltaic canopies made of crystalline Silicon PV Glass by Onyx Solar.

The combined photovoltaic area covers 133 m², which is comprised of 95 PV Glass units with dimensions 1,650 mm x 850 mm.

The PV Glass canopies provide students with shelter and shade, at the same time that they feed the building with clean, renewable energy onsite.

Back in 2010, this innovative and sustainable KAUST campus earned LEED Platinum by the U.S. Green Building Council. Besides, it was Saudi Arabia's first LEED-certified project.



ST. BARNABAS AFFORDABLE HOUSING COMPLEX

PHOTOVOLTAIC CANOPY



Located in the Bronx, across from the St. Barnabas Hospital campus, this project consists of two residential towers that are separated by a landscaped terrace, atop a mixed-use podium.

The taller tower features a roof-top agricultural farm. Together, the 11-story and 7-story residential towers have 181 affordable apartments with approximately 187,000 square feet of residential space.

The north tower has a **photovoltaic canopy** with solar Onyx glass on the roof. **44 units of Crystalline silicon PV glass** have been installed, adding a total canopy area of 950 SqFt.

The nominal power of each PV Glass unit is 291 Watt and its dimensions are **1,977x1,009 mm**. . The total system size is 13 KWp. The building complex was designed by Dattner Architects.

MARRIOTT HOTEL

PHOTOVOLTAIC ROOF



Imperial Beach's Pier South Marriott Autograph Collection Hotel has installed a photovoltaic glass installation on its courtyard roofs, which demonstrates the flexibility in design that contemporary photovoltaic glass can bring to any project.

Modern in every sense, Pier South Hotel stands out in terms of sustainability and energy efficiency. It achieved **LEED Silver Certification by the US Green Building Council.**

The PV Glass had to cover an oval rooftop space, so trapezoidal photovoltaic glass units had to be specifically engineered for the project in order to follow the shape of the roof. A total of **55 different types of PV Glass** were required to complete this project.

The PV Glass is completely frameless, and it is supported on four clamps that attach the PV Glass to the aluminum rails mechanically, ensuring they withstand the wind uplift.

STREET FURNITURE

PHOTOVOLTAIC FURNITURE



Onyx Solar's photovoltaic glass has been installed on public canopies in Sydney, which will provide clean and free energy to the community.

This public initiative is called the ChillOUT Hub, a project collaboration between the Georges River Council, UNSW and Street Furniture Australia, which seeks to modernize public infrastructure and urban furniture across the region.

These ChillOUT spaces were designed to foster connectivity, meeting & playground space.

These Hubs provide free wifi, charging stations, seats and coffee tables for citizens to enjoy while in the outdoors.

These photovoltaic canopies provide pedestrians with an opportunity to relax, connect with the community and immerse in nature.

CORISON WINERY

PHOTOVOLTAIC ROOF



Located in the heart of St. Helena, California, Corison Winery has always been known for its commitment to quality and the craftsmanship in the fabrication of their fine wines. Now, they will take lead in sustainability and design, by installing a photovoltaic glass in their roof that color-matches exactly the metal panel of the roof. It is a dark-green color that goes extremely well with its surroundings landscapes of Napa Valley.

Cathy Corison and William Martin, owners of Corison Winery, knew their roof was due for an update and wanted to go solar.

Onyx Solar custom-fabricated 148 photovoltaic glass panels to match the color required by the client, working with a colored solar cell and a colored back substrate. Each glass measures 1,700 mm x 1,000 mm and offers 226 Wp.

The installation covers a total area of 250 m² (2,700 SqFt) and reaches a total nominal size of 21.4 kWp.

Anado un quote by Cathy Corison:

"Our mission at Corison Winery is to produce world-class Cabernet Sauvignon with integrity. With this intention, one of our founding principles is to minimize negative impacts on the environment." Cathy Corison, Winemaker.



ZARAGOZA BUS STOP

PHOTOVOLTAIC BUS STOP



Onyx Solar has completed a **new street furniture project** using **crystalline silicon technology** in **Zaragoza, Spain**.

This bus shelter is powered by photovoltaic glass made of high-efficiency crystalline Silicon solar cells. The power generated by the glass ceiling will feed the information panel and courtesy LED lighting of the shelter.

The resulting object meets the needs of an element of urban furniture that offers seating, shade, protection from wind and rain, lighting, and information, while maintaining a sustainable model powered only by sunlight.



METRO CESAR CHAVEZ

PHOTOVOLTAIC TRANSIT PAVILION



Onyx Solar has supplied its photovoltaic glass products for Metro L.A.'s brand new Cesar Chavez Transit Pavilion.

The project features several photovoltaic glass canopies with a triangular shape, which required a completely custom-engineered product by Onyx Solar. The client selected amorphous Silicon solar cells for the PV Glass, which would allow unobstructed views through the glass, and make it look like conventional, architectural glass.

Each PV Glass comes in a triangular shape of 2,375 mm x 1,372 mm, and the project was designed by Gensler, one of the top sustainable architecture firms worldwide completed a new project at the new Cesar Chavez Transit Pavilion using our Photovoltaic Glass in Los Angeles, United States. It is a new, state-of-the-art transit pavilion at the Cesar Chavez Metro station bus stop.

The city of Los Angeles is a member of the **Global Covenant of Mayors for Climate & Energy**, a global coalition of municipal pioneers committed to fight climate change.

All these mayors acknowledge the importance of decreasing CO₂ emissions, and they encourage the incorporation of innovative technologies and solutions within their cities. More than 10,000 cities of 138 countries around the world have committed to the pact, representing 973 million people.



ANATOLIA COLLEGE

PHOTOVOLTAIC SKYLIGHT & CURTAIN WALL



Anatolia College - STEM Center in Thessaloniki, Greece counts now on a photovoltaic curtain wall and skylight made of PV Glass by Onyx Solar.

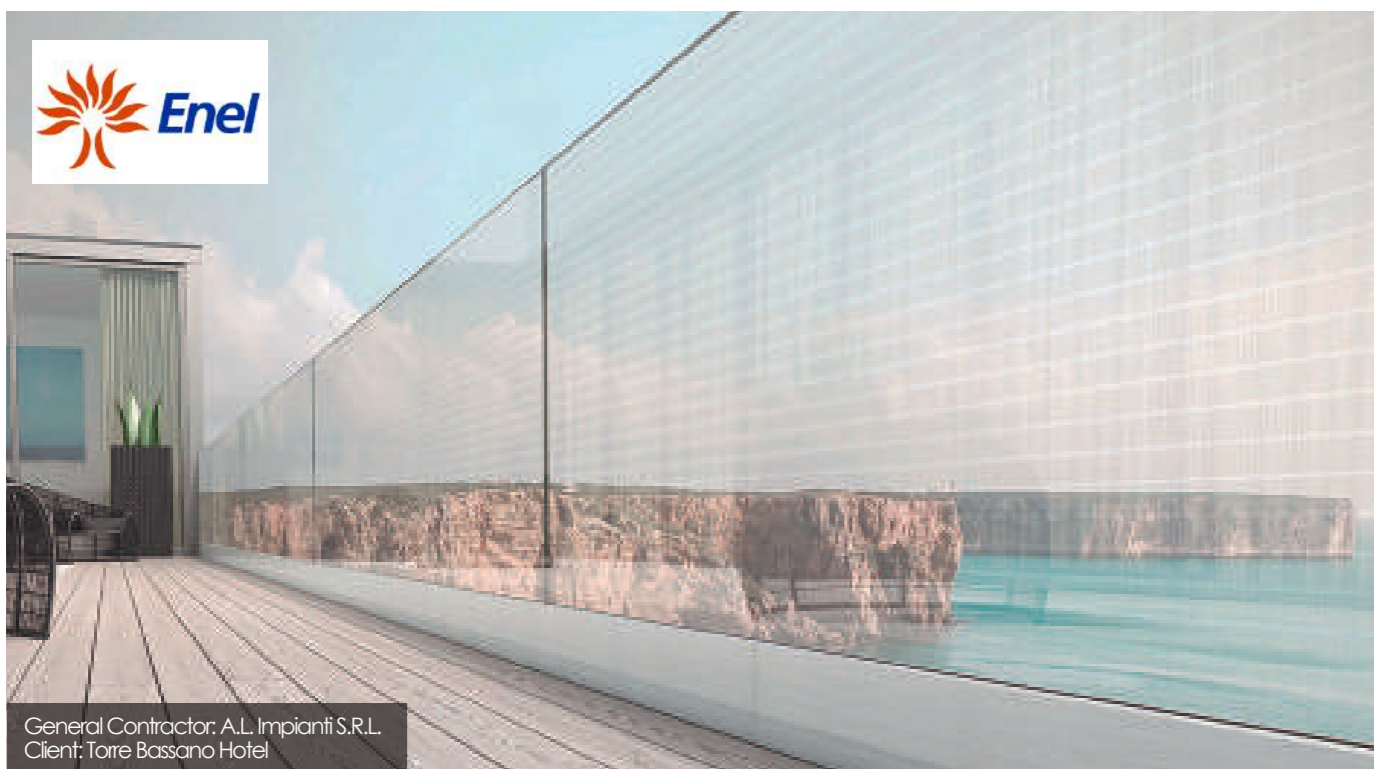
The institution focuses on creating innovative and sustainable solutions for the prevention, diagnosis, treatment & transmission of pandemics and epidemics. Their brand new building has been designed to meet stringent energy-efficiency requirements, including energy-generation onsite.

The photovoltaic glass supplied by Onyx Solar was made of crystalline Silicon cells and it comes with a 16 mm argon spacer and a low-e coating for a better thermal performance.

Students can now enjoy a comfortable indoor space and learn from an installation that will feed their building with clean, free power from the sun.

TORRE BASSANO HOTEL

PHOTOVOLTAIC RAILING



General Contractor: A.L. Impianti S.R.L.
Client: Torre Bassano Hotel

This photovoltaic balustrade comprises **342** amorphous silicon photovoltaic glass panels, fully custom-designed to meet the project's take-off. Each PV Glass is **1,128 mm x 950 mm (3.7 x 3.11 Ft)**, and comes with a 30% see-through degree, so that the hotel guests can enjoy breathtaking views to the Mediterranean sea.

The PV Glass make-up consists of tempered laminated glass of **8 mm + 3 mm + 8 mm (0.3 x 0.11 x 0.3 inch.)**, to withstand the wind loads in the area. The railing system used is a frameless-like balustrade with a U channel that captures the PV Glass at the floor level. That channel covers also the junction box of the glass, resulting in a completely clean installation.

The total system size reaches **11 kWp** which will provide the hotel with **11,000 kWh/year**, preventing the emission of **7 tons of CO2 per year**.

The installation of the balustrade was executed in cooperation with **Enel**, the largest electricity company in Italy and the second largest in Europe.



BALUSTRADE ECOBUILDING

PHOTOVOLTAIC RAILING



Onyx Solar has supplied **340 m2 of 30% transparent**, amorphous Silicon glass to the Eco-Building Generation Office Building at Shanghai's Technology Park. The PV Glass has been installed as a balustrade, which receives large amounts of solar radiation every year.

The system is expected to generate **200,000 kWh** over its lifespan.



GEORGE WASHINGTON UNIVERSITY

PHOTOVOLTAIC FLOOR



General Contractor: Hubert
Client: George Washington University

The first walkable photovoltaic glass floor system in the world was installed at the George Washington University's (GWU) Virginia Campus back in 2013, featuring a total of twenty-seven 2' x 2' photovoltaic glass tiles made of amorphous Silicon solar cells.

The PV Glass tiles come with a textured #1 surface (exterior), which provides the product with anti-slip properties, so that it can be safely walked on.

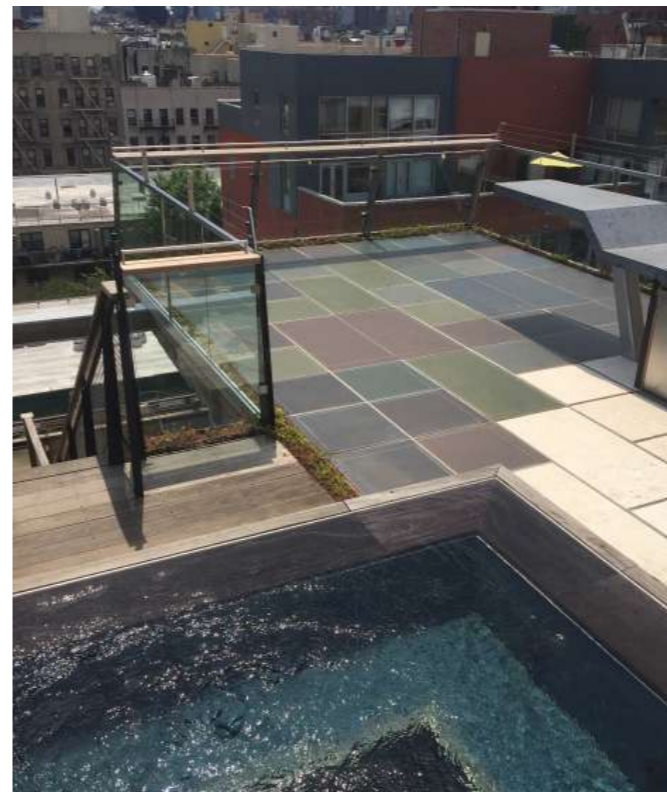
Despite this demo project is small (405 Wp), it will produce enough power to feed **450 LED light points**.

The PV Glass meets the most stringent codes and standards, and it can withstand up to 450 kg punctual load. It was installed on a PVC pedestal system, so it works as a conventional raised-access floor system.

The PV photovoltaic floor tiles are patented by Onyx Solar.

MANHATTAN PENTHOUSE

PHOTOVOLTAIC FLOOR



Penthouses in cities like New York can greatly benefit from the installation of photovoltaic floor systems. Tenants and owners do not have to give up any single square foot of roof space in order to install solar panels.

Photovoltaic glass floor systems (raised-access floor systems) allow clients to install the solar energy that they need while preserving the entire rooftop space, which can be best used as an amenity space. This approach will increase the property's value (lower operating expenses and larger amenity space) while allowing clients meet up and coming local regulations and laws, including Local Law 97 in the case of New York City.

This project installed in New York combined amorphous Silicon photovoltaic floor tiles together with a ceramic tile, creating a unique, vibrant space that allows the client to generate clean energy from the sun.

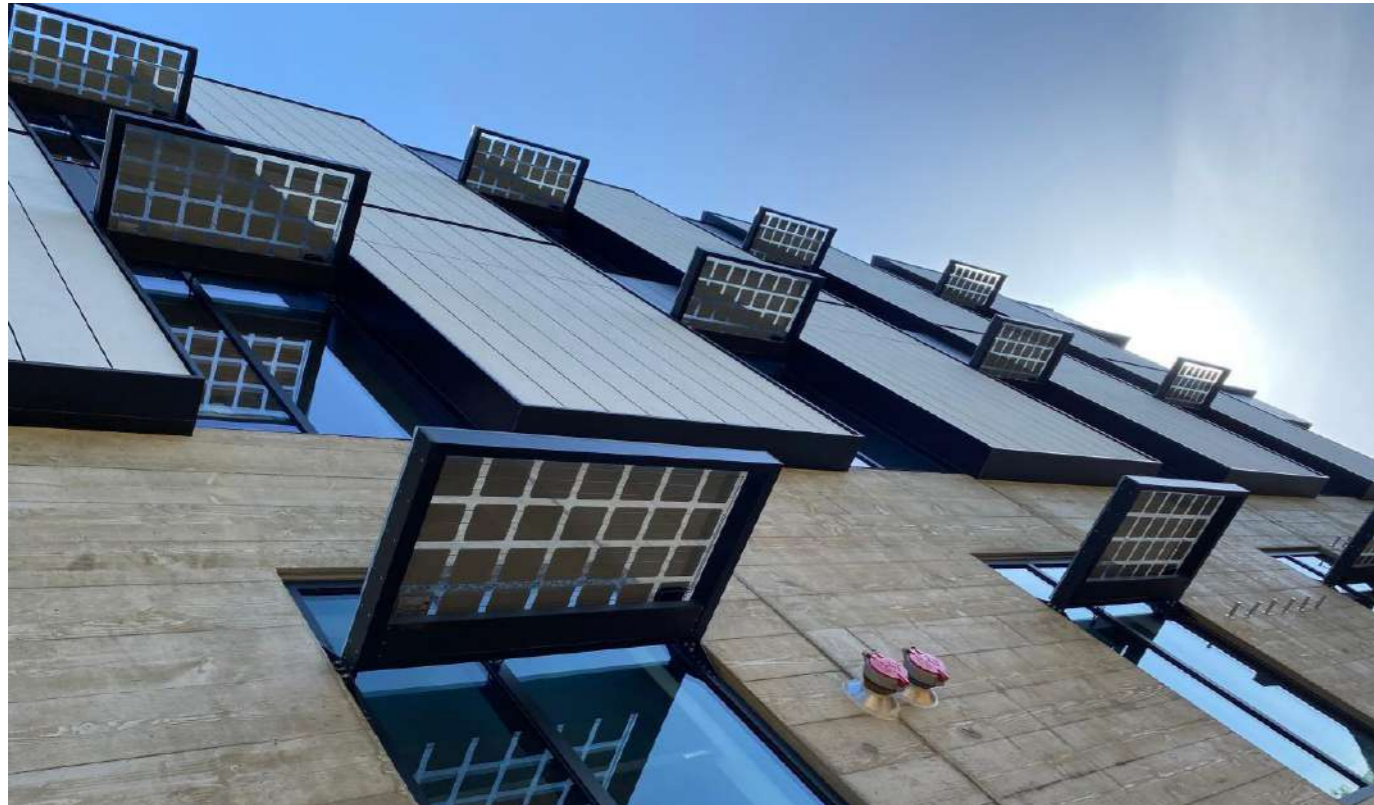
The PV Glass was mounted on an IPE wood grid by Solar Deck; it comes in several colors that pop-up at night thanks to the LED backlit system installed by the contractor.



Design Team: Ethan Ames - SolarDeck and Oisín Clancy - Smart Roof
Project Design: Smart Roof NYC in collaboration with and installed by Solar Deck
Client: confidential

LAKE OSWEGO CITY HALL

PHOTOVOLTAIC SUNSHADES



Onyx Solar has supplied its crystalline silicon photovoltaic glass that has been installed as **photovoltaic sunshades** in the New City Hall of Lake Oswego, in Oregon (United States).

The installation has **29 m² (313 sqft)** and it is composed of **21 units of crystalline silicon photovoltaic glass** with 3 different measures of 1,159x913 mm, 1,464x913 mm & 1,768x913 mm. Each module has a glass configuration of **6T + 6T mm**.

The PV sunshades will provide **shade to the windows** of the facilities, which will be really appreciated as a tool to **reduce the direct sun exposure** of the building while generating free and clean energy that will **reduce the energy bill** of the facilities.



SOLAR TREE

PHOTOVOLTAIC CANOPY



Onyx Solar has supplied its crystalline silicon photovoltaic glass that has been installed as a photovoltaic canopy to create a solar tree structure in the **Center for International Grants and Projects at An-Najah National University**, located in the city of **Nablus, Palestine**.

The installation is composed of **12 crystalline silicon photovoltaic glasses**. Each module measures **1,700x1,000 mm** and has a glass configuration of **4T + 4T mm**.

The glasses are perfectly integrated into the metal structure forming a **solar tree**, the first of its kind in Palestine.

The solar tree generates electricity which enables charging **100 electrical devices**, including computers, mobile phones, wheelchairs, and lighting 20 LED lamps



RESIDENTIAL HONG KONG

PHOTOVOLTAIC FLOOR



Onyx Solar has manufactured and supplied several **photovoltaic floor** tiles to be installed on a residential rooftop located in **Hong Kong**.

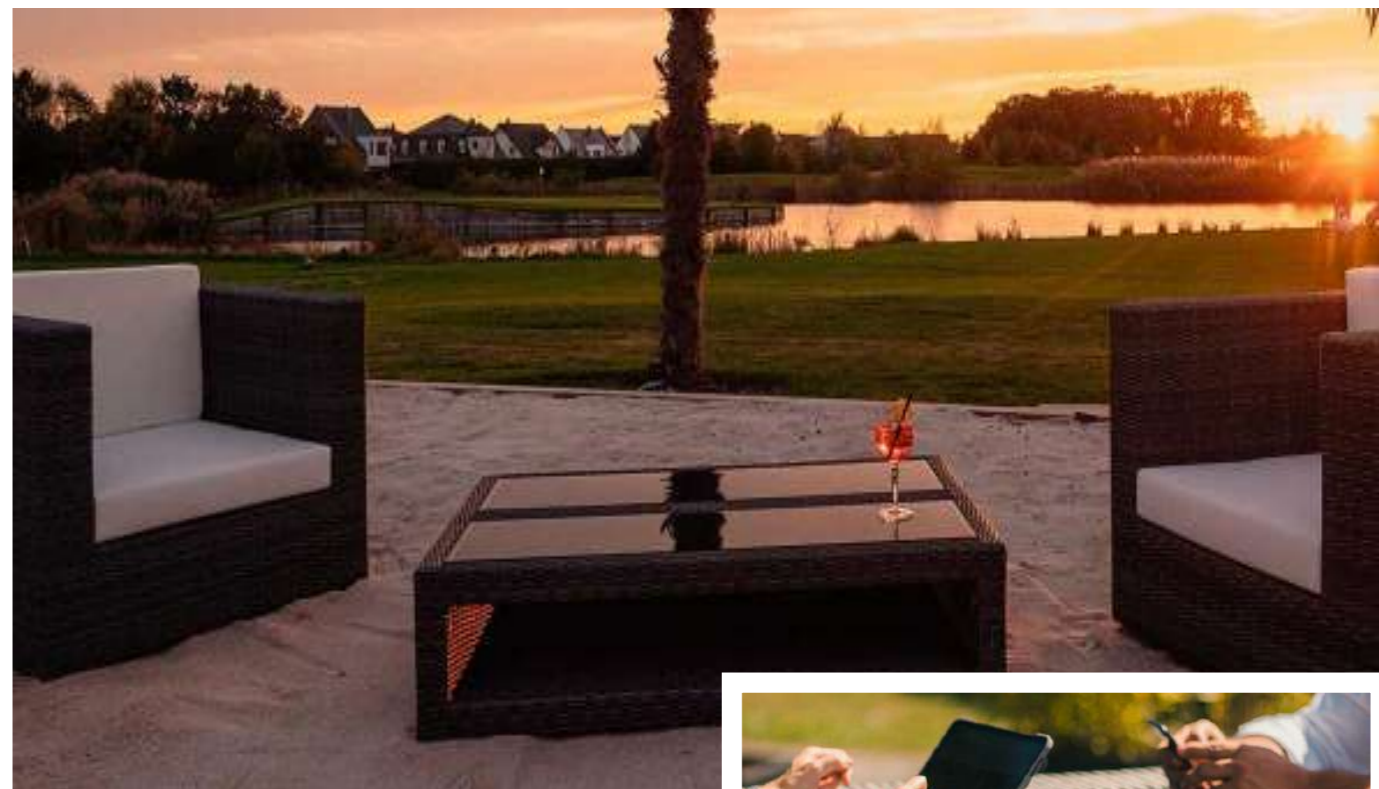
Specifically, The installation was executed on top of the building called Avignon Tower 6, a new construction, residential development that has recently been completed.

Onyx Solar supplied amorphous Silicon, anti-slip PV floor tiles for the project, with average dimensions of 600 mm x 600 mm and a section make-up of 6+3+6mm.

This **photovoltaic installation** allows the owner to **generate free and clean electricity**, while enjoying the entire rooftop space. The PV Glass can withstand 450 Kg point load.

PHOTOVOLTAIC SOLAR TABLES

PHOTOVOLTAIC FURNITURE



Onyx Solar has completed a new project together with the German furniture company **Cucer GmbH**, which integrated **amorphous Silicon photovoltaic glass** into outdoor coffee tables that come with USB charging stations for mobile devices

PV Glass is now more present than ever within the built environment and our surroundings. It can turn any "passive" furniture element into a charging station that works on sunlight. How convenient is this for people running out of battery in the street, or a hotel guests enjoying some time at a pool cabana?

Solar tables and benches combine a modern, stylish design with ecological functionality, bringing added-value to furniture in public and private spaces, and retaining people for longer time when strategically needed.



TERINA MEDITERRANEAN FOUNDATION

PHOTOVOLTAIC SOLUTION PACKAGE

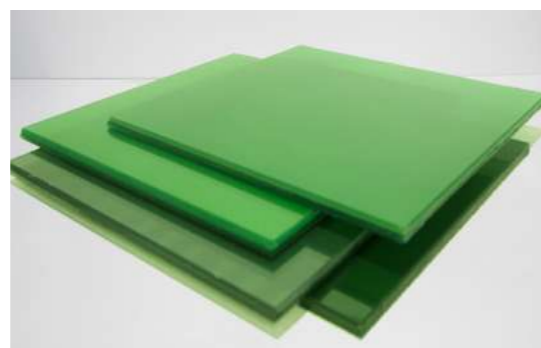


Architect: Architecture Studio Pontoriero
Client: Terina Mediterranean Foundation

The rehabilitation of the Terina Mediterranean Foundation incorporated over 3,000 m² (32,300 SqFt) of photovoltaic glass by Onyx Solar. The project is located in Calabria, Italy, and counts on multiple photovoltaic glass applications, including amorphous Silicon skylights, floors, elevated bridges, and carport structures.

Most of the PV glass supplied by Onyx Solar came in green color so to meet the architectural design intent. Also, the PV Glass features different light-transmittance levels depending on the type of application. Solid, opaque finishes for the floors and carports, semi-transparent, colorful options for skylights and bridges.

The Foundation focuses on agriculture-related research and development activities, as well as on fostering relationships with other institutions and universities working in the same field.



The photovoltaic glass installed at Lamezia Terme is green in colour, one of the colours typical of this region.

“ The “Terina Mediterranean Foundation” research centre awarded Onyx Solar® with a contract to carry out a unique turnkey photovoltaic glass installation made of green colored photovoltaic glass, delighting the architect, owner and students alike.”

Juan Luis Lechon, Engineer at Onyx Solar®.

This project is a great example to learn from when thinking of multiple photovoltaic glass applications for the same building.

Onyx Solar was awarded a turnkey contract, which required Onyx to design, fabricate and install the photovoltaic glass structures. Following its contractual obligations, Onyx Solar designed unique photovoltaic glass systems for the client, which aims to grab the attention of all students within the complex. Therefore, this is not only a project about sustainability, but also about education in new technologies.

The project was a real challenge from the very first moment, however Onyx Solar delivered the turnkey timely and following high-quality standards.



AL-BALQA APPLIED UNIVERSITY

PHOTOVOLTAIC ROOF



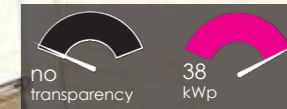
Client: Al-Balqa Applied University

Al-Balqa Applied University (BAU) is **the largest public technical university in Jordan** serving over 21,000 students.

Since its inception, the university has kept great focus on renewable energy and sustainability practices, trying to become a role model institution to learn from.

Its evolving curricula offers students the opportunity to learn about new technologies by continuously incorporating new educational materials in the fields of sustainability and the natural environment in general.

The institution wants to decrease its dependence on fossil fuels by revamping its premises through the adoption of new technologies and renewable energy sources onsite. This will be key for them to keep their O&M costs as low as possible, given the expected electricity rate increases in the coming years.



The objective of this project has been to implement small-scale solar systems in different university buildings, including innovative solutions, such as substitute sheets of photovoltaic glass or photovoltaic coverage of building roofs.

The university implemented several small-scale building-integrated photovoltaic glass systems in order to show students how solar energy can be deployed in different applications and settings.

For instance, the Science & Finance University's building incorporated photovoltaic glass canopies made of crystalline Silicon PV Glass. Each glass measures 1,500 mm x 1,100 mm and comes in a medium transparency level.

These canopies together cover an area of 208 m² and provide a nominal power of 26.60 kWp.

Photovoltaic brise-soleils were also installed on that same building, covering a total area of 191 m² and adding 24.48 kWp to the system. objective of this project has been to implement small-scale solar systems in different university buildings, including innovative solutions, such as substitute sheets of photovoltaic glass or photovoltaic coverage of building roofs. This application will produce 1,354,000 kWh over its lifespan, providing great savings in O&M costs to the client.

BOAT ON THE LAKE OF SANABRIA

PHOTOVOLTAIC SOLAR BOAT



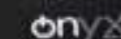
Client: EUROPARQUES

"Helios-Sanabria" is the **first wind- and solar-powered catamaran** in the world, and it incorporates photovoltaic glass by Onyx Solar.

The catamaran features several green crystalline silicon photovoltaic glass modules by Onyx Solar®, with a **semi-transparency degree of 38%**. It is the first 100% environmental-friendly recreational boat to incorporate solar glass as part of its structure.



RESOURCES

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RESOURCES

This section contains all technical and commercial resources you need to know in your journey specifying photovoltaic glass. Use all the resources without limits.

DOCUMENTS



FEASIBILITY STUDIES & ROI



PROJECTS AND REFERENCES



TECHNICAL GUIDE



Onyx Solar® has created a specific website section to support all the A/E/C community with a set of **online tools, technical information and other resources** that ease the understanding and specification of PV Glass. This section is called "**Resources**" and you can freely check it out whenever you need additional information for your next PV glass project.

Among the resources therein included, **you can find PV glass datasheets, installation manuals, projects & references rReferences catalogs, as well as several sample feasibility studies that analyze the economic and environmental benefits of installations with PV Glass across different locations worldwide, while covering different building applications. In addition, you can find a photovoltaic estimation tool (electricity output) and software to calculate the thermal performance of the PV Glass.**



OUR CLIENTS, OUR BEST AMBASSADORS



Somerset Development,
Bell Works (USA)



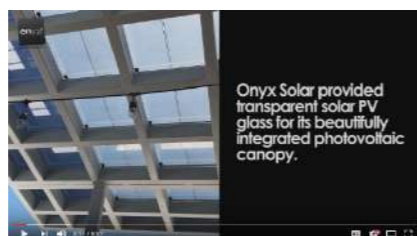
Marriott Group,
Pier South Hotel (USA)



FEMSA/Coca-Cola,
(Mexico)



ROMA Group,
Union City Station (USA)



SAA Associates,
Madrona Marsh NC (USA)



Heineken,
(Mexico)

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LEADING CORPORATIONS THAT DO ALREADY ENJOY OUR PHOTOVOLTAIC GLASS:



TOP ARCHITECTS & CONTRACTORS WE WORK WITH:



FEATURED GOVERNMENTS THAT BENEFIT FROM OUR PHOTOVOLTAIC GLASS:



CERTIFICATIONS AND TESTS

Safety comes first. Onyx Solar keeps stressing the importance of delivering high quality products that meet the most stringent safety codes in different countries.

Accordingly, the company has established an Integrated Management System certified to **ISO 9001:2005 standard (Quality Management)**, and **ISO 14001:2015 standard (Environmental management)**. This system establishes quality control protocols and procedures that guarantee the quality and safety of our products.

Onyx Solar's thin film glass has also obtained the **UL 1703 & ULC/ORD-C1703 certifications "Standard for Flat-Plate Photovoltaic Modules and Panels" standard**. This is a milestone for the industry, since no one had been able to certify extra-large, semi-transparent PV Glass products to UL standards.

In addition, TÜV NORD Lab has certified Onyx Solar's crystalline Silicon glass according to **IEC 61215:2005 "Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval"**, and **IEC61730 2004:1&2 "Photovoltaic (PV) module safety qualification - -Part 1: Requirements for construction & Part 2: Requirements for testing"**.







In order to prove how the product complies with the most stringent safety standards in construction, Tecnalia Lab has tested our crystalline and amorphous Silicon laminated glass products to **UNE-EN 14449:2006 standard: "Glass in building - Laminated glass and laminated safety glass - Evaluation of conformity/Product"**, a benchmark standard in the field of architectural glass for building integration. All tests turned out to be a great success!

Among the most relevant tests, impact resistance (UNE-EN 12600:2003 standard) stands out, with our products achieving the highest score possible. Also, the resistance to manual attack test (UNE-EN 356:2001 standard) has been very successful, scoring a P4A rating. Results for resistance to extreme climatic conditions (UNE-EN ISO 12543-4:2011 standard) have been satisfactory too; **the PV Glass was exposed to high humidity conditions and high temperatures, which didn't impact the lamination of the glass.**

All these milestones prove that Onyx Solar delivers high-quality products that are tested to building and safety standards by third party laboratories worldwide.



Our PV glasses have been tested under more restrictive conditions of temperature, humidity, mechanical loads and impacts than any other building material. They are completely suitable for their architectural integration.

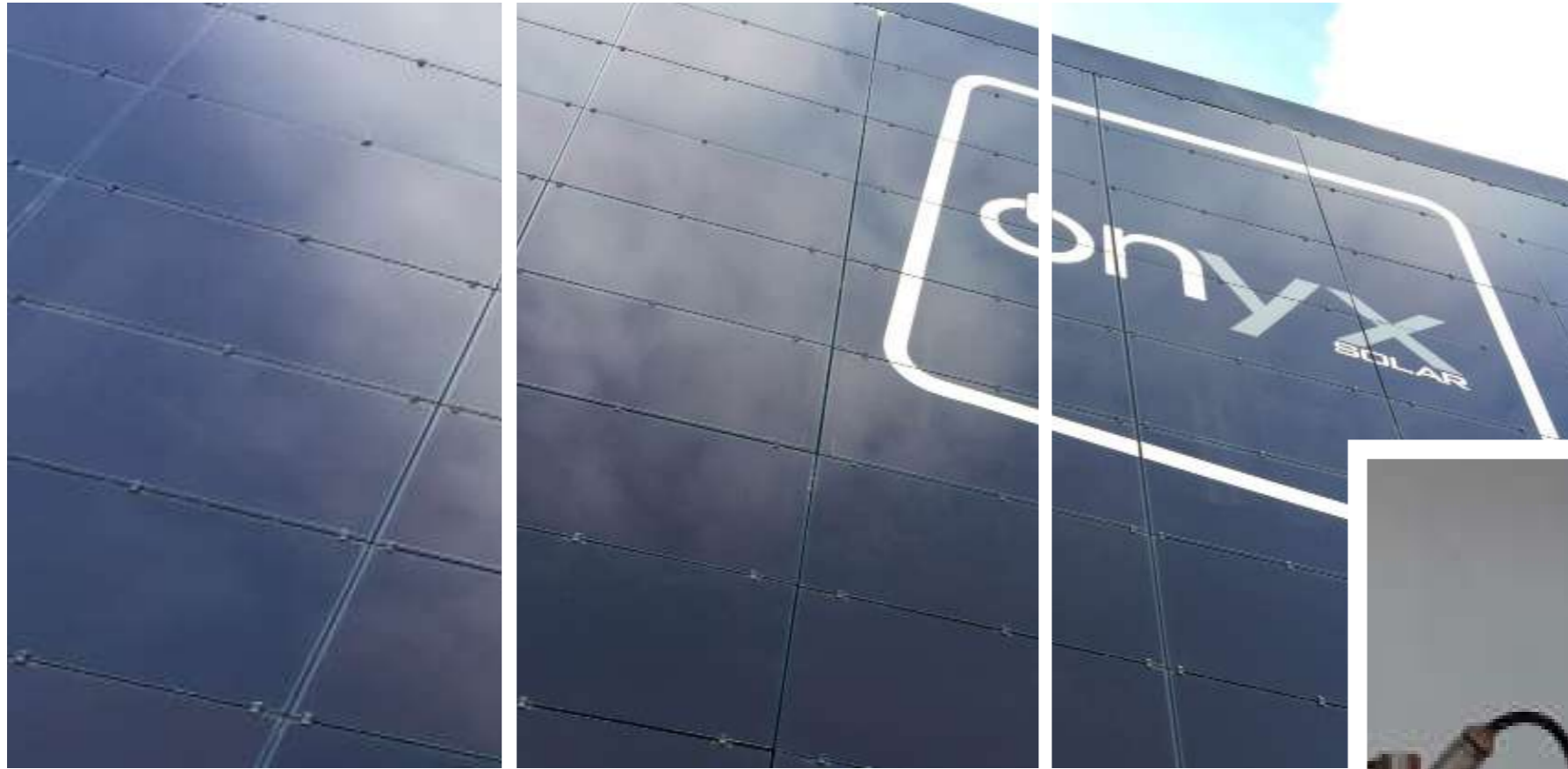
	Temperature Cycling Test (TC200): 200 cycles of temperature from -40°C to + 85 °C.
	Humidity Test (HF10): 10 cycles of humidity-freezing as 10 cycles of +85 °C following by freezing stage as 85% relative humidity at -40°C.
	Damp Heat test (DHT1000): 1000 hours at + 85 °C. and 85% relative humidity.
	Mechanical Loading Test: Our system can support up to a tested load of 5400 Pa (540 kg/m²). The deflection of the system (structure and glass) is below L/240 where L is equal to the clear span length in feet of the deflected member.
	Hail test: Ice ball in diameter 25 mm at 23 m/s, directed against 11 points of impact.
	Light soaking Test: Exposure to light cycles from 600 W-1000 W/sqm until the maximum power of the given units stabilized at +/-2%.

All these milestones prove the worldwide leadership of Onyx Solar in the Building Integrated Photovoltaics field, guaranteeing the maximum safety and quality, key pillars supporting the company's reputation.

Onyx Solar provides comprehensive product warranties that cover both the traditional aspects of an architectural glass warranty, as well as those ones related to the performance of the photovoltaic glass (efficiency of the product). For more information about our warranty, please contact us.



OUR FACTORY



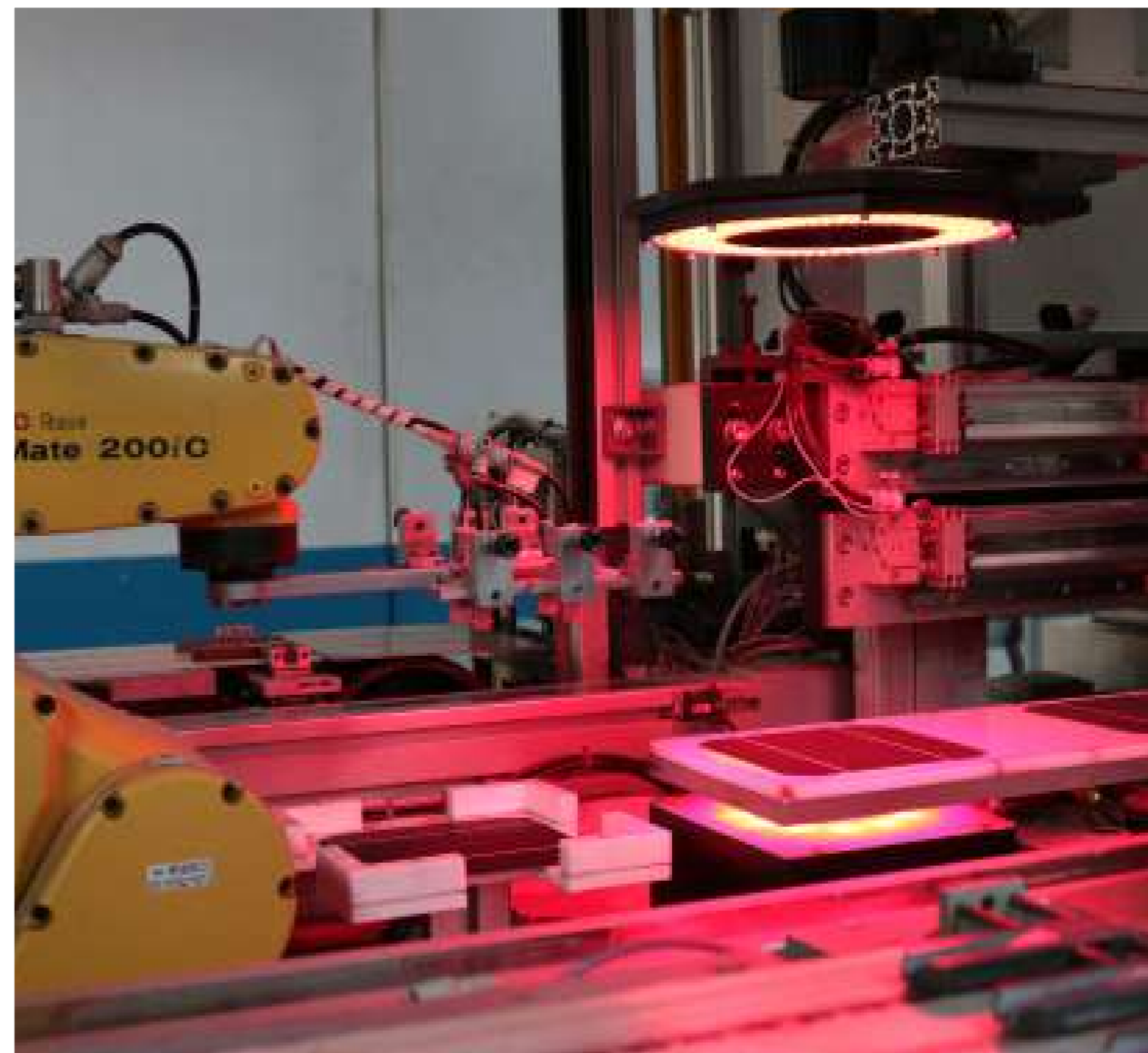
Onyx Solar® is the world leader in the design and manufacture of architectural, photovoltaic glass for buildings; from early research and prototyping to end product design, manufacturing and customer validation, Onyx Solar has successfully completed all the stages needed to develop a cutting-edge product that is currently installed in over 500 projects worldwide.

Onyx Solar has brought together two independent industries as no one had done before; now, the traditional photovoltaic industry and the construction one merge under Onyx Solar's roof to deliver a superior, multifunctional architectural glass with photovoltaic properties.

Onyx Solar PV Glass has been tested to UL and IEC standards, two of the most important test programs to complete both in the USA and Europe in order to commercialize our products.

Our state-of-the-art facilities are located in Avila, Spain, just an hour away from Madrid. From cutting-edge production lines to a large showroom with full size mock-ups, visiting Onyx Solar should be a must in order to learn more about our products.

We count on the ISO 9001 and ISO 14001 certifications, which ensure the quality of our products and processes.



RESEARCH AND DEVELOPMENT

R+D+i

Since inception, Onyx Solar® has committed to continuously invest in R&D, which is a key ingredient to succeed in this field. Technology evolves quickly, and so we do. Many of our products have been developed and commercialized as a result of our continuous research and development programs, many of which count on research centers, universities and third-party companies as our partners.



ENSNARE (Envelope mesh and digital framework for building renovation)
 Programme: HORIZON 2020. European Commission.
 Website: <https://www.ensnare.eu/>



METABUILDING LAB (Open Innovation Test Bed for the BUILDING envelope materials industrial sector using a harmonised and upgraded technical framework and living LABS)
 Programme: HORIZON 2020. European Commission.
 Website: <https://metabuilding-labs.eu/>



CIRCTHREAD (Building the Digital Thread for Circular Economy Product, Resource & Service Management)
 Programme: HORIZON 2020. European Commission.
 Website: <https://circthread.com/>



RESPONSE (Integrated Solutions for Positive energy and resilient Cities)
 Programme: HORIZON 2020. European Commission.
 Website: <https://h2020response.eu/>



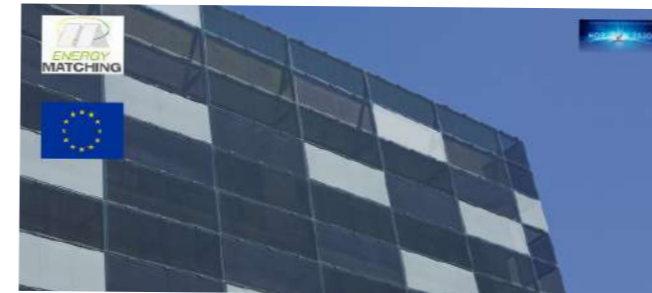
BIPVBOOST (Bringing down costs of bipv multifunctional solutions and processes along the value chain, enabling widespread nzeb implementation)
 Programme: HORIZON 2020. European Commission.
 Website: <https://bipvboost.eu/>



WHITE FAÇADES (Study and development of new BIPV solutions: "WHITE solar FAÇADES")
 Programme: 2018 R&D Projects (ICE-Business competitiveness Institute) - Castile & Leon region.



POCITYF (A Positive Energy CITY Transformation Framework)
 Programme: HORIZON 2020. European Commission.
 Website: <https://pocityf.eu/>



Energy Matching (Adaptable and adaptive RES envelope solutions to maximise energy harvesting and optimize EU building and district load matching).
 Programme: HORIZON 2020. European Commission.
 Website: <https://www.energymatching.eu/>



ESPResso (Efficient Structures and Processes for Reliable perovskite Solar modules)
 Programme: HORIZON 2020. European Commission.
 Website: <https://www.espresso-h2020.eu/>



PV-INV (PHOTOVOLTAIC GREENHOUSE)
 Programme: Grants for the execution of R&D projects by SMEs in Castile and Leon, co-funded by FEDER (2016).



Tech4Win (Disruptive sustainable Technologies for next generation PV Windows).
 Programme: HORIZON 2020. European Commission.
 Website: <http://www.tech4win.eu/>



REZBUILD (REfurbishment decision making platform through advanced technologies for near Zero energy BUILDING renovation)
 Programme: HORIZON 2020. European Commission.
 Website: <https://rezbuildproject.eu/>



COMCO (Photovoltaic devices based on composite material and advanced functional coatings).
 Programme: Eurostars, European Commission.
 Website: <https://www.eurostars-eureka.eu/>



SOLARSHARC (Durable self-clean coating for solar panels to improve PV energy generation efficiency)
 Programme: HORIZON 2020. European Commission.
 Website: <http://solarsharc.com/>



PVCOM (Multifunctional photovoltaic devices based on transparent composite and CIGS for integration)
Programme: Eurostars. European Commission.
Website: <https://www.eurostars-eureka.eu/>



PVSITES (Building-integrated photovoltaic technologies and systems for large-scale market deployment)
Programme: HORIZON 2020. European Commission.
Website: <https://www.pvsites.eu/>



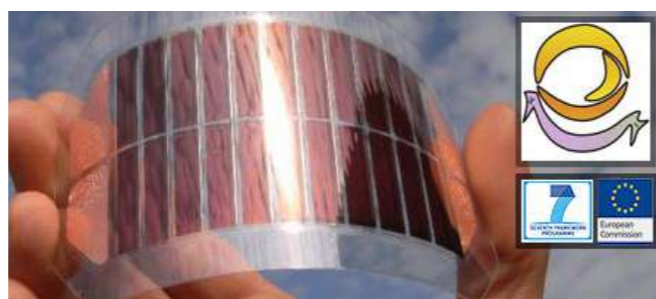
ADVANCED BIPV (New Generation of BIPV glass with advanced integration properties)
Programme: HORIZON 2020. European Commission.
Website: <http://www.advancedbipv.com/>



R2CITIES (Renovation of residential urban spaces: towards nearly zero energy cities)
Programme: 7 Framework Programme. European Commission.
Website: <http://r2.imginternet.it/>



REELCOOP (Research Cooperation in Renewable Energy Technologies for Electricity Generation)
Programme: 7 Framework Programme. European Commission.
Website: <http://www.reelcoop.com>



ARTESUN (Efficient, large-area arbitrary shape solar energy)
Programme: 7 Framework Programme. European Commission.
Website: <http://projects.imec.be/artesun/> <http://artesun-project.eu/>



EUROPHIT (Improving the energy performance of step-by-step refurbishment and integration of renewable energies)
Programme: CIP Programme. Intelligent Energy Europe.
Website: <http://europhit.eu/>



HERB (Holistic Energy-Efficient Retrofitting of Residential Buildings)
Programme: 7 Framework Programme. European Commission.
Website: <http://www.euroretrofit.com>



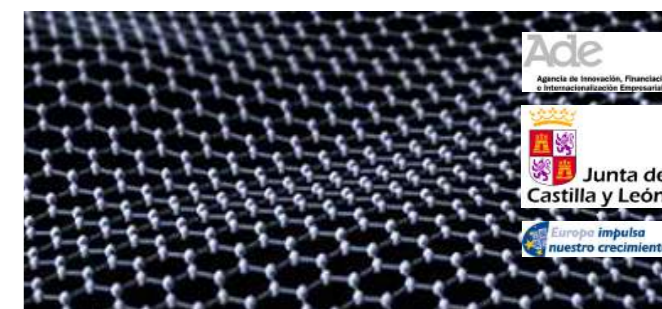
The Autonomous Office
Programme: LIFE 2011. European Commission. Environment.
Website: <http://www.theautonomousoffice.com/>



SOHIRE (Hybrid and Reactive Solution for Integration into Sustainable Building Envelopes)
Programme: Cooperative Research and Development Projects. CDTI - Centre for Industrial Technological Development.



INNDISOL (Innovation in Architectural Solar Integration and Photovoltaic Devices)
Programme: INNPACTO 2010. Spanish Ministry of Economy and Competitiveness.



Solid-state Dye-Sensitized Solar Cells: nanostructured layers forerunning photovoltaic paint in sustainable construction
Programme: R&D projects. Business Innovation, Financing and Internationalisation Agency. Regional Government of Castille and Leon.

Onyx Solar counts on a dedicated team of physicists, architects and engineers who work together in our R&D department, which is in direct and continuous communication with our sales and marketing team. The result is an evolving R&D corporate strategy that gathers the critical thinking of our technical team, and the market knowledge of our sales and marketing department. Our goal together is to stay at the forefront of the industry by creating new products that will have the potential to be incorporated into the building envelope of any building worldwide, efficiently, and economically.



AWARDS AND RECOGNITIONS

THE MOST AWARD-WINNING PHOTOVOLTAIC COMPANY ON THE GLOBE

More than 80 international awards distinguish Onyx Solar® as the world leader company in photovoltaic glass for buildings.



“ We must commit ourselves to innovation, technology and internationalisation as the driving force behind development and growth”.
Álvaro Beltrán, CEO and founder of Onyx Solar®





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