Onyx Solar® is the world leader in the manufacture of photovoltaic (PV) glass for buildings. This is a transparent or colored architectural glass capable of generating clean, free electricity from the sun. It is installed on façades, curtain walls, skylights, and also on floors, enabling buildings of our cities to generate their own electricity for a minimal outlay.

Our aim is to help buildings become self-sufficient from an energy point of view, which is key in the struggle against climate change. In fact, buildings are responsible for the consumption of most of the electrical energy of the planet.

Thus, our photovoltaic glass helps achieving an average reduction of 48% in the energy consumption of buildings, attaining an electrical cost of less than one cent per kWh. This investment is not only a huge step towards a more sustainable future, but it is also a savvy investment since the initial cost is recovered in a matter of months, and it offers an I.R.R. up to 70%.

With over 300 projects completed across 5 continents, we have taken part in large-scale developments for leading companies such as Samsung, Coca-Cola, Heineken, Pfizer and Novartis, who already enjoy the benefits of our glass in their buildings. We also provide advice to prominent architects worldwide, including Foster+Partners, Perkins+Will, Gehry Partners, Gensler, SOM, AS+GG, and Rafael Vinoly. We have also worked alongside the most important construction companies in the world, such as Skanska, Turner, Jacobs, ACS and Ferrovial.

This catalog shows some of the projects we are most proud of. We hope you will enjoy reading it as much as we have enjoyed executing each project.

Welcome to the RevolutiONyx!

Alvaro Beltran
Founder of Onyx Solar®
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OVER 300 PROJECTS IN THE 5 CONTINENTS PROVE OUR GLOBAL LEADERSHIP
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 Sqm), thickness, and semi-transparency degrees, easing its integration within any project and design. Onyx Solar has also developed the first photovoltaic pavement in the world, as well as the first photovoltaic ventilated façade fully customizable onsite.

**COMPARISON BETWEEN A CONVENTIONAL GLASS AND ONYX SOLAR PHOTOVOLTAIC GLASS**

- **Onyx Solar PV Glass** vs. **Conventional Glass**

PV Glass: The Only Building Material That Pays for Itself

Our PV Glass has an average IRR of more than 70% and a payback period of less than 1 year. PV Glass works as a revenue accelerator:
- Reducing in HVAC size and usage thanks to the optimized performance of the PV Glass.
- Unlocking Tax Credits and incentives.
- Generating free and clean electricity from the sun, obtaining a fixed price for the kWh and protecting the owner against continuous electricity rate increases.
- Positive contribution to the natural environment.
- Reduction of building’s Carbon Footprint.
Why do Onyx Solar®'s products add value to any building?

Photovoltaic glass modules produce clean, free energy from the sun, enable the entry of daylight, filter out the harmful components of solar radiation, provide thermal and acoustic insulation, and contribute to a personalised, innovative design which integrates perfectly into any type of building.

Onyx Solar® has developed the first photovoltaic low-emissivity or low-e glass. In addition to generating clean energy from the sun, low-e photovoltaic glass surpasses the properties of a similar conventional glass:

**INSULATION PROPERTIES**

These are expressed by the thermal transmittance of the glazing which, as we have seen before, is also known as “U-value”. Let us remember that this parameter means the amount of heat that traverses the glazing when there is a difference in temperature between its two sides. As this value decreases, our glass will be more insulating, and therefore our building will be more efficient.

**PRODUCTION OF CLEAN ENERGY**

It should not be forgotten that these are glass modules which produce electrical energy when sunlight falls on them. This is due to the micrometric active layers of photovoltaic material deposited on one of the sides of the glass. For example, only 100 square metres of photovoltaic glass in the city of Los Angeles could power over 250 lights during working hours for 25 years. This clean, cost-free energy from the sun which can provide significant financial savings for the consumer, who continually has to endure ever-greater increases in the cost of electricity.

Onyx Solar®’s Low-E photovoltaic glass has been distinguished as “The Most Innovative Glass” in 2015. An honour awarded by the American National Glass Association.

For further information on this innovative construction material, please download the Low-E Photovoltaic Glass Technical Guide.

---

**SELECTIVE ULTRAVIOLET FILTER**

The architectural glass panes developed by Onyx Solar® filter out 99% of the ultraviolet radiation (UV) which may have a harmful effect on interiors, furniture and persons.

**SELECTIVE FILTRATION OF INFRARED RADIATION**

It reduces the transmission of infrared radiation by up to 90% compared with a conventional laminated glass.

**OPTIMISED SOLAR FACTOR**

This optimization of optical properties is related to the solar factor, also known as “g-value” or SHGC (Solar Heat Gain Coefficient). This 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 factor is critical for the obtaining of interior thermal comfort in a building. For example, 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. In this respect, the measurements of Onyx Solar®’s ThinFilm transparent photovoltaic glass display a solar factor of between 10% and 40%, which makes them ideal candidates to achieve control over the interior temperature.

**NATURAL LIGHTING**

As these are transparent glass, they enable the natural lighting of the building. The visible light entering through Onyx Solar®’s ThinFilm photovoltaic glass, being of a more diffuse nature, favours a more user-friendly interior illumination. Its transparency ranges from 10% to 30%, which is usually enough to achieve good illumination.

---

**OPTICAL PROPERTIES OF DE ONYX SOLAR® GLASS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Onyx Solar®</th>
<th>Low-E Glass</th>
<th>Conventional Glass</th>
<th>Conventional PV Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective IR filter</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Selective UV filter</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Solar factor / SHGC</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Natural lighting</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Thermal performance</td>
<td>U &lt; 2 W/m²K</td>
<td>U &lt; 0.35 BTU/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>liner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic performance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Electricity generation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aesthetic integration in buildings</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
</tbody>
</table>

---

**OPTICAL PROPERTIES OF CONVENTIONAL GLASS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Low-E Glass</th>
<th>Conventional Glass</th>
<th>Conventional PV Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural lighting</td>
<td>✓</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Thermal performance</td>
<td>U &lt; 2 W/m²K</td>
<td>U &lt; 0.35 BTU/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>liner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic performance</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Electricity generation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aesthetic integration in buildings</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
</tbody>
</table>
# 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).

## CRYSRALLINE SILICON PV GLASS

For projects seeking maximum power output per Sqm, 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 80 up to 160 Wp/m², depending on the solar cell density required by design. Selecting the right balance between crystalline Silicon glass may be the right answer. Its power nominal power that usually depends on the solar cell density required by design. Selecting the right balance between crystalline Silicon glass and the nominal power will help you better achieving your energy efficiency goals.

### ADVANTAGES:
- Greater nominal power capacity per square metre (Wp/m²).
- Greater efficiency (up to 16%).
- 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

### AMORPHOUS SILICON PV GLASS

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

This PV Glass can be fully opaque/dark (higher nominal power), or present different light transmittance levels, which enables for the natural light to pass through exterior, 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

<table>
<thead>
<tr>
<th>SIZE [mm]</th>
<th>THICKNESS CONFIGURATION* [mm]</th>
<th>WEIGHT [Kg/m²]</th>
<th>CAN BE CUT ON-SITE*</th>
<th>IGU COMPATIBLE*</th>
<th>JUNCTION BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD</td>
<td>CUSTOMIZED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1470 x 480 from 600 x 300 to 1706 x 1006</td>
<td>4T + 4T</td>
<td>20</td>
<td>NO</td>
<td>NO</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1245 x 635</td>
<td>5T + 5T</td>
<td>27</td>
<td>NO</td>
<td>NO</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1461 x 989</td>
<td>6T + 6T</td>
<td>30</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar Edge</td>
</tr>
<tr>
<td>1650 x 850</td>
<td>8T + 8T</td>
<td>40</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar Edge</td>
</tr>
<tr>
<td>STANDARD</td>
<td>CUSTOMIZED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1700 x 1000 from 1706 x 1006 to 4000 x 2000</td>
<td>4T + 4T</td>
<td>20</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1700 x 1460</td>
<td>5T + 5T</td>
<td>27</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>2000 x 2000</td>
<td>6T + 6T</td>
<td>30</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>2400 x 2000</td>
<td>8T + 8T</td>
<td>40</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>R/A-PV FLOOR TILE</td>
<td>CUSTOMIZED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750 x 750 from 750 x 750 to 3000 x 1500</td>
<td>8T + 8T</td>
<td>40</td>
<td>NO</td>
<td>NO</td>
<td>Bipolar</td>
</tr>
</tbody>
</table>

1. Dimensions in mm, T = tempered glass according to UNE-EN12150. For glass 8T+8T, please ask availability.
2. Only non-heat treated, inactive glass can be cut to size on-site. When the glass is cut it loses its photovoltaic properties and it cannot be connected electrically.
3. The IGU glazing is customized in all cases according to the requirements of the project.

### RAISED ACCESS PHOTOVOLTAIC FLOOR TILE

<table>
<thead>
<tr>
<th>SIZE [mm]</th>
<th>THICKNESS CONFIGURATION* [mm]</th>
<th>WEIGHT [Kg/m²]</th>
<th>CAN BE CUT ON-SITE*</th>
<th>IGU COMPATIBLE*</th>
<th>JUNCTION BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD</td>
<td>CUSTOMIZED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1245 x 300 from 600 x 300 to 1245 x 635</td>
<td>3 + 4</td>
<td>17</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1200 x 600</td>
<td>3 + 5T</td>
<td>22</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1245 x 635</td>
<td>3 + 6T</td>
<td>30</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1245 x 1245 from 600 x 300 to 1200 x 600</td>
<td>4 + 3 + 4T</td>
<td>41</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>2462 x 635</td>
<td>4 + 3 + 5T</td>
<td>30</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1245 x 1849</td>
<td>5 + 3 + 4T</td>
<td>41</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1245 x 2456</td>
<td>6 + 3 + 6T</td>
<td>52</td>
<td>NO</td>
<td>YES</td>
<td>Bipolar</td>
</tr>
</tbody>
</table>

1. Dimensions in mm, T = tempered glass according to UNE-EN12150.
2. Only non-heat treated, inactive glass can be cut to size on-site. When the glass is cut it loses its photovoltaic properties and it cannot be connected electrically.
3. The IGU glazing is customized in all cases according to the requirements of the project.
### OPTICAL & THERMAL PROPERTIES

#### AMORPHOUS SILICON GLASS

<table>
<thead>
<tr>
<th>TRANSPARENCY (LT)</th>
<th>CONFIGURATION**</th>
<th>SGMC</th>
<th>U value**</th>
<th>U value</th>
<th>Light Reflection (external)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2+4</td>
<td></td>
<td></td>
<td>%</td>
<td>W/m² K</td>
<td>Btu/h ft² F</td>
</tr>
<tr>
<td>no transparency</td>
<td>3.2+4</td>
<td>22%</td>
<td>5.70</td>
<td>1.00</td>
<td>7.6%</td>
</tr>
<tr>
<td>6T+6T</td>
<td></td>
<td>23%</td>
<td>5.50</td>
<td>0.97</td>
<td>7.3%</td>
</tr>
<tr>
<td>6T+6T/12Air/6T</td>
<td><strong>(also valid for 4+4, see notes)</strong></td>
<td>6%</td>
<td>2.70</td>
<td>0.48</td>
<td>7.3%</td>
</tr>
<tr>
<td>6T+6T/12Argon/6T</td>
<td>low-e</td>
<td>5%</td>
<td>1.60</td>
<td>0.28</td>
<td>7.3%</td>
</tr>
<tr>
<td>6T+6T/12Argon/4/12Argon/6T</td>
<td>low-e</td>
<td>5%</td>
<td>1.00</td>
<td>0.18</td>
<td>7.3%</td>
</tr>
<tr>
<td>low transparency</td>
<td>3.2+4</td>
<td>29%</td>
<td>5.70</td>
<td>1.00</td>
<td>7.6%</td>
</tr>
<tr>
<td>6T+6T</td>
<td></td>
<td>29%</td>
<td>5.50</td>
<td>0.97</td>
<td>7.3%</td>
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<tr>
<td>6T+6T/12Air/6T</td>
<td>low-e</td>
<td>9%</td>
<td>1.60</td>
<td>0.28</td>
<td>7.3%</td>
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<tr>
<td>6T+6T/12Argon/6T</td>
<td>low-e</td>
<td>9%</td>
<td>1.20</td>
<td>0.21</td>
<td>7.3%</td>
</tr>
<tr>
<td>6T+6T/12Argon/4/12Argon/6T</td>
<td>low-e</td>
<td>9%</td>
<td>1.00</td>
<td>0.18</td>
<td>7.3%</td>
</tr>
<tr>
<td>medium transparency</td>
<td>3.2+4</td>
<td>34%</td>
<td>5.70</td>
<td>1.00</td>
<td>7.6%</td>
</tr>
<tr>
<td>6T+6T</td>
<td></td>
<td>32%</td>
<td>5.50</td>
<td>0.97</td>
<td>7.3%</td>
</tr>
<tr>
<td>6T+6T/12Air/6T</td>
<td>low-e</td>
<td>12%</td>
<td>1.60</td>
<td>0.28</td>
<td>7.0%</td>
</tr>
<tr>
<td>6T+6T/12Argon/6T</td>
<td>low-e</td>
<td>12%</td>
<td>1.20</td>
<td>0.21</td>
<td>7.0%</td>
</tr>
<tr>
<td>6T+6T/12Argon/4/12Argon/6T</td>
<td>low-e</td>
<td>12%</td>
<td>1.00</td>
<td>0.18</td>
<td>7.0%</td>
</tr>
<tr>
<td>high transparency</td>
<td>3.2+4</td>
<td>41%</td>
<td>5.70</td>
<td>1.00</td>
<td>7.6%</td>
</tr>
<tr>
<td>6T+6T</td>
<td></td>
<td>37%</td>
<td>5.50</td>
<td>0.97</td>
<td>7.1%</td>
</tr>
<tr>
<td>6T+6T/12Air/6T</td>
<td>low-e</td>
<td>17%</td>
<td>1.60</td>
<td>0.28</td>
<td>7.1%</td>
</tr>
<tr>
<td>6T+6T/12Argon/6T</td>
<td>low-e</td>
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<td>0.21</td>
<td>7.1%</td>
</tr>
<tr>
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<td>1.00</td>
<td>0.18</td>
<td>7.1%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>TRANSPARENCY (LT)</th>
<th>CONFIGURATION**</th>
<th>SGMC</th>
<th>U value**</th>
<th>U value</th>
<th>Light Reflection (external)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2+4</td>
<td></td>
<td></td>
<td>%</td>
<td>W/m² K</td>
<td>Btu/h ft² F</td>
</tr>
<tr>
<td>High density of PV cells (15%)</td>
<td>6T+6T* (see notes)</td>
<td>27%</td>
<td>5.50</td>
<td>0.97</td>
<td>8.3%</td>
</tr>
<tr>
<td>6T+6T/12Air/6T</td>
<td>9%</td>
<td>2.70</td>
<td>0.48</td>
<td>8.3%</td>
<td></td>
</tr>
<tr>
<td>6T+6T/12Argon/6T</td>
<td>low-e</td>
<td>7%</td>
<td>1.60</td>
<td>0.28</td>
<td>8.3%</td>
</tr>
<tr>
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<td>low-e</td>
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<td>1.00</td>
<td>0.18</td>
<td>8.3%</td>
</tr>
<tr>
<td>Low density of PV cells (28%)</td>
<td>6T+6T</td>
<td>22%</td>
<td>2.70</td>
<td>0.48</td>
<td>8.3%</td>
</tr>
<tr>
<td>6T+6T/12Air/6T</td>
<td>20%</td>
<td>1.60</td>
<td>0.28</td>
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#### 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 80 up to 160 Wp/Sqm. 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](http://onyxsolardownloads.com/docs/ALL-YOU-NEED/Technical_Guide.pdf) or contact us at info@onyxsolar.com.

**Amorphous Silicon Glass**

**Crystalline Silicon Glass**

<table>
<thead>
<tr>
<th>Size</th>
<th>Transmittance</th>
<th>Power (Wp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700 x 1000 mm (10% VLT)</td>
<td>160</td>
<td>114</td>
</tr>
<tr>
<td>1650 x 850 mm (30% VLT)</td>
<td>160</td>
<td>114</td>
</tr>
</tbody>
</table>
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 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 – this process results in transparent colored PV Glass, we also follow other techniques to get to the desired color. We can offer solid colors through screen-printing processes and ceramic-frits too. In this case, we can get to beautiful colors with non-transparent photovoltaic glass. Depending on the light intensity, the color shade may vary both in reflection and transmittance.

Keep in mind that depending on the intensity of the light (in reflection or transmission) the color will vary on both sides. In order to ease the color selection, we have created these two selectors:

1. Onyx Solar + Vanceva
   For transparent color PV glass, ask for your Onyx Solar + Vanceva Color Selector, in which you could see over 2,000 different color combinations.

2. Onyx Solar + RAL
   For non-transparent color PV glass, ask for your Onyx Solar + RAL Color Selector, in which you could see over 213 different colors.

FINISHES

GLOSS OR MATT
METALLIC HINT
FIRST PATTERNS
ANTI-SLIP

KROMATIX™

GREY  BRONZE  BLUE
TURQUOISE  TERRACOTTA  GOLD

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

The largest photovoltaic glass in the market

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”).

SIZE & SHAPE

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SIZE & SHAPE
TURN ENTIRE BUILDINGS INTO POWER GENERATORS

RAISED ACCESS PHOTOVOLTAIC FLOOR TILE

PV VENTILATED FAÇADE AND ROOF

PHOTOVOLTAIC SKYLIGHT

PHOTOVOLTAIC BALUSTRADE

PHOTOVOLTAIC CURTAIN WALL

PHOTOVOLTAIC LOUVER
ECONOMIC BENEFITS

Feasibility Studies show the economic benefits that each customer can achieve thanks to the installation of Onyx Solar photovoltaic glass.

The amount of energy, in euros, that will be generated by the installed glass over the next 35 years, this photovoltaic glass being the only construction material that allows buildings to save money, becoming the most profitable construction material on the market.

The installation investment is calculated by comparing what is required to install the glass system against the income generated by the glass in the next 35 years of useful life. Obtaining a benefit that is calculated by adding the energy generated in euros plus the incentives received by the solar installation minus the investment, reaching enormous amounts of profit obtained.

Photovoltaic glass has incentives available for renewable energy or energy efficiency. They are different in each country, being as good or better than the American Solar Investment Tax Credit (ITC), which allows building owners to deduct 30% of the total cost of the photovoltaic system from their federal taxes.

Other incentives focus on providing financing. In several places, some programs allow building owners to finance 100% of their photovoltaic project and reimburse it annually as an evaluation of the regular property tax bill.

The recovery time of the project or Payback Time of the photovoltaic glass can even be reduced to less than one year, and the internal rate of return (TIR) achieved can be higher than 230% thanks to the active and passive properties and the solar incentives it unlocks.

PAYBACK TIME <1 YEAR

This value shows the annual profitability that the owner will obtain for 35 years without any risk, getting to recover the investment of the installation several times.

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PAYBACK TIME <1 YEAR

This value shows the annual profitability that the owner will obtain for 35 years without any risk, getting to recover the investment of the installation several times.
The amount of energy, in kWh, generated by the photovoltaic glass installed during the next 35 years.

This glass is the only construction material that allows buildings to generate their electricity, making them a true solar power plant, while reducing the building’s carbon footprint.

The photovoltaic installation will be able to supply energy to a large quantity of light points in the building for 35 years, free of charge.

A good example is the installation of 2,500 square meters in the Netherlands, a site that despite not having many hours of sunlight, is capable of supplying electricity to more than 2,500 light points working for 4 hours a day for 35 years.

With this energy generated, the millions of kilometers that can be traveled by electric car are calculated, reaching 7 million in the case of the Netherlands with the amount of energy saved by photovoltaic glass.

Avoiding a huge amount of CO₂ emissions into the atmosphere, a fairly important issue in modern times since buildings are the main CO₂ emitters.

Another issue of great importance is the number of barrels and liters of oil that are avoided when installing Onyx Solar glass. While glass generates energy, it is obvious to consume large amounts of oil. In the case of the Netherlands, almost 800 barrels of oil are avoided, or what is the same, 120,000 liters of this fossil fuel.

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

- Preventing the emissions of CO₂ into the atmosphere with our architectural glass capable of generating the energy that a whole building needs.
- Absorbing the greenhouse gases already emitted with the tree we plant.

We fight to absorb the enormous amounts of CO₂ from our atmosphere with the installation of the most efficient machinery in the market in terms of emission absorption. It is a machine developed by nature itself that feeds on CO₂ and also grows alone and serves as a home and even food for many living beings. It is a machine called... TREE!

We have decided that for every m² of glass we manufacture, we will plant a tree in some especially devastated area where the ecosystem needs to be recovered. Places such as the Amazon, Indonesia or India where these trees will also be fruit trees with the aim of serving as food for families living in areas devastated by typhoons and floods.

We install this machinery to absorb CO₂ completely free of charge and on behalf of our clients, receiving a certificate with the number of trees planted in their name as well as the coordinates and photographs of the plantation.

In this way, any of our clients know that when they decide to buy an m² of photovoltaic glass, they will be on the one hand avoiding CO₂ emissions and on the other hand, absorbing them thanks to the planted tree.

One m² of photovoltaic glass to avoid emissions, a tree to absorb them.
Skylights are an ideal application for photovoltaic glass. They are normally well exposed to the sunlight, allowing for optimal energy yields.

PV skylights also improve thermal inner comfort, since most of the UV and infrared radiation are filtered out by the Silicon-based material (solar filter effect). In addition, Air or Argon spacers guarantee the best thermal performance for the application.

In other words, PV skylights combine active and passive properties that improve the overall efficiency of the system. Semi-transparent PV glass reduces the need for artificial lighting, generates power, and provides thermal and sound insulation. It also helps delaying interior ageing.
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 walls are becoming a popular application for photovoltaic glass in buildings. They allow for owners to generate power 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 and others. From a mechanical prospective, the glazing contractor will take care of its installation, and then the electrical contractor will interconnect the units.

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. This strategy contributes to optimizing the energy yield from the elevation, while maintaining unobstructed views.
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.E. and payback time are unbeatable.
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 and the electrical material necessary for the connection of electronic devices (mobile telephones, laptop computers, tablets, etc.) via a USB port. It further comprises a battery to store the power generated during the day for its use at night. This simple system enables the convenient and environmentally sustainable recharging of electronic devices, meeting an ever more important need nowadays.

The photovoltaic glass employed in the kit may be integrated in the furniture itself, or a walkway made of photovoltaic tiles may be used to generate the energy. In both cases, the glass may be either amorphous or crystalline silicon. If made of amorphous silicon, it is ideal for shaded areas, as diffused light can be captured, while crystalline silicon enables the generation of more power per m². Both feature a modern, technological appearance.

This kit is available in different sizes of module and in a wide range of colours, enabling the designers to integrate it in the most aesthetically suited manner in all types of furniture.
As a part of the complete revitalization of the two-million-square-foot former Bell Labs facility into an iconic mixed-use metroburb located in Holmdel, N.J., Onyx Solar will be supplying Bell Works with 5,575m² (60,000 SqFt) of amorphous silicon photovoltaic glass, to create the largest-of-its-kind photovoltaic skylight in the USA.

Upon completion, the PV skylight will both naturally illuminate the complex while generate free, clean electricity from the sun. It will simultaneously offset 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 would provide enough power to drive 100 electric cars along 6,840 km (4,250 miles) per year.

Utilizing state-of-the-art technology, Bell Work’s skylight will feature 24 different glass units from Onyx Solar to cover the various unique skylight schemes at the Eero Saarinen-designed architectural gem. Each will be comprised of amorphous silicon thin film photovoltaic (a-Si PV) active glass, laminated between two sheets of tempered safety glass, allowing for 20% Visual Light Transmittance (VLT) to reduce solar heat gain while producing energy, all while preserving Bell Work’s historical 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.
At Samsung, we undertake the responsibility of carrying out our activity with the aim of enriching our planet.

Our sustainability policy is based on the continued improvement of the environment throughout our activities, naturally including the efficient use of energy at our facilities.

Samsung sustainability report, 2015

FEASIBILITY STUDY OF AMORPHOUS SILICON SKYLIGHTS IN SINGAPORE

- Energy cost: <0,01€
- 28% Reduction in HVAC energy demand
- 86% Internal Rate of Return
- <1 year Payback

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® is taking part in this project with the integration of a large photovoltaic pergola of over 2,600 m² (27,986 SqFt) located at the entrance to the building, with an installed power capacity of 125 kWp. The pergola features 858 amorphous silicon photovoltaic glass modules measuring 2,456 x 1,245 mm (8.05 x 4.08 Ft), with a semi-transparency degree of 10%, which will enable the building to supply over 7,000 lights per day thanks to the sun (125,810 kWh per year).

This energetic efficiency measure contributes to the building obtaining the Greenmark and the Platinum LEED certification. Furthermore, the building has already been granted a 2015 WAN AWARD in the “Future Projects” category.

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.

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® is taking part in this project with the integration of a large photovoltaic pergola of over 2,600 m² (27,986 SqFt) located at the entrance to the building, with an installed power capacity of 125 kWp. The pergola features 858 amorphous silicon photovoltaic glass modules measuring 2,456 x 1,245 mm (8.05 x 4.08 Ft), with a semi-transparency degree of 10%, which will enable the building to supply over 7,000 lights per day thanks to the sun (125,810 kWh per year).

At Samsung, 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.”

“Sustainability is a strategic part of our business. We believe that by developing environmentally friendly solutions, we can help shape a better future.”

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

Onyx Solar® has participated in this project with the integration in the façade of 1,200 m² (12,916 SqFt) of amorphous silicon photovoltaic glass. Approximately 2,500 modules measuring 485 x 985 mm (1.6 x 3.23 Ft) of a triple safety laminate have been manufactured in a yellow-gold colour with a semi-transparency degree of 20%. The total installed power capacity reaches 38 kWp and will enable the building to generate a large proportion of the energy it needs for its operation.

This multi-functional glass, besides contributing to the creation of a sustainable building fed to a considerable extent by solar energy, provides the frame with undeniable aesthetic value due to its yellow colour. It also filters out ultraviolet and infrared radiation, thus preventing the greenhouse effect so common in cities with hot climates and improving the comfort of its occupants. Thanks to the integration of Onyx Solar®’s photovoltaic glass in the envelope of the building, considerable energy savings may be achieved in the air handling of the same.

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


Dubai Municipality

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

Feasibility study of amorphous silicon façades in Dubai

- Energy cost 37%
- Reduction in HVAC energy demands 22%
- Internal Rate of Return <5 years
- Payback medium

ONYX SOLAR®
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.

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”.

Diego Cuevas

Diego Cuevas – Business Development VP at Onyx Solar®
DEWA R&D CENTRE

PHOTOVOLTAIC FACADE

The four facades of the building will implement a louver system composed by Onyx Solar amorphous silicon glass with transparency degree XXL and 7 different colors, creating a multicolored façade that provides a unique effect to the building. The two entrance canopies on north and west facades will also integrate Onyx Solar semitransparent glass to maintain visual continuity in the complete building envelope. All photovoltaic glass pieces manufactured for this project are 100% customized to fit the design requirements of the building.

This project is a great example of DEWA’s commitment with sustainability. DEWA (Dubai Electricity and Water Authority) is a state entity whose objective is to provide an adequate and sustainable supply of electricity and water to Dubai’s population. DEWA also focuses its efforts on promoting energy efficiency and the use of renewable energies in United Arab Emirates.

Onyx Solar® participates in the construction of DEWA R&D Centre & Laboratory in Dubai, by supplying 1,000 m² (10,764 sqft) of semitransparent colored photovoltaic glass.
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 modules of photovoltaic glass measuring 1,511 x 1,931 mm (4.95 x 6.33 Ft), with a power capacity of 340 Wp. It was manufactured with perforated crystalline cells, which enable the passage of daylight. The design of the skylight enables the modules to be opened and closed, making the skylight totally operable.

The incorporation of this innovative technology enables the building to generate over 273,000 kWh per year, equivalent to lighting over 600 homes yearly, and entailing a reduction of nearly 185 tons of CO₂ released into the atmosphere, and avoiding the consumption of 165 barrels of oil per year.

Novartis, with over 120,000 employees, is a worldwide referent due to its sustainable practices and occupies the leading position among pharmaceutical companies in the Dow Jones European and World Sustainability Indices.

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

Turner: construction, leadership and safety.

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”.

“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®.
The technical competence displayed by our team when faced by a highly complex project was decisive for the awarding of this contract”.

Teodosio del Caño, CTO at Onyx Solar®.
MIAMI HEAT STADIUM

PHOTOVOLTAIC SKYLIGHT

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.

At the entrance to the NBA Miami Heat stadium, also known as the “American Airlines Arena”, several circular skylights may be seen, bearing the stamp of Onyx Solar®.

To complete the many circular skylights, approximately 300 crystalline silicon photovoltaic glass units, made entirely to measure for the occasion, were used. These modules enable the stadium to generate 34,500 kWh yearly, to be used for the building’s self-consumption, leading to the prevention of the release of 20 tons of CO2 into the atmosphere.

Onyx Solar®’s technology has contributed to this stadium being the first sports and entertainment centre to obtain the LEED Gold recertification.

General Contractor: Skanska
Architect: DLR Group
Client: NRG

>> FEASIBILITY STUDY OF CRYSTALLINE SILICON SKYLIGHTS IN MIAMI

< 0.01€
Energy cost
44%
Reduction in HVAC energy demands
77%
Internal Rate of Return
<1 year
Payback

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.

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McDonald’s has just unveiled its Global Flagship located on the West side of Disney’s property on Buena Vista Drive, Orlando, Florida. The opening of this restaurant shows the company’s firm commitment to sustainability and energy efficiency, since it will become a Zero-Energy Building, the First Zero Emission Restaurant in the US.

McDonalds wanted to have an efficient restaurant, with 100% Green energy and no CO2 emissions to the atmosphere. McDonalds also wanted to educate all those who make use of it. Inside, users will be able to watch videos about the project as well as techniques and changes they can make in their lives to help in the fight against climate change.

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 ¼” fully tempered glass, where the interior lite comes in a light grey color. The average light transmittance achieved is 34%, 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.
The largest photovoltaic skylight in Africa is already a reality. It is part of the new headquarters of the I&M Bank in Nairobi, Kenya.

It is composed of 2,200 M² (23,680 sqft) of photovoltaic glass in amorphous silicon technology combining different degrees of transparency (low and medium transparency) and different sizes of glass to adapt to the design requirements.

The building’s skylight acts as a solar panel to ultimately harness the energy and, consequently, saving up on power costs will generate a total of 3,342,503 kWh of energy in 35 years. It will be enough energy to illuminate 6,558 light points during these 35 years.

This 76.5 KWp skylight of peak power improves the efficiency of the building as it generates on-site electrical energy for the self-consumption of users while allowing the natural lighting of the building. It also avoids approximately 84 tons of annual CO₂ emissions.

"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 of I&M Bank.
The Edmonton Convention Center Atrium upgrade is complete. In this way, the Canadian city joins the already extensive list of partners that produce their own clean energy thanks to photovoltaic glass from Onyx Solar. The building upgrade will produce 227,000 kWh each year and will help improve climate insulation in the extreme temperatures of the Canadian city.

The installation of our glass is part of the rehabilitation project for the roof of the main atrium designed by DIALOG. The atrium’s cover was built 35 years ago and had serious insulation problems.

This project makes a statement about the Centre’s sustainable ambitions and includes a poetic message for visitors of the Centre and the river valley.

The pattern of the cells opens up to a circular oculus with lines of Morse code that spell out a poem. It is an excerpt of Gifts of a River by E.D. Blodgett, a former Edmonton Poet Laureate, that reads:

"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 within the atrium, but the visual appeal extends outside and across the valley.

The new solar cells will convert sunlight into clean electricity while maintaining the transparency of the Centre’s current glass atrium. All 696 sloped panels on the atrium have been replaced. Even with the PV cells covering approximately 50% of the surface, more light is getting through to the atrium compared to the previous tinted panels.

It is estimated that more than 200 Megawatt-hours of electricity will be generated each year and that the panels will reduce anticipated greenhouse gas emissions by over 150,000 kg.

"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 Rodu, Sustainability Manager of the Edmonton Convention Centre.

The city of Edmonton and its mayor, Don Iveson, are one of the leaders of (Global Covenant of Mayors for Climate & Energy), a global coalition of municipal pioneers committed to the fight against climate change. All these mayors acknowledge the importance of decreasing CO2 emissions and they are encouraging the incorporation of innovative technologies and solutions within their cities. More than 10,000 cities of 60 countries around the world have committed to the pact, totaling 320 million people.
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.

In addition to generating power, the glass modules employed filter up to 99% of ultraviolet radiation and 95% of infrared light. These modules also have an optimal Solar Factor which enables the entry of daylight while preventing the greenhouse effect, enhancing considerably the comfort of its occupants. The G value is between 20% and 40%, depending on the degree of semi-transparency.

>> FEASIBILITY STUDY OF AMORPHOUS SILICON SKYLIGHTS IN MADRID

< 0.02€
Energy cost

34%
Reduction in HVAC energy demands

55%
Internal Rate of Return

<2 years
Payback

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”. “In this way, this area represents a further example of our commitment to the environment: we achieve considerable energy savings, we use resources responsibly, we promote sustainable architecture and we gain a different, innovative workplace”.

Juan Carlos Castillo, ING Bank General Services and Security Director.
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 sanctuary Cristo de Los Milagros in Bayaguana is a work conceived for the Christian pilgrimage and attraction of the Monte Plata province.

Its estimated cost is around 300 million pesos. Its architecture responds to the modern style, and the structure is built to withstand earthquakes and meet other demands of advanced engineering.

This new construction wants to provide a more modern temple to pilgrims and parishioners and to transfer the image of the Holy Christ of the Miracles from the ancient temple.

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

Our photovoltaic glass will provide the Sanctuary of the Christ of the Miracles with a large cross-shaped photovoltaic skylight, which will allow the entry of natural light and the generation of clean energy.

The skylight, with a surface area of over 617 m² (6641.33 SqFt), is comprised of 251 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 21.6 kWp and is capable of generating nearly 32,300 kWh of clean, free energy yearly, thus preventing the release of almost 21 tons of CO₂ into the atmosphere while supplying over 1845 lights throughout the building.

In addition to generating power, the glass modules employed filter up to 99% of ultraviolet radiation and 95% of infrared light. These modules also have an optimal Solar Factor which enables the entry of daylight while preventing the greenhouse effect, enhancing considerably the comfort of its devotees. The G value is between 20% and 40%, depending on the degree of semi-transparency.
Onyx Solar® has taken part in the refurbishment of the 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, in Brittany (France), the building preserves the spirit of Eiffel with its metal structure, and is considered to be a national heritage. The refurbishment of this building, a Tourism Development and Culture Centre of the locality, has followed a sustainable approach.

A photovoltaic skylight, comprised of low-emissivity (or low-e) glass with a semi-transparency degree of 10%, enables this facility to generate over 42 kWh per square metre per year. This solution enables the entry of daylight and improves energetic efficiency, while reducing the Culture Centre’s electricity bill and HVAC energy demands.

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Le Petit Écho de la Mode was a famous women’s fashion magazine which for decades printed over a million copies per week. It had as many as 200 employees working in the printing process and in the manufacture of sewing patterns until it closed in 1983.
PROJECTS & REFERENCES

HIGH-END RESIDENTIAL

PHOTOVOLTAIC SKYLIGHT

ARCHITECT: Costa Brown Architecture

It is located in an exclusive town of 9,000 inhabitants in Marin County, beside the Bay of San Francisco, offering privileged views of the city and the iconic Golden Gate bridge.

Onyx Solar® has taken part in the modernization of a luxury residence where innovation and sustainability are a priority. The photovoltaic glass has been integrated in the form of a skylight, thus providing the building with an air-conditioned swimming pool. The skylight has an original fairground switchback-like shape, thanks to the curved wooden structure on which the nearly 72 photovoltaic glass modules rest.

The glass employed is triple-laminated, made of amorphous silicon, with a semi-transparency degree of 20%. Due to this, the thermal and acoustic comfort of the users of this pool has been increased, as the interior temperature is maintained constant.

Furthermore, it filters out up to 99% of the ultraviolet radiation, an extra which protects those who enjoy this wonderful swimming pool with sea views from the sun’s rays.

This skylight has a total installed power capacity of 6.59 kWp, and enables the residence to generate approximately 10,595 kWh per year.

“*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 Gutiérrez

Client: Lumen

Onyx Solar® has executed the installation of the largest photovoltaic skylight in Mexico City and one of the largest in the Americas, with a surface area of 2,300 m² (24,757 sqFt).

The installation of this skylight, under the auspices of and according to a project by the visionary architect Enrique Ruiz Gutiérrez, is located in the shopping centre belonging to the paper manufacturing company LUMEN.

This solution developed by Onyx Solar® is comprised of 800 polycrystalline photovoltaic glass measuring 1,510 x 1,900 mm (4.95 x 6.23 Ft). The peak installed power output is 258 kWp, and it is capable of generating over 347,000 kWh of energy per year, powering 19,800 lighting points and preventing the release 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

- Feasibility Study of Amorphous Silicon Skylight in Salamanca

- Energy cost: <0.02€
- Reduction in HVAC energy demands: 34%
- Internal Rate of Return: <2 years
- Payback: General Contractor: Tuconsa
  
Client: Bejar Town Council

Refurbishment of the historic Food Market of Bejar, Salamanca (Spain), with the installation of a 176 m² (1,894 SqFt) photovoltaic skylight. This skylight combines amorphous silicon modules of varying degrees of transparency and colours which form a mosaic inspired by the neoplasticism of Piet Mondrian. Besides, due to an installed power capacity of 6.7 kWp it can generate almost 9,000 kWh of energy per year, and prevent the release of 6 tons of CO₂.

Part of the power generated is sent to be stored in batteries, and the rest is sent to the grid for the building’s own consumption.
This project is part of the refurbishment of San Anton Market, located in the centre of Madrid, where a 168 m² (1,808 sq ft) skylight, comprised of transparent low-e photovoltaic glass, has been entirely integrated in the building.

The system enables the generation of electricity in situ, while providing multi-functional bioclimatic properties such as the filtration of solar radiation, and at the same time enhancing interior light and providing thermal and acoustic insulation thanks to its double-glazing.

The glass employed is made of amorphous silicon, with a semi-transparency degree of 20%, and the total installed power capacity is 6.5 kWp. This photovoltaic skylight generates over 7,700 kWh per year and prevents the release of 5 tons of CO₂. For this reason it has been selected as a sustainable project of reference by the European Commission.

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.
The Azurmendi Restaurant has not only obtained the LEED-Gold certification but was also declared 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 the whole of Europe.

The low-emissivity (or low-e) glass used is made of amorphous silicon and features a semi-transparency degree of 20%. This type of glass enables the passage of daylight into the interior while it filters out as much as 99% of the ultraviolet radiation and 95% of infrared light, thus preventing harm to the interior furniture, to persons or to plants, and the greenhouse effect which is so common in glass-covered buildings.

The skylight and the curtain wall total an installed power capacity of 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 restaurant with three Michelin stars and headed by Eneko Atxa, has won, in only two years, the 19º place in the ranking of “The World’s 50 Best Restaurants”.

Most Sustainable Restaurant in the World in 2014.
**KIRK KAPITAL HQ**

**PHOTOVOLTAIC SKYLIGHT**

KIRK KAPITAL is primarily a business and investment company which seeks to create a long-term capital return, the wealth managed by KIRK KAPITAL today has its origins back to 1932. This was the year that Ole Kirk Kristiansen started making wooden toys that from 1934, he sold them as LEGO toys.

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, soars to a height of twenty-eight metres (ninety two feet)

Onyx Solar has participated in the construction of the new headquarters of this company where innovation and sustainability are priorities. The photovoltaic glass has been integrated into the form of a circular roof, with eleven circles of different diameters.

In total, 446 glass units with different types of measurements have been installed. Regular ones of 1015x1000 mm and others with a semicircular shape to complete the circles of the cover.

The glass used is opaque, made of crystalline silicon, where the front of the glass is acid etch and the rear layer includes a black frit for a more homogeneous aesthetics.

This skylight has a total installed power capacity of 51 kWp, and generates approximately 40,638 kWh per year.

**EGLON HOUSE**

**PHOTOVOLTAIC SKYLIGHT**

In the exclusive neighborhood of Primrose Hill in North London, designer Russell Sage created Eglon House, a magnificent modernist house that reinvents an architectural classic for the 21st century that has been put up for sale in northwest London for £21 million.

Eglin House incorporates a photovoltaic skylight in the upper floor; Photovoltaic solar glasses are fixed in the triple glass ceiling lights so that it simultaneously reduces brightness and generates energy.

The project consists of 13 units of amorphous silicon pv glass with an argon chamber based on a low degree of transparency. In addition to providing on-site power, they also provide natural light, ultraviolet and infrared radiation filters, and permanent protection against London weather conditions.

The dimension of this triple laminated glass for this skylight is 1100X3000mm and you have a power per unit of 154 Wp.

The skylight glass goes to aluminum frames that are supported by exposed steelwork.

**PROJECTS & REFERENCES**

**ONYX SOLAR®**

**EGLON HOUSE**

**PHOTOVOLTAIC SKYLIGHT**

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In the exclusive neighborhood of Primrose Hill in North London, designer Russell Sage created Eglon House, a magnificent modernist house that reinvents an architectural classic for the 21st century that has been put up for sale in northwest London for £21 million.

Eglin House incorporates a photovoltaic skylight in the upper floor; Photovoltaic solar glasses are fixed in the triple glass ceiling lights so that it simultaneously reduces brightness and generates energy.

The project consists of 13 units of amorphous silicon pv glass with an argon chamber based on a low degree of transparency. In addition to providing on-site power, they also provide natural light, ultraviolet and infrared radiation filters, and permanent protection against London weather conditions.

The dimension of this triple laminated glass for this skylight is 1100X3000mm and you have a power per unit of 154 Wp.

The skylight glass goes to aluminum frames that are supported by exposed steelwork.
**MELBOURNE GRAMMAR SCHOOL**

Onyx Solar has completed a new project in Melbourne, Australia. In this case, the Melbourne Grammar School has chosen Onyx Solar’s PV glass for the skylights of its new building, the Geoff Handbury Science and Technology Hub.

The skylights integrate 37 units of amorphous Silicon glass with a standard size of 1245 x 635 mm (4.08 x 2.08 Ft) and a 20% transparency, contributing to the modern and beautiful new construction designed by Denton Corker Marshall Architecture studio.

The total area of PV integration is about 30 m² (323 sqFt) leading a nominal power of 1.0 kWP. The installation is expected to reduce HVAC demand by 52%, with a payback period of fewer than two years and allows recovering up to 55 times the investment in a 30 years period.

**ALZIRA TOWN HALL**

This photovoltaic skylight, integrated into the Town Hall of Alzira in Valencia, is comprised of low-e amorphous silicon photovoltaic glass modules with a semi-transparency degree of 10%.

The skylight enables the passage of daylight, facilitating the natural illumination of the courtyard while preventing the overheating of the building due to its solar (g) factor of between 5% and 40%, this making it an optimal choice for the prevention of the greenhouse effect, particularly in warm climates such as that of Valencia. Furthermore, due to its photovoltaic properties it generates over 1,000 kWh yearly and prevents the release of almost 1 ton of CO₂ each year. The total installed power capacity is 5.1 kWp.

Denton Corker Marshall is an international architecture practice established in Melbourne in 1972. It was founded by architects John Denton, Bill Corker, and Barrie Marshall. While Melbourne remains the design base, the firm has additional practices in London, Manchester, and Jakarta with over 510 projects in 37 different countries.

The Melbourne Grammar School is one of Australia’s leading independent schools, with a tradition of excellence extending over more than 160 years.

Denton Corker Marshall is an innovative piece of architecture in both performance and appearance. Aesthetically, it is a singular, clear and simple structural form, sympathetic to the campus heritage. Internally, the building supports the scientific and technology-driven investigations carried out by the students and encourages creativity, learning, and social interaction.
**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 storeys of modern offices and of which Harrowood Assets Limited is proprietor, features a 130 m² (1,400 sqft) skylight integrating solutions developed by Onyx Solar®.

The objective is to optimise the production of power while avoiding structural modifications and respecting the design of the building. For this reason, Onyx Solar® is an optimal choice, as it provides protection against the sun and generates power while improving the aesthetic appearance.

The panes forming the skylight are made of amorphous silicon with a 20% of semi-transparency degree. In addition to providing power in situ, these also provide natural lighting, ultraviolet and infrared radiation filter, and permanent protection against the climatic conditions of London.

Onyx Solar®’s solution for this skylight generates a total of 3,700 kWh per year, making possible the powering of 210 lights and preventing the release of 2.5 tons of CO₂ into the atmosphere. The total installed power is 34 kWp.

**Client:** Harrowood Assets Limited  
**General Contractor:** McLaren  
**Architect:** GMW Architects  
**Engineering:** Hoare Lea

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**PATRAS SCIENTIFIC PARK**

**PHOTOVOLTAIC CANOPY AND PARKING LOT**

Among the many works executed in this science and technology park belonging to the Greek government, Onyx Solar® was entrusted with the supply of the 88 photovoltaic glass modules integrated both in a pergola, located in the car park, and in a skylight located in one of the buildings.

The crystalline silicon glass modules measure 1,850 mm x 1,200 mm (6.07 x 3.94 Ft) and have a power capacity of 233 Wp. The cell density was executed in accordance with the client’s specifications, to enable the passage of daylight.

The total installed power capacity is 20 kWp, enabling the park to generate approximately 33,500 kWh per year.

Sufficient power to feed 1,912 lights and to prevent the release of over 3 tons of CO₂.

**Client:** University of Patras / ARPLOURS
This photovoltaic skylight, executed by Onyx Solar® for the Town Hall of Conil, in Cadiz (Spain) has a surface area of 90 m² (969 sq ft).

For this project, a low-e (low-emissivity) photovoltaic glass was chosen, whose air chamber endows the building with a high degree of both thermal and acoustic insulation.

The glass, made of crystalline silicon, has a semi-transparency degree of 25%, which enables the entry of daylight into the building. The installed power capacity is 12.2 kWp and it generates the 19,000 kWh per year needed to supply 1,100 lights.

During the 2010 Shanghai Expo, the Bamboo House was the headquarters of the Madrid pavilion. This building was given a RIBA (Royal Institute of British Architects) European Award. It was also awarded a prize for the best urban practice in 2010 due to its revolutionary bioclimatic concept.

The house features a low-e photovoltaic skylight with a semi-transparency degree of 20%. This glass, in addition to producing power, is capable of filtering out 99% of ultraviolet radiation and up to 95% of infrared radiation while enabling the entry of daylight.

A glass with a g value of between 5% and 40%, depending on the degree of semi-transparency selected, and which is optimal for the prevention of the greenhouse effect within the building, thus enhancing the comfort of the occupants. Thanks to the photovoltaic properties of the glass, this skylight generates 1,400 kWh per year.

Alejandro Zaera, the architect who penned this project, is also the creator of projects such as the Yokohama International Port Terminal in Japan.
The project at the Rota Naval Base in Cadiz consists of the installation of photovoltaic glass modules in a structure executed with the aim of providing shade and generating renewable energy at this military base. 12% of the vast amount of power consumed by the American Navy is of renewable origin, and their aim is that this percentage should continue to grow.

In this case, they decided on the integration of high-efficiency (15.20%) crystalline silicon laminated (6 + 6) photovoltaic glass modules, measuring 1,550 x 1,000 mm (5.08 x 3.28 Ft) and with a power capacity of 235 Wp. To complete this 121 m² (1,302 sqFt) structure 78 modules were required, capable of generating nearly 33,000 kWh, preventing the release of over 21 tons of CO₂ into the atmosphere and saving 19 barrels of oil per year.

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

For this 180 m² (1,937 sqFt) skylight, a low-emissivity (low-e) amorphous silicon glass was chosen, which also features an air gap to improve the insulation of the building even further and thus to prevent the undesirable greenhouse effect within.

The glass modules measure 2,200 mm x 1,300 mm (7.22 x 4.26 Ft) and feature a degree of semi-transparency of 20%. Thus, the glass is able to permit the ingress of daylight while filtering out the harmful UV and IR radiation, which prevents the overheating of the building interior and significantly improves the comfort of its occupants.

With an installed power capacity of 6 kWp, this skylight is capable of generating 8,700 kWh per year and of powering 500 lights for 4 hours each day, while it prevents the release of nearly 6 tons of CO₂ into the atmosphere.

Acciona is one of the primary Spanish business corporations, a leader in the development and management of renewable energies and infrastructures.
The new terminal at Viracopos-Campinas International Airport features 33 amorphous silicon photovoltaic skylights integrated in the roof.

The 4,100 photovoltaic glass units employed form a surface area of over 3,340 m² (35,952 sqft) and a total installed power capacity of 154 kWp, which will enable the generation of sufficient energy from the sun to feed approximately 10,200 lights cleanly and without cost, preventing the release of nearly 120 tons of CO₂ into the atmosphere each year.

Low-e Photovoltaic Glass

Onyx Solar® has developed the first low-e photovoltaic glass on the market. A glass which has been rewarded by the American Glass Association as the best glass in 2015.

This glass, in addition to generating clean, free energy from the sun, is capable of filtering out 99% of ultraviolet radiation and up to 95% of infrared radiation while permitting the entry of daylight. These properties make this glass an ideal candidate when designing a building with high standards of energy efficiency and thermal comfort.

This is a glass with a g value (SHGC) of between 5% and 40%, depending on its degree of transparency, which prevents the interior temperature from rising too high due to the greenhouse effect, particularly in locations with a hot climate, such as Sao Paulo.

“The mission is to contribute to the sustainable development of the airport. We are committed to the development of sustainable solutions for a wide range of airport-related matters and we work ceaselessly to sharpen our sustainable, innovative approach.” – NACO

As part of the refurbishment of a historic building located by the River Garonne in Bordeaux (France), the complex has been equipped with a photovoltaic skylight measuring 48 m² (516 sqft). The glass modules measure 2,954 x 1,240 mm (9.69 x 4.07 Ft) and feature a degree of transparency of 10%. The glass has a Solar (g) Factor of between 5% and 40%, and is capable of filtering out 99% of ultraviolet radiation and 95% of infrared radiation, making it an optimal choice in the prevention of overheating of the building and thus enhancing the thermal comfort of its occupants.

The refurbishment of the building was managed by the town planning authority of the city, the Bordeaux Métropole Aménagement (BMA), and was designed by the architect Jean Louis Montagnier.
CENTER FOR NOVEL THERAPEUTICS

PHOTOVOLTAIC SKYLIGHT

The University of California, San Diego is one of the top 15 research universities in the world. Situated 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 is bringing the pharmaceutical industry onto 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.

Located at the heart of the building, a photovoltaic skylight greets visitors to the park and serves as a central collaboration space with views.

The skylight consists of amorphous silicon PV glass based on a medium degree of transparency. In addition to providing on-site power, they also provide natural light, ultraviolet, and infrared radiation filters, and permanent protection against weather conditions.

As a showcase of sustainability, the skylight will serve as the central lung for the building – filtering air and daylight into the adjacent offices/meeting areas through Onyx Solar PV glass in the skylight areas.

The architects responsible for the design of this building was Perkins + Will. The Center for Novel Therapeutics is LEED® Gold Certified thanks to the renewable energy provided by the solar PV glass of Onyx Solar.
UNIVERSITY CAMPUS

PHOTOVOLTAIC SKYLIGHT

ONIX SOLAR

NEW FEASIBILITY STUDY OF CRYSTALLINE SILICON SKYLIGHTS IN PALÉNCIA

$0.01

Energy cost

51%

Reduction in HVAC energy demands

77%

Internal Rate of Return

<2 years

Payback

ARCHITECT: FRANCISCO VALBUENA

CLIENT: UNIVERSITY OF VALLADOLID

New skylight completed for the University of Valladolid, this time, its campus in Palencia, Spain.

This 1938 building was an old factory whose function was to provide jute sacks to pack beet sugars. Times have changed in this emblematic building, where we will now find books and university material.

We have rehabilitated the existing skylights with crystalline monocrystalline silicon photovoltaic glass with separation between the cells to allow natural light to enter.

University Campus

ARCHITECT: FRANCISCO VALBUENA

CLIENT: UNIVERSITY OF VALLADOLID

This double laminated glass has been manufactured with solar control properties to reduce and filter direct radiation.

The energy generated will feed 1,200 points of light and prevent 400 tons of CO₂ into the atmosphere.

Architect: Francisco Valbuena.

SHOPPING CENTER

SONAE SIERRA

PHOTOVOLTAIC SKYLIGHT

SONAE SIERRA, a leading company in shopping and entertainment centers in Portimão, Portugal, already enjoys our photovoltaic solar glass.

The Continent Shopping Center has the objective of increasing eco-efficiency with increasingly efficient management of its resources and promoting the control of the environmental impacts resulting from its commercial activities.

The existing glass in a skylight been replaced by an area of 254 square meters of multidimensional crystalline silicon photovoltaic glass.

It provides 900 MWh of clean and free energy to the building, in addition to feeding 1,800 points of light.
The old customs warehouse in Essen, Belgium, has already installed our photovoltaic glass.

This 1902 Flemish neo-Renaissance-style building was the most critical border station between Belgium and the Netherlands. Now, its primary objectives the promotion of sustainability.

To combine the latest technology and sustainable materials in a building of the early twentieth century, Onyx Solar has supplied photovoltaic glass in amorphous silicon technology with a medium degree of transparency for the central skylight area of the building, by incorporating 440 glasses with the insulating chamber.
The photovoltaic installation has been carried out in the main skylight of the city hall of Linares, Jaén, where the old conventional glass has been replaced by photovoltaic glass capable of generating energy.

The City Hall is a 19th-century building - architectural and heritage important. Renovation and extension project of Linares City Hall Recovering a historic and iconic building for the city.

Onyx Solar has supplied Crystalline Silicon Photovoltaic Glass rectangular and triangular of different sizes for its pyramidal skylight, working with partners to execute the turnkey solution for the client.

We have installed 80 m² (861 sqft), with a total installed power of around 5 kWp enough power to power 408 light points running 4 hours for 35 years and to avoid 118 tons of CO₂ into the atmosphere.

48 units of Polycrystalline silicon technology with insulated glass units, 12 mm have been installed, air gap and low emissive inner glass. Leaving an area without cells to allow natural light to enter the building.

The old Elsa Triolet Institute located in France, built in 1979, has implemented Onyx Solar glass in its reconstruction.

The hall has been equipped with a skylight of 100 m² (1076 sqft) of monocrystalline cell photovoltaic solar glass (1,600X1,000 mm modules of 124 Wp each). Also, each module has double glazing with a 16 mm argon chamber that allows perfect insulation from the outside and protects against harmful solar radiation.

In addition to generating more than 300 MWh of energy, it will prevent the emission of 200 tons of CO₂ into the atmosphere.
RECONAL OFFICE  
PHOTOVOLTAIC SKYLIGHT  
Poland

SOUND OF MUSIC  
PHOTOVOLTAIC SKYLIGHT  
India

MAICH CAMPUS  
PHOTOVOLTAIC SKYLIGHT  
Chania

CASAGRANDE EVERIT  
PHOTOVOLTAIC SKYLIGHT  
Italy

LAGO GARZA  
PHOTOVOLTAIC SKYLIGHT  
Italy
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 most satisfactory. Like in all projects, working with top-notch specialised companies is a guarantee of success.”

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

Onyx Solar® executed the modernisation of the façade of Femsa’s headquarters in Monterrey, Coca-Cola’s main bottling plant worldwide.

This ventilated façade solution consists of integrating a double skin of photovoltaic glass whose mounting structure is not visible from inside the building.

To this end, 370 large-sized grey amorphous silicon glass modules, with a semi-transparency degree of 20%, were designed to measure.

The photovoltaic glass of the façade generates approximately 17,200 kWh and prevents the release of over 11 tons of CO₂ into the atmosphere.

Furthermore, the ventilated façade is doubtless an optimal construction solution from an energy-efficient viewpoint. In fact, it has been estimated that the energy savings derived from the remarkable insulation produced by this construction solution may reach as much as 40% of the energy requirements of the building. If we add to these savings the possibility of generating clean, free energy from the sun by means of the use of photovoltaic glass, we are doubtless looking at one of the most effective construction solutions on the market.

This project is included in the many initiatives directed and developed by Coca-Cola Femsa in their quest for sustainability and corporate responsibility.
The new headquarters of the Canary Islands Higher Education Institution, located in Las Palmas de Gran Canaria, possesses a forefront technology which will make it the first LEED Platinum building in the Canary archipelago.

Onyx Solar® has contributed to this project with a system consisting of amorphous silicon photovoltaic glass slats integrated vertically into the façade. This is a triple-laminated glass, nearly three metres long and half a metre wide (9.8 x 1.64 ft), with a degree of semi-transparency of 20%, and combined with inactive glass modules to give the building a remarkable mosaic-like appearance. In addition to generating clean, free energy from the sun, these modules filter out the harmful radiation (UV & IR) and prevent the overheating of the interior, due to a Solar (g) Factor which is optimal for this type of warm climates.
Bursagaz, one of the principal companies in the natural gas sector in Turkey, has a new headquarters in the city of Bursa, which it is hoped will obtain the LEED Gold Certification.

Onyx Solar® has been entrusted to provide the building with a touch of originality by integrating a double skin of photovoltaic glass in the form of a mosaic, which is superimposed on the façade. The 315 amorphous silicon glass modules, measuring 500 mm x 700 mm (1.6 x 2.3 ft), have a degree of transparency of 20%, enabling the uniform passage of light into the building and thus reducing the need for artificial lighting. This is a 4.1 kWp installation, generating approximately 3,400 kWh per year.

Bursagaz, the natural gas distributor in Bursa, the fourth largest city in Turkey, with 1.5 million inhabitants, was formed in 2008 and has grown considerably, now being the third largest company of the sector in the country. Among the pillars of Bursagaz’s corporate strategy is the development of innovative projects contributing to a more sustainable future.

The installation of a double skin on the façade of this building belonging to the multi-national pharmaceutical company Pfizer creates a spectacular pixelated mosaic of glass of different shades and sizes especially created for this project.

This project has an installed power capacity of 19.3 kWp, generating 32,000 kWh of energy per year and preventing the consumption of 19 barrels of oil yearly.

This building, envisaged as an area for research into the genetic basis of diseases, employs this photovoltaic double skin for the production of a large amount of the energy it consumes, specifically 1,814 lights in the building itself.

Furthermore, the double skin thermally and acoustically insulates the building, providing significant savings in heating and air handling systems.

**PFIZER-GENYOO LABS**

Our aim is to continue with our commitment to energetic efficiency and the use of renewable energy provided that it is profitable and that it makes sense.”

**BURSAGAZ HQ**

“The installation of a double skin on the façade of this building belonging to the multi-national pharmaceutical company Pfizer creates a spectacular pixelated mosaic of glass of different shades and sizes especially created for this project.”

**ONYX SOLAR®**
There is no better way to study and make known our product than to install and monitor it in our own offices. In addition to generating energy, it confers a great aesthetic value on the building and the heating and cooling requirements have decreased, thanks to the thermal insulation provided by our façade in comparison with the traditional type”.

Angel Gallego, Onyx Solar® architect entrusted with the façade design and works.

THE BLACK BOX

PHOTOVOLTAIC FAÇADE

This is the name we have given to the building where we, the people who form part of Onyx Solar®, come each day to enjoy ourselves, to innovate and to develop 21st-century construction solutions. The building features a ventilated amorphous silicon photovoltaic glass façade.

The façade, generating 4.3 kWp, is comprised of 310 laminated photovoltaic glass modules capable of generating 12,685 kWh per year, thanks to which we prevent the release of nearly 9 tons of CO₂ into the atmosphere.

This represents an optimal construction solution which enables us to save 53% of our electricity bill.

FEASIBILITY STUDY OF CRYSTALLINE SILICON FAÇADES IN AVILA

<table>
<thead>
<tr>
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<th>Value</th>
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<tr>
<td>Energy cost</td>
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<tr>
<td>Reduction in HVAC energy demands</td>
<td>53%</td>
</tr>
<tr>
<td>Internal Rate of Return</td>
<td>&lt;3 years</td>
</tr>
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</table>

THE BLACK BOX

medium transparency 34% opacity

8 Barrels

245 m²

12,685 kWh

723 Lighting points

8,499 CO₂
Both shading of the building for the low angle sun in the summer it’s incredibly hot, it’s able to cool the building but also from the other angle it’s able to produce energy.”

Devin Kleiner, Senior Project Architect at Perkins + Will.

Science and Technology Center is the state-of-the-art home for the Faculty of Engineering and Faculty of Pharmacy designed with powerful and latest generation technology infrastructure. Laboratories are designed to positively contribute to progress science in various research areas such as cancer, genetics, food chemistry and robotics.

The Science and Technology Center is a unique project that houses the largest Building Integrated PV System of Cyprus.

This project converts the Cyprus International University as an example in generating power through solar energy.

In Cyprus, solar power panels are usually installed with a single type plan configuration. However, in the context of the present project, Onyx Solar photovoltaic glass has been installed on the facade of the building integrating the photovoltaic installation in the same construction structure.

The glass is made of crystalline silicon, measures 1245x1849mm, with a high transparent degree.

The total area of the installation is around 1000 m² installed in a facade with a total power capacity of 21.4 KWp.

From the university, a sustainable education is being promoted because it is the very first step needed to help save our environment.
THE GENERAL

PHOTOVOLTAIC FAÇADE

The building has been designed by the architect C.Kairouz and is located in the center of Northcote, in Melbourne.

The amorphous silicon glasses with low transparency and size 1245 x 1849 mm (4.08 x 6.06 Ft) have been installed in the railing system at the north facade of the building.

The total installed power capacity reaches 5 kWp, so the energy generated will cover the consumption of light and mechanical equipment in the common areas.

The Onyx Solar glasses allows to take the natural entry of light and give an innovative design to the building, which has been selected for the awards The International Design and Architecture Awards 2018, organized by the magazine Design et al.

MIELEC CITY

PHOTOVOLTAIC FAÇADE

The installation of this second skin in an old building in the city of Mielec, Poland, generated a spectacular aesthetic change, in addition to endowing it with a new glass that Onyx Solar explicitly designed for this project applying innovative techniques to date not used in solar PV glass.

The facade of 231 m² (2,486 sqFt) is formed by 644 laminated double glazing, reaching a total power of 3.8 kWp, generating the energy of 3000 kWh / year and avoiding the emission of CO₂ into the atmosphere of 2 tons per year.
The European Solar Decathlon is an international university competition to boost research into the development of energy-efficient residences. The goal of the teams taking part is the design and construction of houses which consume a minimum quantity of natural resources and produce minimal waste during their lifetime. Special emphasis is given to reducing energy consumption and obtaining all the energy required from the sun.

Originally created by the U.S. Department of Energy, it has had a European counterpart since 2010.

Onyx Solar® took part in the integration of the photovoltaic façade and floor for the 2012 SML System solar house, designed by students and researchers of Architecture and Engineering at CEU University, who were awarded second prize for Innovation.

Opaque laminated double-glazing was used for the façade and floor, chosen in order to achieve a greater output, approximately 3,500 kWh of energy generated per year.

The 2010 SML House, executed by the CEU Cardenal Herrera University, won first prize in the Market Feasibility and Industrialisation category.

Onyx Solar®’s participation in the project consisted of the integration of opaque amorphous silicon glass into the façade with a wooden lath substructure. The façade generates nearly 1,200 kWh of energy per year, sufficient to supply 70 lights cleanly and free of cost, thanks to the sun.

This house, fed solely by solar energy, was the best rated of those presented by Spanish universities and was the most voted by the 190,000 visitors to the competition held in Madrid.
CASTLE LANE
PHOTOVOLTAIC FAÇADE

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

On this occasion, the project consists of the installation of a ventilated façade with crystalline silicon technology in the attic of the Castle Lane building.

This type of glass was installed to achieve a darker aesthetic, with a rear black glass fit that allows this attic to receive maximum solar radiation and thus produce an important amount of clean and free energy.

EASTERN BANK
PHOTOVOLTAIC FAÇADE

The new corporate headquarters of the Eastern Bank in Dhaka, Bangladesh, features a slatted amorphous silicon photovoltaic glass façade which makes it more efficient and sustainable.

The façade, of over 500 m² (5,382 sq ft), is comprised of low-emissivity (low-e) amorphous silicon glass modules with a high transparency, fitted by means of a system of slats. This enables the uniform passage of daylight into the building, while providing thermal insulation, preventing the undesired greenhouse effect within.

This glass is capable of filtering out 99% of ultraviolet radiation and 85% of infrared radiation, and features a Solar (g) Factor of between 5% and 40%, depending on the degree of transparency. A glass which enables the passage of daylight while also allowing the entry of heat, a critical factor in cities such as Dhaka, where temperatures of up to 40º are reached. The façade is capable of generating 22,600 kWh per year, which makes it possible to power 1,300 lights while preventing the release of 15 tons of CO₂ into the atmosphere. Its total installed power capacity is 12.5 kWp.
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 in the store located in Miami Fashion District has a beautiful blue color in the exterior side of the laminate. Its configuration is Hurricane Resistant and each glass lite is heat strengthened. It has an optimised solar factor, which enhances thermal comfort inside the building.

Each one of the 42 units of glass which sizes are 2,804 x 1,388 mm and 2,808 x 1,413 mm (9.19 x 4.55 Ft and 9.21 x 4.64 Ft), and have a peak power of 338 Wp. The installation will generate 7,700 kWh yearly.

Photovoltaics have never been so fashionable. Balenciaga, one of the most renowned fashion brands and part of the Luxury group Kering, has chosen Onyx Solar’s PV glass to dress the façade of it store in Miami with a design that combines beauty, innovation and sustainability.
The University of Washington’s project, designed by renowned Perkins+Will and constructed by Skanska USA, features 650 m² (7,000 sqft) of transparent PV glass manufactured by Onyx Solar in their “Life Science Building”, dedicated to R&D activities.

The College of Arts and Sciences at University of Washington is getting ready to soon open a spectacular, modern research and instructional space called the Life Sciences Building (LSB), which will provide students with over 15,800 m² of open and flexible lab space, to boost a collaborative and interdisciplinary approach to research in the field of Biology.

The building has been designed by architects Perkins + Will, and it is a seven-story construction – including two stories below grade, which has been envisioned as a benchmark project in terms of energy efficiency, innovation, and onsite renewable energy.

The design targets 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.

Project awarded the title of “Best Multi-Functional Curtain Wall in 2018”. Build Magazine.

"Both shading of the building for the low angle sun in the summer it’s incredible hot, it’s able to cool the building but also from the other angle it’s able to produce energy.”

Devin Kleiner, Senior Project Architect at Perkins + Will.
TWIN CITY

PHOTOVOLTAIC CURTAIN WALL

Onyx Solar supplied amorphous silicon technology for this iconic project. Amorphous silicon glass supplied is full black, with a grey tint pattern and argon chamber in various dimensions according to the project requirements. Some of these dimensions almost reaching 4 sqm. The 192 glasses supplied achieve a peak power of 25 kWp.

Project Twin City is a new development made by one of the largest developers in central Europe, HB Reavis. It will become an important icon of Bratislava, Slovakia.

HB Reavis is a fully integrated property developer applying a unique and highly successful approach to the complete development chain. The strong position of the Group was confirmed in the annual rating carried out by Property EU, placing HB Reavis among the Top 3 office developers across European Union.

Company Activities Delivered projects. Total Gross leasable area: 1,064,000 m².

Founded in 1887, Skanska is one of the world’s leading construction and project development companies, focused on selected home markets in the Nordics, other European countries and North America. The Skanska Purpose is to build for a better society.

Skanska provides innovative and sustainable solutions to create a sustainable future for its people, customers and communities the efficiency of its buildings.
CULVER CITY CREATIVE

PHOTOVOLTAIC CURTAIN WALL

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 Gensler, 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.

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 a walking distance to the recently renovated Westfield Culver City Mall.

C3 outstanding project integrates a PV curtain wall by Onyx Solar of 743 m² (8,000 sqFt), comprised by up to 24 different sizes of amorphous silicon PV glass. It is the company’s first curtain wall project developed in the United States.

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

HEINEKEN

PHOTOVOLTAIC CURTAIN WALL AND FLOOR

“The greenest beer factory of the world will feature Onyx Solar’s PV glass”.

Onyx Solar’s transparent photovoltaic glass will generate clean electricity to feed the new factory that Heineken is building in Meoqui (Chihuahua, Mexico).

The new plant will have an initial capacity of producing 5 million hectoliters per year. It plans to be the greenest factory of the country. By the year 2020, the 66% of the power used has to come from renewable sources.

The transparent PV glass will be installed at the offices’ building and other process areas. It will enable the building to be energy self-sufficient. It will also improve its energy efficiency and thermal comfort. It will have a perfect integration thanks to the possibility of customizing the glass in terms of shape, color, size, and degree of transparency.

Blanca Brambila (Chief of Corporate Social Responsibility at Heineken Mexico), Eusebio Reynoso (Heineken Meoqui Brewery Manager) and Jose Maria Lozano (Head of Technologies at the Heineken Meoqui’s plant) tell us about the project and its collaboration with Onyx Solar.
Brunel University, located in Uxbridge, west London, has installed transparent photovoltaic glass manufactured by Onyx Solar in its Wilfred Brown Building’s curtain wall. The building features 42 units of PV glass with high transparency-degree and different sizes; some of them are even 2.6 m wide! This project is part of the remodeling of this 4,710sqm building, which celebrated its 50th anniversary in 2018.

Installation of a photovoltaic curtain wall at the new headquarters of the Guadalhorce Valley Rural Development Group, reducing the energy consumption of the building. This enclave, located in the province of Malaga, was born to be a Social, Economic and Environmental Innovation Centre to house the bodies and associations currently working in the region on the development, promotion and innovation of the valley.

This time, Onyx Solar®’s photovoltaic glass was installed on the façade of the building, forming a remarkable curtain wall capable of generating over 2,700 kWh per year, with a peak installed power capacity of 2.5 kWp. The glass modules, made from amorphous silicon, are large-sized and were made to measure to satisfy the requirements of the client, the Andalusian regional government. It is of note that the photovoltaic glass employed is of the low-emissivity (Low-E) type, which improves the thermal and acoustic insulation of the building and enhances energy savings in the same. It further features a semi-transparency degree of 20%, which enables the uniform passage of light into the interior, reducing the need for artificial light while preventing the ingress of heat and the undesired greenhouse effect due to its Solar (g) Factor of between 5% and 40%, depending on the degree of semi-transparency. All the above is conducive to an improvement in the comfort of those inside, in addition to being in keeping with the natural surroundings of the location of these headquarters by preserving the aesthetics of the building.
Bidwells, the leading real estate consulting company in the UK, has decided to choose our photovoltaic glass to install a curtain wall in the renovation of its headquarter in Cambridge.

It has installed amorphous silicon technology with high transparency degree, dimensions of 967 x 2,683 mm (3.17 x 8.80 Ft) and configuration with Argon camera. Onyx Solar technology allows Bidwell House to produce clean, free energy thanks to the sun and thus become one of the most innovative buildings in its sector.

The major refurbishment of Bidwell’s existing Cambridge head office will provide the company with a modern flagship office to support the growing needs of the team. Built over 3 floors, the new office consists of a 100 seat café, a large marketing suite for staff and customers on the ground floor, and 2 floors of open plan office suites designed to provide flexible space for all employees.

Its offices have been in the epicenter of Cambridge for 177 years, and the installation of our photovoltaic glass will ensure that many more will remain in it.

The building of the Municipality of this city bathed by the Mediterranean will now showcase two large solutions with photovoltaic glass from Onyx Solar. More and more public organizations are betting on total photovoltaic integration in their buildings and Onyx Solar technology.

Our photovoltaic glass has been installed in a curtain wall and a shell, both with amorphous silicon technology.

The curtain wall has a surface area above 300 m² (3,230 Ft²), low transparency and dimensions of 1245 x 2456 mm (4.08 x 8.06 Ft).
Onyx Solar has completed a new project in Pennsylvania, USA. In this case, the Lombardo’s Welcome Center, Millersville University has chosen Onyx Solar’s PV glass for the curtain wall of its new building. It will be a beautiful project which will become Millersville’s first Net Zero Energy Building.

We will supply black opaque amorphous Silicon double pane glass for the curtain wall, which can turn the building into a Positive Energy Building.

With this project, the University of Millersville is entering a more sustainable future.

The building generates its renewable energy to run its systems and devices. Most buildings draw electricity from the power grid to turn on lights, devices and provide heating and air conditioning, however, the goal of the Lombardo Welcome Center is to achieve this by using renewable solar energy.

Beyond its sustainable design, the Lombardo Welcome Center is also visually striking, with large glass windows that let in plenty of sunlight, an open and spacious architecture that invites visitors to the interior.

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

Among the energy efficiency measures incorporated in the new hospital facilities are the works executed on the three façades, where high-efficiency opaque monocrystalline silicon photovoltaic glass modules have been integrated. To this end, 69 safety laminated glass modules measuring 1,870 x 1,399 mm (6.13 x 4.59 Ft), with a power capacity of 383 Wp each and an efficiency of 15% were installed. The total installed power capacity is 26.5 kWp.

Our client, Ferrovial, is a worldwide referent in the infrastructure and services sector, a field in which it develops solutions characterised by their innovative nature and their sustainability. The company has over 69,000 employees and is present in over 25 countries, belonging to prestigious sustainability indices such as the Dow Jones Sustainability Index. "At Ferrovial we are totally committed to reducing the environmental impact of all our activities; we therefore use the best technologies developed for this purpose."
THE AUTONOMOUS OFFICE

The Autonomous Office is a project located in the Science and Technology Park of Gijon, in Asturias, Spain. The Park is the location of reference in Gijon destined for the establishment of knowledge-intensive companies, the performance of R&D&I activities and the development of new pathways for technology transfer.

The objective of the “Autonomous Office” project is the construction of a sustainable, energetically self-sufficient building which will reduce the environmental footprint to a minimum, for this reason it has been awarded the LEED Platinum Certificate.

The development company for the construction of the building is Biogas Fuel Cell (BFC), devoted to the recovery and management of organic waste by its transformation into biogas.

Onyx Solar® is participating with the installation in the building of various integrated photovoltaic solutions, which are the main source of power generation. Thus, by replacing traditional building materials with multi-purpose photovoltaic materials, in addition to creating clean, cost-free electricity from the sun, the power requirements of the air handling and lighting systems are also reduced by controlling the sunlight and increasing thermal and acoustic insulation.

The photovoltaic technology employed on two of the façades of this building is CIGS technology (Copper, Indium, Gallium and Selenium), which produces a peak installed power of 24.5 kWp and which will generate 10,686 kWh per year. It will also prevent the release of 3 tons of CO2 into the atmosphere.

The project is co-financed by the European Union via the LIFE+ programme in the thematic field of Environmental Policy and Governance (LIFE11 ENV/ES/000622).

BOOTS PHARMACY

Boots, the largest pharmacy chain in Great Britain and Ireland, now has a photovoltaic glass curtain wall at its offices in London, UK.

This curtain wall, designed especially for Boots by way of a showroom, is comprised of low-emissivity (low-e) amorphous silicon glass modules.

Each module has three different degrees of semi-transparency: low, medium and high. This will enable the company to study in situ the reduction in its electrical power consumption thanks to an innovative construction material which is also aesthetically attractive.

Boots pharmacy is a company committed to innovation and sustainability and which, like so many others, endeavours to improve the energetic efficiency of its stores and offices. It has approximately 2,500 stores in the United Kingdom, and since its merger with the American company Walgreens in 2012, it has become the largest purchaser of pharmaceutical products worldwide.
Sierra e-facility is home of India’s highest ranking Green Building rated by GBCI under LEED (New Construction v2009), the 2nd in the world: the “Sierra e-facility” building. It scored 103 points out of 110 points in the LEED-NC rating system. It combines transparent photovoltaic glass manufactured by Onyx Solar with conventional glass, achieving an aesthetic and functional result. The dimensions are $1245 \times 635$ mm ($4.08 \times 2.08$ Ft).

Coimbatore uses environmentally friendly building materials and high-performance glass, such as Onyx Solar’s PV glass, which not only is aesthetically pleasing but also generates free and clean electricity from the sun, improves the building’s energy efficiency and filters harmful radiation and it doesn’t obstruct the view.

Our photovoltaic glass in Chile has reached the southernmost city of the planet.

The high efficiency of our photovoltaic glass enables it to generate nearly 5,000 kWh of clean, free energy from the sun, with a peak installed power capacity of 8.6 kWp, even in the city nearest the South Pole, in the Chilean Antarctic.

This is a photovoltaic glass whose cell density was totally customised, in accordance with the client’s design, to allow the entry of daylight. In this way, the glass, which incorporates monocrystalline silicon cells, features a degree of transparency of 70%, enabling the passage of a large amount of light into the building while generating sufficient energy to supply 300 lights for 4 hours each day.

Coimbatore: COMBATORE®

PHOTOVOLTAIC CURTAIN WALL

Campus

Total area: 16,00 m²

Electricity consumed per year: 4,867 kWh

277 Lighting points

3,261 CO2

3 Barrels
This curtain wall, installed in Malta, is made of low-e amorphous silicon photovoltaic glass modules with a degree of semi-transparency of 20%, enabling the passage of light into the interior and also enjoyment of the 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 being perfect for the prevention of the greenhouse effect within the buildings.

In this case, the glass also comprises an air gap to provide greater thermal insulation for the building.

The installation generates 3 kWp and is comprised of 124 differently-sized and shaped glass modules which were made to measure for this project.
Onyx Solar® has taken part in the refurbishment of the high-speed Union City station in San Francisco, supplying the safety laminated (8+8) photovoltaic glass included in the immense canopy of the new building.

The canopy is comprised of 800 crystalline silicon photovoltaic glass modules measuring 1,805 mm x 1,137 mm (5.92 x 3.73 ft), totaling a power capacity of 172 kWp (215 Wp per module). These modules are capable of generating 174,280 kWh per year, sufficient to power 10,000 lights and to prevent the release of almost 120 tons of CO₂ into the atmosphere and the consumption of 105 barrels of oil.

The glass features a ceramic screen print on its reverse side, endowing the interior of the canopy with an elegant, uniform design.

This glass was designed especially for this project, which achieved UL 1703 certification, a guarantee of its optimal efficiency and quality, ensuring compliance with the highest quality and safety standards in the case of mechanical or electrical issues, and also its resistance to fire.

This photovoltaic canopy was Onyx Solar®’s first project in the United States and it is considered to be one of the largest photovoltaic integration operations executed in the country. For this reason, it was leading news in many of the most significant journals of the sector, such as “Glass Magazine”, belonging to 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.
The installation has been made in the new 3D Research and Development Center that has become one of the largest and most advanced in the digital printing and manufacturing industry on the planet.

The new center, with about 50,000 square meters, will be focused on the development of the printing portfolio, engineering and co-development and R&D of 3D products.

Designed with the direct collaboration of engineers and the R & D division of HP, together with clients and partners, the new installation integrates flexible, interactive, and sustainable designs.

This center reflects HP’s commitment to the environment by incorporating a photovoltaic canopy with Onyx Solar PV glass.

The glass is made of crystalline silicon, measures 2890x730 mm and 2946x730 mm, with a cell density of 73%.

The total area of the installation is around 1000 m² with a total power capacity of 138 kWp. The present invention provides on-site electricity generation and provides the building with a shadow surface for all its workers.

HP’s intention is to continue working with Onyx Solar in future installations to use 100% renewable energy in its global operations over time.
LA TROBE UNIVERSITY

PHOTOVOLTAIC CANOPY

Founded over 40 years ago, La Trobe University is a multi-campus with 5,000 teaching staff and researchers, 30,000 students and 5 faculties. As part of its great commitment to caring for the environment it has committed itself to Onyx Solar®’s photovoltaic solutions.

Onyx Solar® has installed a photovoltaic pergola in the university campus in order to provide shade while generating free and clean electricity.

The pergola, designed totally to measure, combines varied monocrystalline silicon glass by Onyx Solar®. These generate 14,392 kWh for the university, preventing the release of almost 10 tons of CO2 into the atmosphere.

MOHAMMED VI UNIVERSITY

PHOTOVOLTAIC CANOPY

This photovoltaic pergola of nearly 600 m² (6,458 SqFt) was installed at the entrance to 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, this being necessary in locations such as Morocco where high temperatures are reached and people are exposed to solar radiation.

For Onyx Solar®, this project entailed a challenge and an important record due to the high efficiency of the glass modules manufactured from crystalline silicon. These modules are of a large size and were designed especially to satisfy the client’s needs. It is of particular note that a single module contains 144 photovoltaic cells and achieves a power capacity of 626 Wp, that is, 160 Wp per m², enabling the pergola to generate 135,000 kWh and to prevent the release of almost 100 tons of CO2 into the atmosphere each year.

This project was penned by two architects of worldwide renown, Ricardo Boffil and Elie Mouyal, who preserved the spirit of Arab latticework in their design. Jacobs, a world leader in the provision of engineering and construction services, was entrusted with the construction of the pergola.

The Mohammed VI Polytechnic University is located at half an hour’s distance from Marrakesh. This initiative was Onyx Solar®’s first project 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 has a surface area of 1,000 hectares and features a ratio of 20 m² (215 sqFt) of greenspace per capita.
Onyx Solar has supplied 64 pieces of mono-crystalline glass with size 3,100 x 1,744 mm (10.17 x 5.72 Ft) and a nominal power of 626 Wp per unit. The PV glass has been installed without the frame, fixed by a spider system, which provides greater visual continuity to the canopy. Thanks to the photovoltaic colonnade, a shaded walkway area has been created, providing an enjoyable experience for visitors.

This extra-large photovoltaic glass has been customized following the clients’ requirements. In that case, North Sydney Council had the objective of refurbishing an industrial park in a green platform with plants and modern architecture to produce clean energy where people could learn about sustainability in everyday life. Photovoltaic Canopy was the perfect solution to create a modern colonnade that provides shade for walking near Parramatta River and reducing the energy demand of the complex.
**PANAMA PACIFICO**

**PHOTOVOLTAIC CANOPY**

London & Regional, one of the largest private real estate companies in Europe, is the developer of “Panama Pacific”. This immense multi-use complex is a recreational, residential and business community located to the west of Panama, on the former Howard Air Base.

Onyx Solar®’s contribution to this project has been the construction of an amorphous silicon photovoltaic canopy for one of the buildings. The glass has a semi-transparency degree of 10% and generates 7,300 kWh yearly, with a total installed power capacity of 5.1 kWp.

**US EMBASSY OF JAKARTA**

**PHOTOVOLTAIC CANOPY**

Designed and built by renowned BL Harbert International, this new state-of-the-art, 4,366 m² (47,000 SqFt) complex will incorporate 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 is located in the historic center of Jakarta, surrounded by national government offices. Upon completion, it will provide workspace for approx. 1,300 employees, who will enjoy the benefits of green building practices.
Tony Gallardo Park has an area of 9 hectares and a perimeter of 1,161 linear meters, after the interventions carried out the park behaves like a living, balanced and adapted ecosystem.

It is intended to optimize resources to the maximum, in favor of a minimum maintenance and a reduction in consumption.

Onyx Solar participated in the transformation of this park by providing photovoltaic glass for the installation of a canopy system.

30 pieces of monocrystalline glass with a size of 1800 x 900 mm and a nominal power of 5300 Wp have been installed.

Thanks to the photovoltaic canopy, a shaded footbridge area has been created, which provides a pleasant experience for visitors.

Computech City is one of the most important IT infrastructure management services companies in the United States, for its new headquarters, this tech organization sought an innovative, environmentally-friendly design.

The innovative photovoltaic glass provide cover and generate low-cost electricity in all weather conditions, including low light and cloudy days.

The project consists of a PV canopy with 200 units of crystalline Silicon glass on glass modules. The glass dimensions are 1641 x 989 mm (4.08 x 2.08 Ft).

Onyx Solar’s PV glass not only is aesthetically pleasing but also generates free and clean electricity from the sun, improves the building’s energy efficiency and filters harmful radiation.
Today we are located in the Algarve, south of Portugal, one of the sunniest and warmest regions in Europe, reaching around 3,000 hours of sunlight a year.

We have installed a 48m² photovoltaic canopy of crystalline silicon glass in a luxury residential area.

Its objective is to be a self-sufficient house. It generates 200 MWh thanks to the energy coming from the sun, having a Payback Time of less than 3 years.

Besides, this installation will feed 500 points of light and prevent the emission of 150 tons of CO₂ into the atmosphere.
This photovoltaic canopy, comprised of crystalline silicon glass, is located in Hawai. Specifically in a building belonging to Yahoo, the Silicon Valley technology company.

The canopy is made up of 320 glass modules made entirely to measure for the project. Said modules are of safety 8 mm + 8 mm laminated glass measuring 1,943 mm x 1,016 mm (6.37 x 3.33), and are perfectly integrated into the building.

The total installed power capacity is 34 kWp, and it is capable of generating 58,000 kWh per year, sufficient power to feed the 3,300 lights in the building and to prevent the release of 38 tons of CO₂ into the atmosphere.

The glass also features a ceramic screen print on its reverse side, which filters out the harmful solar radiation while providing the glass with a uniform design.
Arcadia University

Photovoltaic Canopy

Integration of a photovoltaic sunshade in the new building of Arcadia University Campus, in the state of Pennsylvania, US.

This solution provides a shaded area, totally integrated in the building and designed to measure, with a combination of monocrystalline silicon glass modules of two different sizes, giving the appearance of a mosaic. Furthermore, it generates 4.8 kWh per year and prevents the release of 3.2 tons of CO₂ into the atmosphere and the consumption of 3 barrels of oil.

The famed Arcadia University was founded in 1853 in Glenside (Pennsylvania) and has over 4,000 students.

"Onyx Solar® has equipped Arcadia University with an integrated photovoltaic sunshade which has awakened a greater environmental conscience among the students. Onyx™ has done a great job and we recommend them for any project including innovative, high-quality solutions for photovoltaic integration."

Chris Chapman, of Delran Builders, and Site Manager at Arcadia.
**SENIORS RESIDENCE**

**PHOTOVOLTAIC CANOPY**

Installation of a photovoltaic pergola at the “Primavera” Seniors Residence in Coslada, Madrid.

The installation covers an area of 70 m² (753 sqFt), with 48 opaque amorphous silicon photovoltaic glass modules. This pergola generates over 5,000 kWh yearly, preventing the release of 4 tons of CO₂ into the atmosphere per year. The installed power capacity is 4.3 kWp.

**XSCHE’S HOUSE**

**PHOTOVOLTAIC CANOPY**

This photovoltaic pergola has been installed in Barcelona to provide shade and comfort for the occupants of this residence, located in the midst of the Paseo de Gracia, and comprised of 70 crystalline silicon glass modules measuring 1,650 mm x 850 mm (5.41 x 2.79 ft).

The safety photovoltaic glass modules, with a power capacity of 140 Wp, generate 11,710 kWh per year, enabling this residence to feed over 600 lights and to prevent the release of over 7 tons of CO₂ into the atmosphere.
One of the things we like the most is when technology and ecology walk hand in hand.

Madrona Marsh Nature Center in Torrance, Los Angeles, is a natural reserve where people can explore and learn the wonders of nature.

Onyx Solar provided transparent solar PV glass for its beautifully integrated photovoltaic canopy. This amorphous silicon solution allows the natural light in while filtering the 99% of UV radiation. It also prevents the release of CO2 to the atmosphere and generates free and clean electricity.

The Scotch College, founded in 1851, is the oldest secondary school in Victoria, Australia.

The Campus, located in the heart of Melbourne, has executed the construction of a building called “The Sir Zelman Cowen Centre for Science”, with the aim of being a showcase of environmental sustainability, where Onyx Solar® just had to be present.

The solution developed by Onyx Solar® at Scotch College consists of the installation of a photovoltaic pergola on the roof of the building. This is formed of amorphous silicon glass with medium semi-transparency, enabling the ingress of daylight while providing considerable thermal protection.

The total installed power is 3.7 kWp, enabling the school to generate 2,051 kWh per year and to power nearly 120 lights cost-free and cleanly, thanks to the sun. It also prevents the release of 1.4 tons of CO2 into the atmosphere.
Onyx Solar has completed a new street furniture project in Zaragoza, Spain. It consists of several self-sufficient bus shelters equipped with our crystalline silicon photovoltaic glass.

Our photovoltaic glass powers our energy storage batteries which are inside the bank. With this clean and free energy will feed the information screen and the LED lighting of the marquee itself.

For efficiency in consumption, both a twilight presence detector and a push button are available to activate the devices only when there is a need for it.

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 capable of capturing and storing the energy needed for this space.

Designed by LGF Architects, this new Car Barn Training Center located in the Washington, D.C. area incorporates a photovoltaic canopy using Onyx Solar’s mono-crystalline Silicon glass on glass units.

The PV Glass make up consists of two layers of 5/16” fully tempered glass with 36x 6” cells embedded in between them. The glass design comes with drills to accommodate spider fittings, and the total system size is 5.76 kWp.
The University of Valladolid decided to trust Onyx Solar for a second time after the great success of the Lucia building PV skylight installation. This building has become the most sustainable building in Europe and the entire northern hemisphere.

This time, Onyx Solar leaded a turnkey project for the installation of parasols in one of the university’s classroom buildings. Apart from providing the glass modules, Onyx Solar also coordinated both mechanical and electrical installation for this project.

The parasols installed, using monocrystalline silicon modules in different sizes, provide shade to the classrooms while generating energy from the sun at the same time.

Onyx Solar has installed a photovoltaic canopy with crystalline silicon technology in a new project in Prague.

The glass supplied is blue crystalline silicon in different dimensions, monocrystalline silicon, and some trapezoidal shapes according to the requirements of the project. The 20 glasses provided have a peak power of 177 Wp.

This photovoltaic canopy has been installed in a private residence in the Czech Republic. The canopy allows residents to enjoy an outdoor space without weather concerns.

This solution generates clean and free energy through the sun. Thanks to this technology, the residence can save a significant part of your electricity bill.
How is it possible to power 600 lights in a public park efficiently, economically and sustainably? The Barcelona City Council, following its commitment to sustainability and efficiency, has no doubt at all: by installing photovoltaic glass.

For this reason, the Rodrigo Caro Gardens in Barcelona feature three magnificent photovoltaic glass pergolas. Glass modules which, in addition to providing shade for the citizens who enjoy this well-known park, generate nearly 11,000 kWh per year cleanly and without cost, thanks to the sun.

Sufficient to power the 600 lights throughout the park. Size of the modules: 1,255 x 1,240 mm (4.12 x 4.07 Ft). Power: 183 Wp.

Located in the Bronx, across from the St. Barnabas Hospital campus, this project consists of two residential towers are separated by a landscaped terrace, atop a mixed-use base. 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, forming a total area of 950 SqFt.

Each installed glass unit has a power of 291W and dimensions of 1977x1009 mm. The total power of this canopy is 13 Kw/p and will provide clean and free energy to these two towers in New York.
This solar PV System at the Pier South - A Marriott Autograph Collection Hotel & Resort located in Imperial Beach, CA - at the beach front, demonstrates that designing with PV Glass has almost no limits.

Modern in every sense, the Pier South stands out for being a sustainable and environmentally friendly building awarded LEED Silver Certification (Leader in Energy and Environmental Design), thanks to the innovative solutions brought by Onyx Solar® through Soorya Unlimited, a Californian company specializing in solar energy and project development.

Soorya Unlimited proposed a solution that included photovoltaic technology in the hotel, for which Onyx Solar® is a safe bet in the design of such photovoltaic construction solutions.

The objective of creating a fully customizable solution in the form of a photovoltaic roof, which requires greater aesthetic appearance, was achieved through the design of custom-shaped glass modules with more than 55 different shapes, fully frameless.

The PV Glass, designed and manufactured by Onyx Solar®, is composed of crystalline silicon solar cells, reaching an installed capacity of 38 kWp. This solution enables the Pier South to generate 58,500 kWh annually, destined for the building's self-consumption, thereby preventing the emission of 39 tonnes of CO2 into the atmosphere.

The installation by Soorya Unlimited is flat on the roof and ballasted so no penetrations are done in roof. Additionally, some string lights under the entire array will be installed to enhance the aesthetics further - when lit at the night, they will make the whole roof look like a dance floor. This luxury complex has 78 modern guest rooms with private balconies overlooking spectacular views of the Pacific Ocean. For sure, it is a place where sustainability and relaxation meet.
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 also wanted to go solar.

The new roof design, with the colors of the original design are combining with the new energy efficient roof, Corison also wanted the solar modules to disappear as much as possible into the lines of the new roof.

Onyx Solar used their photovoltaic glass etching technology to color match the modules with the color of the new roof and to design the right technology mix needed to achieve the solar design.

The owners will benefit from the photovoltaic installation of 148 photovoltaic glasses with 226 Wp/unit savings on roof maintenance since their new roof has a 30-year warranty renovation.

The glass is made of crystalline silicon, measures 1,700x1,000 mm. The total area of the installation is exactly 938 m² (10,096 sqft) installed in a façade with a total power capacity of 21.4 kWp.
## PRIVATE RESIDENCE

### PHOTOVOLTAIC BACKYARD WALL

*Feasibility Study of Amorphous Silicon Façades in Naples*

- Energy cost: $<0.03/€
- Reduction in HVAC energy demands: 34%
- Internal Rate of Return: <4 years
- Payback: <5 years

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

A Photovoltaic Balustrade at the foot of Vesuvius in the Gulf of Naples.

This photovoltaic balustrade is comprised of 342 amorphous silicon photovoltaic glass modules, designed to measure for the client 1,128 x 950 mm (3.7 x 3.11 ft). These modules feature a degree of high semi-transparency, enabling the hotel guests to enjoy a wonderful view of the Mediterranean.

The glass is a triple safety tempered laminate of 8 mm + 3 mm + 8 mm (0.3 x 0.11 x 0.3 inch.) and has withstand the strict tests required to guarantee the safety of the guests of this five-star hotel.

With a total installed power capacity of 11 kWp, the balustrade generates 11,000 kWh of power per year, sufficient to supply over 600 lights for 4 hours each day and to prevent the release of 7 tons of CO₂ into the atmosphere.

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

"At Enel we are totally committed to energetic efficiency, the reduction of the environmental footprint, protection of the surroundings, and technological innovation" - Enel.

Onyx Solar® has installed its first photovoltaic perimeter fence in a private residence located in Avila, Spain.

The glass employed is one of the greatest innovations. It is a satin-finish anti-glare glass which maintains its photovoltaic properties and at the same time diffuses the passage of the light, providing privacy and comfort for users.

This fence generates clean, free energy from the sun, reaching 425 kWh per year, with a total peak installed power of 820 Wp.
The refurbishment of this small Hostel at Gotarrendura, Spain, includes the integration of low-e amorphous silicon photovoltaic glass in the windows and door. This is the only glass capable of filtering out 99% of ultraviolet radiation and up to 95% of infrared radiation, depending on the degree of semi-transparency selected.

Thanks to this installation, this town in Avila was awarded the Livcom prize in Seoul. This prize commenced in 1997 to encourage innovation and leadership in the creation of sustainable environments.

“Thanks to this installation, the town in Avila was awarded the Livcom prize in Seoul. This prize commenced in 1997 to encourage innovation and leadership in the creation of sustainable environments. This award represents a great success for the town, warranting the Town Council’s commitment to the environment, to development and to well-being”, says Fernando Martin, mayor of Gotarrendura, who received the award in Seoul, accompanied by Luis Arias-Romero, Spanish Ambassador in this Asian country.

Shanghai, the largest city in China, enjoys 340 m² of our high transparency amorphous photovoltaic glass. We have installed photovoltaic solar glass on a photovoltaic balustrade in the Eco-Building Generation office building in Shanghai Technology Park.

A city full of skyscrapers like Shanghai is essential to turn buildings into vertical power generators.

With this railing, about 200,000 kWh will produce in 35 years.

The refurbishment of this small Hostel at Gotarrendura, Spain includes the integration of low-e amorphous silicon photovoltaic glass in the windows and door. This is the only glass capable of filtering out 99% of ultraviolet radiation and up to 95% of infrared radiation, depending on the degree of semi-transparency selected.

Thanks to this installation, this town in Avila was awarded the Livcom prize in Seoul. This prize commenced in 1997 to encourage innovation and leadership in the creation of sustainable environments.

This award represents a great success for the town, warranting the Town Council’s commitment to the environment, to development and to well-being”, says Fernando Martin, mayor of Gotarrendura, who received the award in Seoul, accompanied by Luis Arias-Romero, Spanish Ambassador in this Asian country.

Shanghai, the largest city in China, enjoys 340 m² of our high transparency amorphous photovoltaic glass.
ONyx Solar® has received awards on many occasions for developing and patenting the first non-slip photovoltaic glass floor in the world. Thanks to the breakthroughs achieved by the company’s R&D&I Department, this solution fulfills the highest technical standards; it complies with non-slip regulations and withstands 450 kg in the momentary load tests, and its installation is very simple, as it is laid like a raised floor, with plots.

In Manhattan, New York, this private residence in the Lower East Side has trusted Onyx Solar for the installation of a photovoltaic walkable floor for the renovation of its penthouse.

This project has been carried out along with Solar Deck combining photovoltaic glass pieces of multiple colors and sizes in the outdoor space of the terrace. Up to 50 units of pavers of different dimensions are placed in a surface of 20 m² (215 sqft). Its LED lighting will certainly intensify the vibrant colors of the units.

A great retrofit project by Onyx Solar which represents a perfect breakthrough solution for a better use and performance of the city’s highly expensive soil. It fulfills all safety standards complying with non-slip regulations and it is beautifully integrated into the building.
UNION NATIONAL BANK

PHOTOVOLTAIC ENVELOPE

The Union National Bank (UNB), located in the financial and commercial area of Giza, is the new headquarters of the bank in this Egyptian city.

UNB is one of the main Egyptian banks, standing out due to its provision of excellent services to its customers and achieving the best performance possible for its shareholders.

The solution which Onyx Solar® has integrated into this new 16-storey building consists of the inclusion of photovoltaic glass on the façade and rooftop of the same, with a total of 439 m² (4,725 sqFt) of integrated photovoltaics with 20.61 kWp of peak installed power.

On the one hand, blue amorphous silicon glass of two different sizes were used for the main and lateral facades, featuring a low semi-transparency degree. On both façades a double-skin system is used, where the glass is installed on a metallic structure, forming a geometric pattern on the façade.

On the other hand, the panes integrated on the building rooftop are made of monocrystalline silicon and provide a peak power output of 28.08 kWp.

The installation of Onyx Solar®’s photovoltaic technology at the Union National Bank enables the generation of over 61,000 kWh per year, enough to power 3,482 lights and to prevent the release of 41 tons of CO₂ into the atmosphere.

PHOTOVOLTAIC BENCH

The photovoltaic bench, the new urban furniture innovation of Green Integrations Builders Co., our official distributor in Panama.

Onyx Solar is providing solar PV glass that allows this reality. The bench has a USB port that will enable you to recharge your phone and other gadgets thanks to the Sun.

This project has been possible thanks to the collaboration between GIBCO and Onyx Solar, working together for a more sustainable world.
The “Terina Mediterranean Foundation” research centre has entrusted Onyx Solar® with the refurbishment of its buildings, with an optimal integration of amorphous silicon photovoltaic glass with different degrees of transparency and shades of green.”

Juan Luis Lechon, Engineer at Onyx Solar®.

The refurbishment of the buildings of the Terina Mediterranean Foundation in Calabria, Italy, has a unique character and represents an important milestone for Onyx Solar®, as a single building complex houses 3,000 m² (32,300 sqFt) of photovoltaic glass. The glass, made of green amorphous silicon and with various degrees of transparency, has been integrated in skylights, floors, walkway, parking lots and even in an elevator with panoramic views.

The Terina Mediterranean Foundation is a centre of excellence devoted, among other activities, to research and knowledge of the agro-food industry via a network of relationships with Italian and foreign universities.

The photovoltaic glass installed at Lamezia Terme is green in colour, one of the colours typical of this region.
Al-Balqa Applied University (BAU) is the largest public technical university in Jordan with capacity for more than 21,000 students.

Since its creation, the university has sought to bet on sustainability and enrich the experiences of its students in terms of renewable energy.

Throughout its career, the university has strived to continually develop its programs and specializations in a manner consistent with scientific and academic changes.

The university is working on the continuous modernization of its facilities to reduce the dependence on fossil fuels used in power generation.

Due to the expected 70% increase in energy consumption over the next 20 years, from the university, there is an urgent need to ensure alternative energy sources.

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 photovoltaic installations have been carried out in the faculties of science and finance, using a crystalline silicon photovoltaic glass with dimensions of 1500 x 1100 mm and medium transparency.

In the faculty of science, glass has been installed in a photovoltaic canopy consisting of 126 units with a total area of 208 m² and a power of 26.6 kWp.

The second installation of photovoltaic glass with an area of 191.4 m² has been carried out in a brise-soleil on the facade of the faculty of finance.

The 116 glass units of this installation have a total power of 24.48 kWp, enough power to produce 1,354,115 kWh in 35 years.
The "Helios-Sanabria" is the first wind- and solar-powered catamaran in the world, and features the latest technology to perform didactic and pleasure excursions on the Lake of Sanabria in Zamora, Spain.

The catamaran features several green crystalline silicon photovoltaic glass modules by Onyx Solar®, with a semi-transparency degree of 38%.

This vessel is 100% environmentally-friendly, with zero emissions, waste, effluents and zero decibels in the environmental noise rating.

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 info for your next PV glass project.

Among the resources therein included, you can find PV glass datasheets, installation manuals, Projects & References, and also online tools to estimate the energy yield of your project, and the thermal performance of the glass.
OUR CLIENTS, OUR BEST AMBASSADORS

Somerset Development, Bell Works (USA)

Marriott Group, Pier South Hotel (USA)

FEMSA/Coca-Cola, Joa in Monterey (Mexico)

ROMA Group, Union City Station (USA)

SAA Associates, Madrona Marsh NC (USA)

Heineken, (Mexico)

FOLLOW ONYX SOLAR, A STRONG PLAYER IN DIGITAL MEDIA

FOLLOW ONYX SOLAR, A STRONG PLAYER IN DIGITAL MEDIA
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 the ISO 9001:2005 standard (Quality Management), and the 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 to UL standards.

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

In addition, 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 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 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. Also, the resistance to manual attack test (UNE-EN 356:2001 standard) has been very successful, scoring a P4A rating. Likewise, an awesome result has been obtained in the tests that measure resistance to extreme climatic conditions (UNE-EN ISO 12543-4:2011 standard); our PV Glass was successfully exposed to a deep humidity environment and high temperatures keeping the lamination intact.

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

Onyx Solar provides similar warranty terms compared to the standard warranties offered by the glass fabricator industry and the photovoltaic industry. Depending on the final Solution requested, warranties may change. The Onyx Solar standard warranty offers a five-year term for manufacturing defects, and 20 years power output (80%). Extended warranty may be granted upon case by case, upon request.
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 and disrupt the market.

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.

This PV Glass has already been tested to UL and IEC standards successfully, and deployed in projects all over the world. Our state-of-the-art facilities located in Avila, Spain, alongside our processes have recently received the ISO 9001 and ISO 14001 certifications, attesting to our Quality and Environmental Management Systems in place.

Also, back in 2016, Onyx Solar set up a new plant in China, which will help the company securing enough fabrication capacity to satisfy a growing market demand. From PECVD to lamination, its vertically-integrated production lines are fully operative with a production capacity of over 200,000 m². The strategic set up of a wholly owned foreign enterprise to produce in China (WOFE) allows the company to be more competitive and gain access to the immense Chinese market, a market that amounts to one third of the global glass demand for buildings. Its commercial office in Beijing started its operations in 2017.
Since its commencement, Onyx Solar® has been committed to investment in R&D&i as the key to the development of its innovative products, and has therefore participated in several R&D&i projects with renowned universities, research centres and leading companies.

**ADVANCED BIPV (New Generation of BIPV glass with advanced integration properties)**

**REELCOOP (Research Cooperation in Renewable Energy Technologies for Electricity Generation)**

**HERB (Holistic Energy-Efficient Retrofitting of Residential Buildings)**

**R2CITIES (Renovation of residential urban spaces: towards nearly zero energy cities)**

**SOLARSHARC (Durable self-clean coating for solar panels to Improve PV energy generation efficiency)**

**BIPVBOOST (Bringing down costs of BIPV multifunctional solutions and processes along the value chain, enabling widespread NZEBS implementation)**

**PVCOM (Multifunctional photovoltaic devices based on transparent composite and CIGS for Integration)**

**ARTESUN (Efficient, large-area arbitrary shape solar energy)**

**COMCO (Photovoltaic devices based on composite material and advanced functional coatings)**

**POLYMERS (BIPV materials and advanced functional coatings)**

**PVSITES (Building-integrated photovoltaic technologies and systems for large-scale market deployment)**

**REZBUILD (REfurbishment decision making platform through advanced technologies for near Zero energy BUILDing renovation)**

**INNDISOL (Innovation in Architectural Solar Integration and Photovoltaic Devices)**

**ESPResSO (Efficient Structures and Processes for Reliable perovskite Solar modules)**

**Tech4Win (Disruptive sustainable Technologies for next generation PV Windows)**

**EUROPHT (Improving the energy performance of step-by-step refurbishment and integration of renewable energies)**

**REBUILD (Retrofitment decision making platform through advanced technologies for near Zero energy BUILDing renovation)**

**COMCO (Photovoltaic devices based on composite material and advanced functional coatings)**

**PVSITES (Building-integrated photovoltaic technologies and systems for large-scale market deployment)**

At Onyx Solar, we consider the investment in R&D&i as one of the key factors to enable a more sustainable and competitive building model with a high aesthetic value. In such way that those factors are perfectly correlated with the main national and international energy policies, banking on the inclusion of renewable energy and energy efficiency in the building sector.
AWARDS AND RECOGNITIONS

THE MOST AWARD-WINNING PHOTOVOLTAIC COMPANY ON THE GLOBE

More than 75 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®