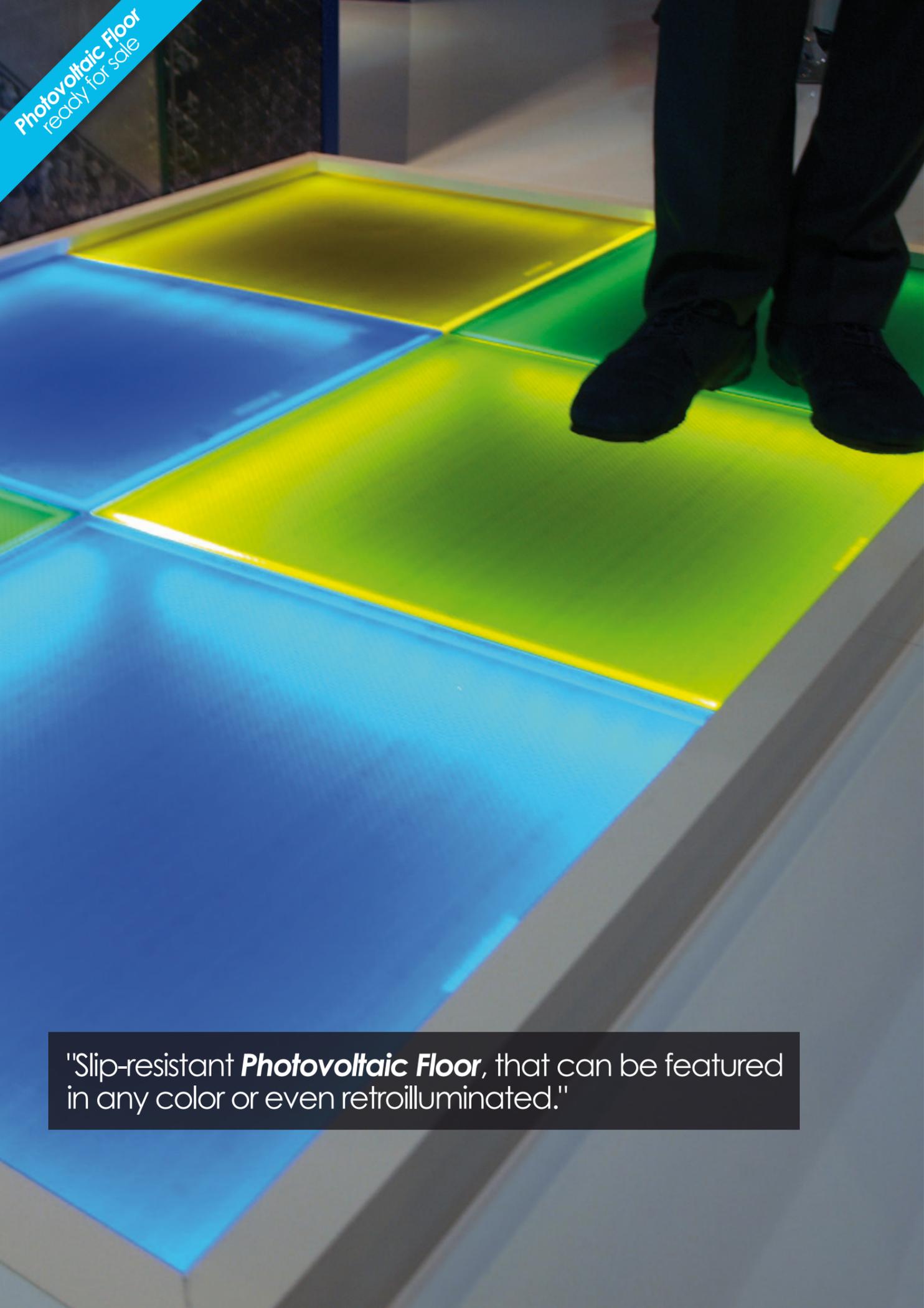


Photovoltaic Floor  
ready for sale



# PHOTOVOLTAIC BUILDING MATERIALS

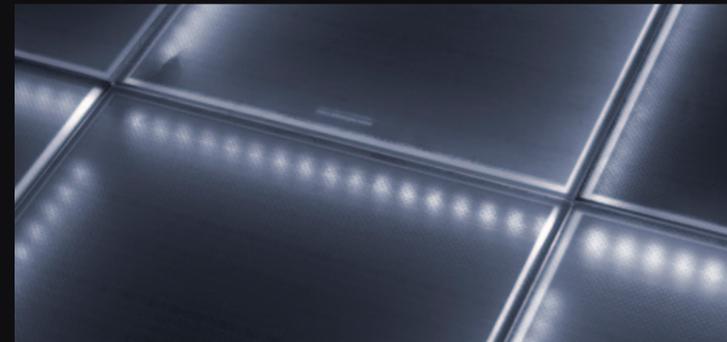
Photovoltaic Floor  
ready for sale



"Slip-resistant **Photovoltaic Floor**, that can be featured in any color or even retroilluminated."



# BUILDING INTEGRATED PHOTOVOLTAICS



At Onyx Solar we develop building integrated photovoltaic materials which are used for the replacement of conventional construction materials from different parts of the building's exterior such as roofs, skylights, windows or façades.

At Onyx Solar we are committed to the study and start-up of energy efficient measures and sustainable technologies which will allow us to retrofit existing buildings and to design new eco-friendly projects. Our philosophy consists of developing unique and elegant solutions for architectural integration, by combining both thermal optimization and photovoltaic generation.

Our Building Integrated Photovoltaics –BIPV- systems can turn the roof, the windows or the curtain wall of a building into a complete, multifunctional, high-performing, solar-energy power plant. Onyx Solar counts on the most extensive and innovative approach to design and implement BIPV applications.

**"Solar architecture is not about fashion, it is about survival"**

Sir Norman Foster



*"Modular Photovoltaic Skylight"*



# BIPV SOLUTIONS



Onyx Solar offers a range of materials and services adapted to any client needs.

From standard photovoltaic glass configurations, to 100% customized glasses or turnkey solutions.

For further information, choose the BIPV service that fits better to your requirements:

- 1** STANDARD PV GLASS
- 2** CUSTOMIZED PV GLASS
- 3** TURNKEY PROJECTS



façade



slip-resistant walkable floor



modular skylight



brise-soleils



# STANDARD PHOTOVOLTAIC GLASS



Onyx Solar has launched the first colored photovoltaic glass adapted to construction standards. From this moment on, photovoltaic energy can be integrated as any other building construction material, or combined with them into buildings.

There are 4 standard sizes and almost infinite possibilities of configuration in color and transparency.

Therefore, Onyx Solar photovoltaic glass can be incorporated in any type of building: Curtain walls, façades, brise soleil, skylights... Even a PV walkable anti-slip floor, a solution developed by Onyx Solar which is already available in the market.

- ✓ Sizes adapted to construction standards.
- ✓ No limits of color or semitransparency.
- ✓ Fully integrable and combinable with any other construction material.
- ✓ Fits perfectly into Ventilated Façades, Skylights, Walkable Floors, Brise Soleils, Canopies, Windows, Curtain Walls, Balconies...

### Your Standard PV Glass for:



Floor Tiles



Second Skins



IG Units

the most **cost-effective** solution



# CUSTOMIZED PHOTOVOLTAIC GLASS



If you are working on an unique Project which requires a non-standard photovoltaic glass with special features, Onyx Solar will design a 100% customized glass adapted to your needs.

Configuration options are almost infinite based on glass type, size, photovoltaic technology, transparency degree and color, to make sure we meet your project requirements.

*thickness* **size** *color*  
*transparency*

- ✓ Receive your pv glass quotation within 48 hrs.
- ✓ No limits of color or semitransparency.
- ✓ The highest expression of BIPV.

*your* **quotation**  
**48h** *ready in*

"100% **customized** photovoltaic glass for your tailor - made projects"



# TURN KEY PROJECTS



Onyx Solar is the leading company in BIPV turnkey projects. Our proven experience in Building Integrated Photovoltaics (BIPV) enables us to be the more reliable partner in all the stages of the project: Design, custom glass manufacturing, mechanical and electrical engineering, installation, performance monitoring and management.

As EPC experts we have completed BIPV projects in Spain, France, Italy, including the largest integrated photovoltaic skylight in the United States.

- ✓ EPC/EPCM solution
- ✓ Photovoltaic project design.
- ✓ Photovoltaic modules manufacturing.
- ✓ Mechanical and electrical engineering.
- ✓ System installation and implementation.
- ✓ Performance monitoring of the installation.
- ✓ Value engineering.
- ✓ Design For Manufacturability.

"Turn Key installation of **the largest integrated photovoltaic skylight in the World** for the new **Novartis Pharmaceuticals** Corporation's headquarters in New Jersey, United States."

Total Area: **27,500 Sqf.**  
Energy Generated: **270,000 kWh/year**



**1<sup>st</sup> PRIZE**  
MARKET & INDUSTRIAL VIABILITY  
sd europe SOLAR DECATHLON EUROPE

The photovoltaic building solutions developed by Onyx are the first and unique constructive solutions which are fully paid back, and keep generating energy across their entire lifespan.



# PHOTOVOLTAIC CONSTRUCTIVE SOLUTIONS



We have designed a wide range of multifunctional constructive solutions integrating on a smart manner photovoltaic properties on them.

- skylight*
- ventilated façade*
- walkable floor*
- led lights*
- pergola*
- curtain wall*
- canopy*
- parking*
- brise soleil*



Skylight that combines three types of glasses with different colours and transparency degrees to create an aesthetical mosaic inspired by Piet Mondrian neoplasticism.

• Semi-transparent photovoltaic double glazed insulating units

Retrofit of the "Food Market" in Bejar (Salamanca), by installing a photovoltaic skylight  
 Energy generated: 8,763 kWh/year  
 Avoided CO<sub>2</sub> emissions: 2.95 t

# MULTIFUNCTIONAL BIOCLIMATIC PROPERTIES



In addition to an undeniable aesthetic value, these are solutions that combine active properties (*photovoltaic generation*) with passive properties such as thermal and acoustic insulation, natural lighting and selective filtering of the harmful components of solar radiation.

- |   |                                  |  |
|---|----------------------------------|--|
| 1 | ENERGY GENERATION                |  |
| 2 | UV & IR FILTER                   |  |
| 3 | THERMAL & ACOUSTIC INSULATION    |  |
| 4 | NATURAL ILLUMINATION             |  |
| 5 | INNOVATION DESIGN                |  |
| 6 | REDUCE CO <sub>2</sub> EMISSIONS |  |

Photovoltaic skylight and curtain wall installed at Bodegas Iturralde, Larrabetzu (Vizcaya)  
Architect: Naia Eguino  
Energy generated: 19,342 kWh/year  
Avoided CO<sub>2</sub> emissions: 6.52 t

"The non-consumed energy is the cheapest one"

#### PHOTOVOLTAIC CONSTRUCTIVE SOLUTIONS

1. Photovoltaic Skylight
2. Photovoltaic Ventilated Façade & Roof
3. Photovoltaic Curtain Wall
4. Walkable Photovoltaic Floor
5. Photovoltaic Parking-Lot
6. Photovoltaic Brise Soleil
7. Photovoltaic Canopy
8. Photovoltaic Pergola
9. Leds Lighting



## PHOTOVOLTAIC DOUBLE GLAZED INSULATING UNITS



Double glazed photovoltaic insulating units can be incorporated into the project providing better thermal insulation properties.

Normally they consist of an external photovoltaic laminated glass of 0.24, 0.32, 0.40, 0.47, 0.59, 0.75 in (6, 8, 10, 12, 15 or 19 mm) thick, an air chamber of 16 mm for a greater thermal insulation performance, and an inner pane of 6 mm thick glass.

Additionally, Argon filling can be used with the chamber for a better thermal performance.



## TRIPLE GLAZED INSULATING UNITS

In order to achieve even better thermal insulation, triple glazed insulating units could be considered as a possible solution. Generally they consist of an additional inner pane of 0.24 in (6 mm) thick glass which is incorporated into the double glazed unit.

Argon filling can be used with the chamber for a better thermal performance in the same way that the previous case.

Photovoltaic ventilated façade  
Architect: Enrique Vallecillos · Emiliano Rodríguez  
Energy generated: 31,837 kWh/year  
Avoided CO<sub>2</sub> emissions: 21.33 t



## PHOTOVOLTAIC LAMINATED SAFETY GLASS



For projects where laminated glass is required, we consider various options in order to meet the customer's specifications. Laminated glass is composed of several panes of glass, bonded together by an interlayer (EVA or PVB normally).

The thickness of the panes uses to be a 0.12, 0.24, 0.40, 0.47, 0.75 in (3, 6, 10, 12 or 19 mm) glass which can be toughened and heat soaked. Additionally, the interlayer material can be adapted in order to improve the degree of insulation and to provide a wide range of colors, being both necessary in order to achieve a greater acoustic insulation and to meet the aesthetic requirements of the project.

Laminated safety glass is comprehensively tested for wind forces, seismic activity or impact resistance, in order to comply with all the functional, quality and safety standards required. Also, other tests are carried out in order to comply with additional regulations such as the UL 1703 certification or the International Electrotechnical Commission -IEC-.



One of the main applications of our laminated glass consists of its usage in ventilated photovoltaic façades, roofs and curtain walls. For an easy and quick installation, we have developed a complete set of complementary products and services, which also allow its installation in any type of project.

### TEN KEY ADVANTAGES OF THE PHOTOVOLTAIC VENTILATED FAÇADE:

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

For photovoltaic integration into windows, curtain walls or skylights, both junction boxes and wires are completely hidden behind the framing structure.

• Semi-transparent photovoltaic double glazed insulating units



Photovoltaic skylight in Madrid, constructed with semi-transparent photovoltaic double glazed insulating units.  
Architect: García + Montiel (QVE Arquitectos)  
Energy generated: 7,448 kWh/year  
Avoided CO<sub>2</sub> emissions: 5 t

Reference sustainable project selected by the European Commission



# PHOTOVOLTAIC TRANSPARENT GLASS

Take advantage of the sunlight to illuminate your building. Thanks to our transparent BIPV glass you will allow the entrance of the sunlight, avoiding UV radiation and infrared radiation, and seeing through the glass at the same time.

Choose between 10%, 20% or 30% semi-transparency degree, depending on the luminosity required and enjoy your views.



Colored semitransparent photovoltaic glass are available in a wide range of colors.



# COLORED PHOTOVOLTAIC GLASS



Onyx Solar goes beyond green, Onyx goes blue, yellow, orange, brown, pink, purple... with its new, huge, patented range of colorful photovoltaic glass, now available to the market to be integrated as an artistic colored PV skylight, curtain wall, balcony or any other multifunctional constructive solution.

We have been able to create this range of colorful solutions which maintains the same efficiency rate as non-colored BiPVs.

Create an innovative skylight in line with your corporate image and colors; create a pixelated façade showcasing your logo, design a cutting edge, sustainable building able to generate its own energy in an artistic manner. Just innovate.



\*Note: Color scheme could vary depending if the glass is seen from the interior or exterior side. Colors displayed are only shown as a representation of actual pv glass colors. Color is affected by light, and therefore cannot truly be matched. Colors displayed here should not be substituted for color matching with actual glass samples. Please order a sample to ensure you are pleased with your color selection before ordering for your project.

COLOR PALETTE





# DESIGN INNOVATION TECHNOLOGY

Photovoltaic skylight

Walkable photovoltaic pavement



# INNOVATION 360°



Onyx Solar designs multifunctional photovoltaic constructive solutions with an undeniable aesthetic value, unbeatable in terms of thermal and acoustic insulation that produce clean and free energy from the sun.

Onyx Solar follows a complete, empirical methodology for each project, ranging from the observation, the diagnosis and the evaluation of several alternatives, to computer simulation, final solution development and posterior industrial production. That is what we call innovation at 360°.

Following this methodology, both energy variables and photovoltaic generation are optimized qualitative and quantitatively, allowing us to develop the optimal constructive solution possible from the energy viewpoint (energy saving + electricity production) and also from the aesthetical one.



# RESEARCH & DEVELOPMENT



# HISTORICAL BUILDINGS RETROFITS



Onyx Solar develops multifunctional solutions that combine aesthetic and photovoltaic technology applied in historical buildings, being a cutting edge technology for buildings retrofits.

Photovoltaic Technology improves energy conditions of the buildings, making more efficient all those who were not designed under modern patterns of sustainability and energy efficiency.

This contribution respects building's original aesthetic concept by using "low visual impact solutions" on all these buildings that represent the artistic and cultural heritage of a city.

Photovoltaic Brise Soleil installed at Arcadia University, Pennsylvania (USA)  
Architect: Kliment Halsband Architects  
Energy generated: 4,820 kWh/year  
Avoided CO<sub>2</sub> emissions: 2.56 t

Onyx Solar has developed the photovoltaic windows installed on "Cabinet House" project, a sustainable house prototype designed by Finnish architect Sami Rintala.

The "Cabinet House" is located in front of the MAXXI Museum in Rome, one of the most emblematic projects of the Iraqi architect Zaha Hadid, voted the best building in the world in 2010.

# SUSTAINABLE BUILDINGS

12 credits and 39 points at stake



ONYX SOLAR SOLUTIONS CONTRIBUTE TO  
**LEED CERTIFICATION**



## SUSTAINABLE SITES

Credit 4.3. ALTERNATIVE TRANSPORTATION  
Credit 7.1. HEAT ISLAND EFFECT - Noon roof  
Credit 7.2. HEAT ISLAND EFFECT - Roof  
Credit 8. LIGHT POLLUTION REDUCTION



## ENERGY & ATMOSPHERE

Credit 1. OPTIMIZE ENERGY PERFORMANCE  
Credit 2. ON-SITE RENEWABLE



## MATERIALS AND RESOURCES

Credit 5. REGIONAL MATERIALS



## INDOOR ENVIRONMENTAL QUALITY

Credit 2.0. INCREASED VENTILATION  
Credit 7.1. THERMAL COMFORT DESIGN  
Credit 8.1. DAYLIGHT & VIEWS - Daylight  
Credit 8.2. DAYLIGHT & VIEWS - Views



## INNOVATION IN DESIGN

Credit 1.1. INNOVATION IN DESIGN

"We do not inherit the Earth from our ancestors,  
we borrow it from our children"



We believe in a better future. That's how Onyx Solar approaches corporate responsibility. We see our environmental-friendly solutions as a small contribution to create a meaningful change, needed to secure a sustainable legacy for generations to come.



# CORPORATE SOCIAL RESPONSIBILITY

Onyx Solar commitment to sustainability has an impact on your company's *Corporate Social Responsibility* policy and its performance in three dimensions: economic, environmental and social.

**Economic.** Sustainability is becoming core to business practice on corporate strategies. Proved to be embedded in customer expectations, improves company's reputation, drives sales and makes a company more competitive in their market. Fitting premises with photovoltaic cells has been shown as one of the most powerful measures to achieve it.

**Environmental.** Adopting Onyx Solar innovative solutions and combining them with other environmental-friendly practices is the best contribution a company can make to build a greener future for people and our planet.

**Social.** We collaborate with local partners and organizations to enhance our ability to do business responsibly in the communities where we operate. From developed countries to developing ones, we try to set more sustainable patterns to grow.





ANDROID



WEB



# PHOTOVOLTAIC ESTIMATION APPS



In our ongoing commitment to innovation and listening to our customers' feedback worldwide, we have designed a completely free of charge Photovoltaic Estimation App.

Enter the value for the photovoltaic installation area you have in mind, select the photovoltaic technology, and it will display the energy that would be generated and its equivalencies in avoided CO<sub>2</sub> emissions, hours of light and electric car mileage.

Use the screen of your smartphone to simulate the active surface of the photovoltaic glass, and just place it in the same position that your installation would be. The results will change depending on inclination and rotation of the device. Try it out and compare results for different design purposes.



New Version

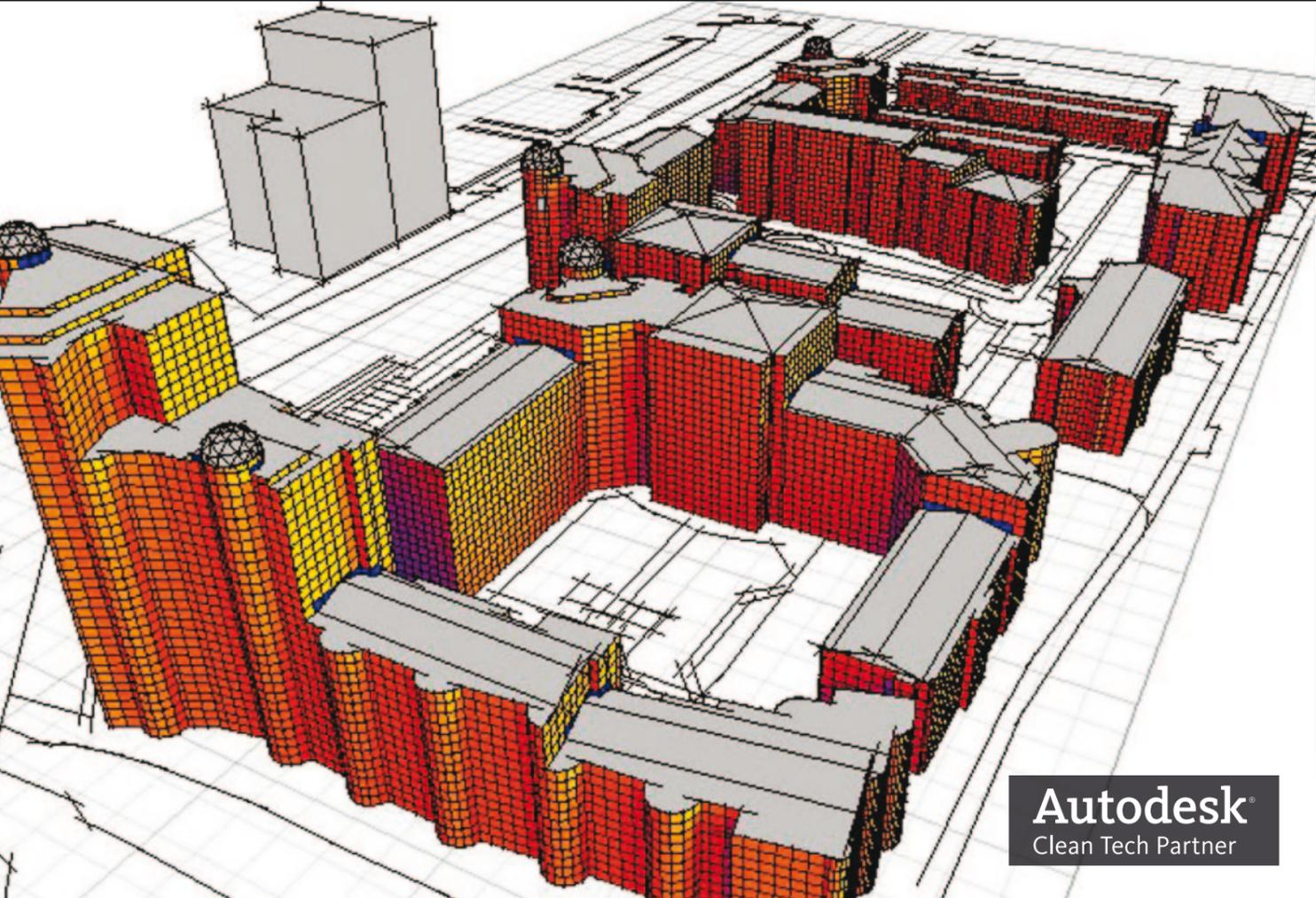




# GREEN BUILDING TECHNICAL CONSULTING SERVICES



## BUILDING SIMULATION AND ANALYSIS TOOLS



**Autodesk**  
Clean Tech Partner

Onyx Solar provides technical consulting services regarding the field of green building through computer simulation methods which look for those solutions which could reduce energy costs and mitigate the impact on the environment.

Thus, we count on the following service lines:

- Green building consulting and audit services, execution, LEED certification, GRIHA, eco-efficient building, Energy Conservation Building Code, ECBC 2007 performance, Building Star Rating Facilitation, etc.
- Building simulation and analysis tools: energy balance, solar analysis, photovoltaic energy production, shading and lighting studies, etc.

Onyx Solar is a proud member of the U.S. Green Building Council (USGBC), the Green Building Council of Spain (GBC España) and other related organizations and associations.

Onyx Solar works with a variety of sources and input environments (BIM models, 3D models, 2D drawings, sketches) and it provides analysis in the areas of energy, daylighting or shading effects, and thermal, water, air flow and acoustic studies.

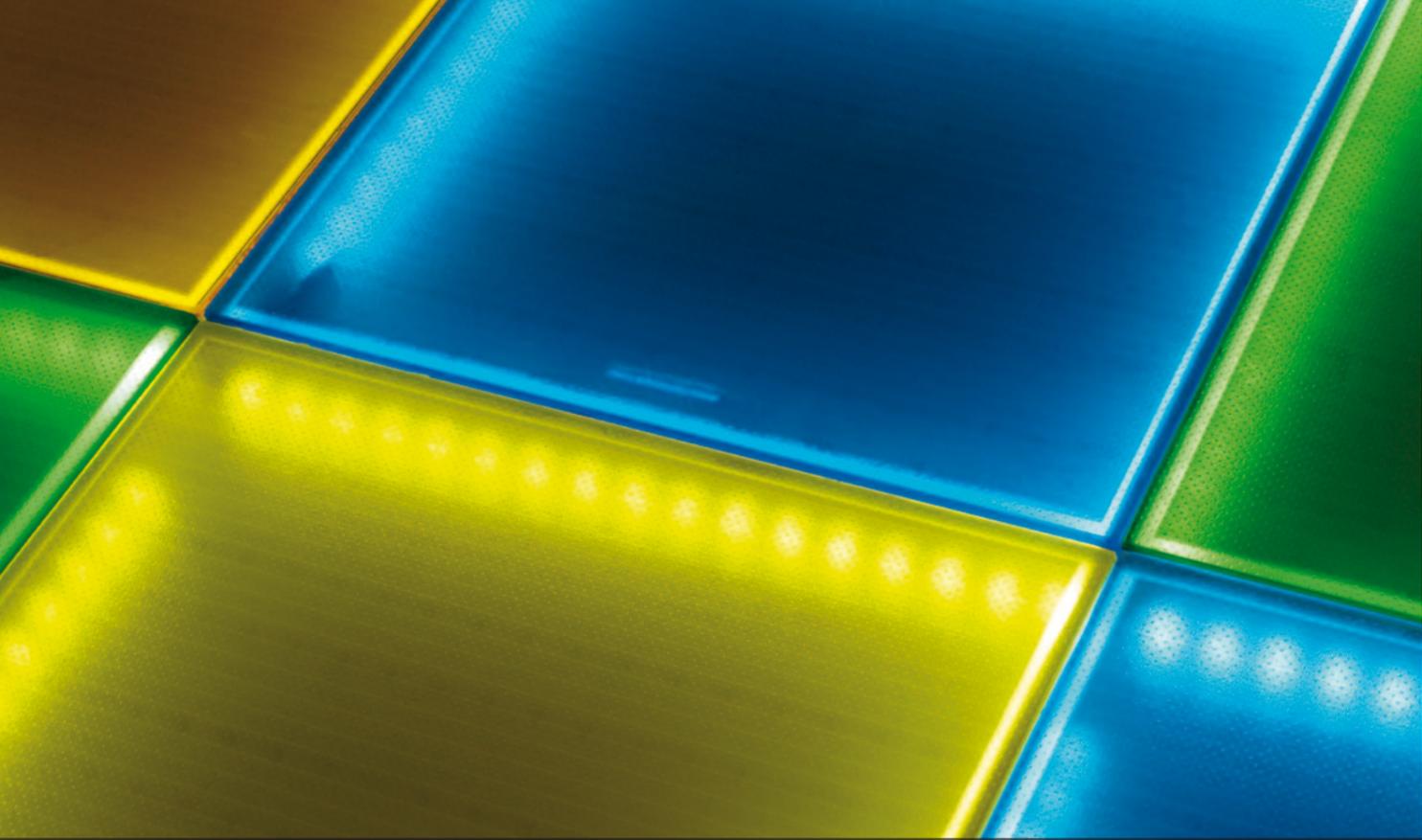
Onyx Solar's building simulation solutions allow us to address the thermodynamic complexities involved in the design of a building and to evaluate alternatives in advance.

For the first time, the construction industry counts on computer aided tools to get assessments which are very close to the physically validated results. Simulation provides a way to assess the benefits of particular schemes, to improve life cycle performance, and to evaluate several climate change mitigation measures.

The main advantage for simulation at the design stage is to integrate the different technical domains from the building and to identify key points in order to get the optimal solution.



[www.onyxgreen.com](http://www.onyxgreen.com)



**WALKABLE FLOOR**



**SKYLIGHT**



**CURTAIN WALL**



**DOUBLE SKIN**



**$\alpha$ -BIPV**



**BRISE SOLEIL**



**ROOF**



**CANOPY**

